BOTSWANA AFTER DIAMONDS:

A Study into the Consequences of and Responses to the Depletion of Botswana's Diamonds

Edited by: Roman Grynberg, Margaret Sengwaketse and Masedi Motswapong

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Botswana Institute for Development Policy Analysis

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Botswana Confederation of
Commerce Industry and Manpower

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Introduction and Foreword to the Botswana After Diamonds Study

By Maria Machailo-Ellis
CEO, Botswana Confederation of Commerce, Industry and Manpower

This study was conceived over five years ago in the wake of the 2008 Global Economic Crisis and the impact this had on the economy of Botswana and on the private sector. At that time there was a dramatic decline in the demand for luxury commodities – diamonds and tourism services – which are two of Botswana's most important export sectors. These were hit disproportionately as a result of the economic crisis. Diamond mining, the principal source of revenue in the country, declined dramatically in 2009 as the mines at Jwaneng and Orapa were temporarily shut. In 2009 diamond production fell to 17.7 million carats from 32 million the previous year. Tourist numbers stagnated and real tourism exports declined sharply. For the first time in Botswana's history the country experienced a significant year-on-year decline in real GDP in 2009 of 7.8%.

It was these events that prompted BOCCIM to reflect carefully on what would happen to the Botswana economy in the event that diamond production went into terminal decline as is inevitably the case. The resource assessment at the time was predicting that diamond production would go into decline by around 2020. This was reflected in the projections of NDP 10. Soon after, Cut 8 at Jwaneng was announced and the date of the imminent decline was extended to around 2027. It was expected that Botswana would experience a significant decline in its fortunes that would emanate from the decline of diamonds that prompted this series of studies.

BOCCIM then consulted with the Ministry of Finance and Development Planning and we concluded that this was a matter of great national concern and that a detailed series of studies of what was believed to be an imminent decline in diamond revenue would be addressed. It was at this point that the African Development Bank offered the possibility of funding the three projects that were envisaged through its MIC Grant Fund. Without the generous support of the African Development Bank this important research would not have been possible and we are deeply grateful for their ongoing support.

The Botswana Institute for Development Policy Analysis was brought in and developed a detailed terms of reference for three ambitious studies. The first of these was to consider what new projects are likely to emerge over the 15-year horizon that the project was considering. At first, and based on 10th NDP projections of revenue, this was seen as a long enough period to cover both a decline in diamond revenue which was at the time expected at the end of the current decade and the subsequent revival of the economy. The expectations of Cut 8 meant that this was deferred until the very end of the period i.e. until 2027.

The first of the three studies by Fichani and Freeman undertaken in 2012 entitled 'Minerals and Energy Exports and Revenue Projections' looked at the prospects of the development of the known new mines in Botswana. This includes coal, CBM, uranium base metals including iron ore, copper and nickel. Significantly, the report concludes that even if all these new mines are developed it is unlikely to compensate for the losses that were expected as a result of the decline in revenues from the diamond sector. This means that, on their own and without further beneficiation, the new sectors are unable to act as either a revenue or export replacement of the important revenues from diamonds which make up some one third of government revenue on an annual basis. This report was predicated on a resource estimate for diamonds which has now been superseded in late 2014 and it would now appear that diamond production will not decline significantly from current levels before 2050. While this new assessment is highly fortuitous for Botswana it means that the dates of diamond decline have been delayed for what is effectively a whole generation.

The second report looks at the impact that the decline in diamond revenues will have on the economy of Botswana. Irrespective of the date of the decline it remains no less true that diamonds are not forever and that at some point diamonds will run out. In their study entitled 'Life after Diamonds: The Economy-wide Consequences of Declining Diamond Production in Botswana' Dr Rob Davies and Dr Dirk van Seventer consider what would happen to the Botswana economy if diamond revenue declined and then what would happen when it eventually ceases. While diamond mining is only 20% of GDP, it is the country's main source of foreign exchange earnings and hence the impact of the loss of diamonds on the country's GDP/ capita is far higher at 47%. The authors suggest important measures that government may wish to consider to retard the impact of a decline in revenues.

The last of the three studies undertaken by Roman Grynberg, Margret Sengwaketse, Masedi Motswapong and Kedibonye Sekakela of BIDPA is entitled 'Export Diversification- Policies for Export Success in Botswana'. The study considers first and foremost the reasons why Botswana, after 30 odd years of having had export diversification as one of its principal economic objectives, has found itself in the current situation where diamonds are arguably even more important in terms of total exports than they were in the early 1980s. It also considers the transformation experience of several neighbouring resource-rich countries like Namibia and Mozambique, and arguably successful countries like Mauritius. Important lessons are to be drawn from these countries as well as the successful transformation of Chile and Malaysia, two resource-rich countries which have successfully transformed their economies. The important contribution that this study makes is to examine the cost of doing business in Botswana compared to that of other regional and international competitors and argues that the cost disadvantages of Botswana are not either exclusively or largely as a result of the country's landlocked and remote location but rather as a direct result of policies in the labour market as well as taxation policies.

While the precise date of the decline in diamond revenue may have been superseded by recent resource evaluations, the lessons from the studies and the policy changes needed to make Botswana internationally competitive are not time-bound or dependent upon those resources. The most important policy issue is whether, given the comfort and space that the new diamond revenues will create, there will be any imperative to undertake the necessary reforms that will make the country internationally competitive. For the sake of the nation and its future prosperity one can only hope that the changes will be made sooner rather than later.

I wish to acknowledge the tireless support of the Botswana Government through the Ministry of Finance and Development Planning and other Ministries that were part of this study.

Finally, I wish to acknowledge the Botswana Institute for Development Policy Analysis for participating in this study, and also playing a leading role in ensuring that the study was successfully completed.

Acknowledgements

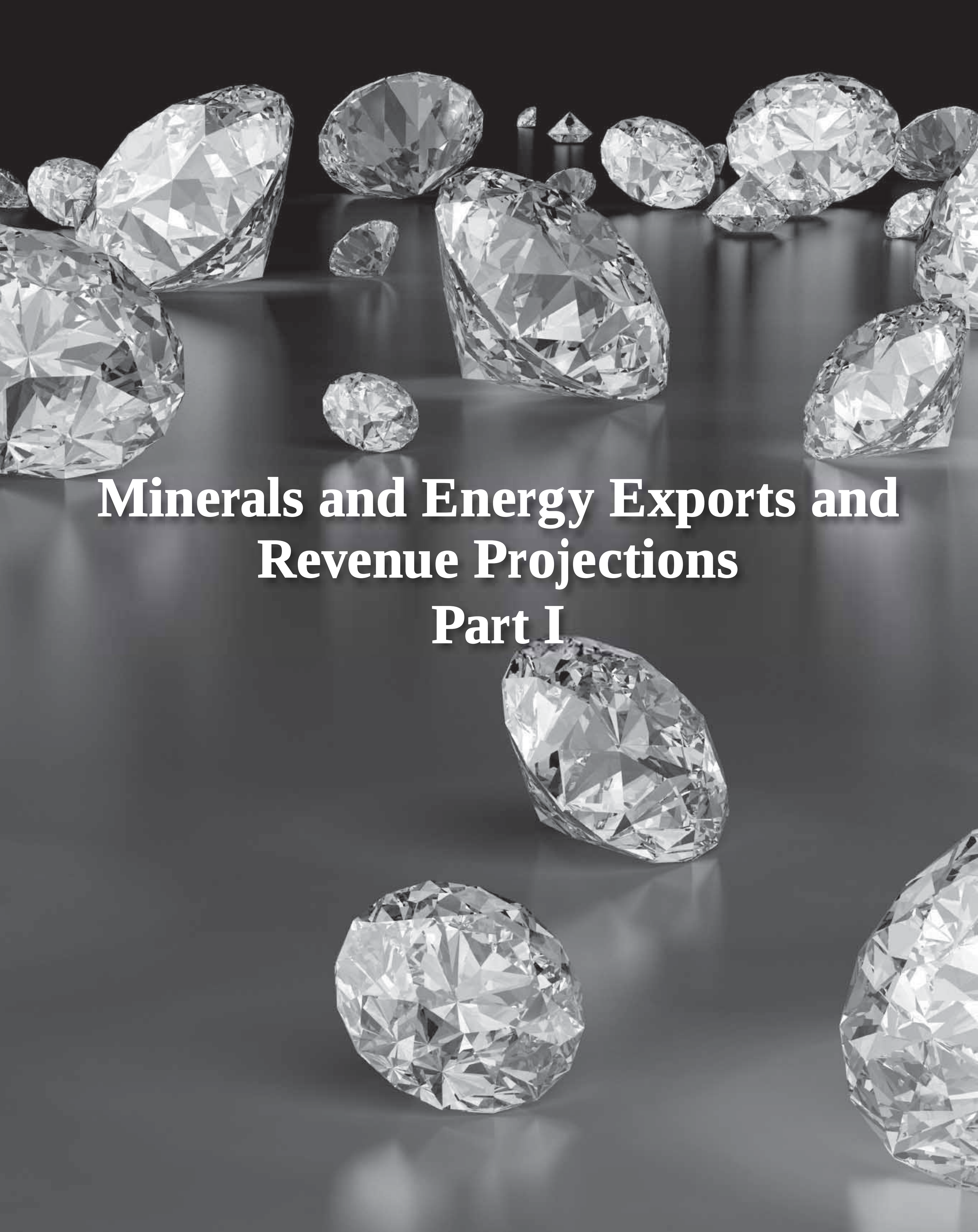
The Botswana Confederation of Commerce, Industry and Manpower (BOCCIM) would like to thank the Botswana Institute for Development Policy Analysis for coordinating this study by bringing together consultants who carried out the study and assembling a team of professionals to provide the Peer Review Group for this study.

We would also like to show our appreciation for the support that we got from the Botswana Government, specifically the ministries of Finance and Development Planning and that of Minerals, Energy and Water Resources without which the efforts by the consultants to collect the data and arrange meetings with mining operators and exploration companies would not have been forthcoming.

As this project is funded by the African Development Bank, we would like to thank them for their support.

Lastly, we would like to thank the consultants for their efforts in collecting the data and producing this report.

N. Moleele
BOCCIM



Minerals and Energy Exports and Revenue Projections
Part I

Final Report for the Study on

Minerals and Energy Exports and Revenue Projections

Part I

Khaulani Fichani
Peter Freeman

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LIST OF ACRONYMS

ADI	African Development Indicators
BCL	Botswana Coal Limited
BOCCIM	Botswana Confederation of Commerce, Industry and Manpower
BIDPA	Botswana Institute for Development Policy Analysis
BPC	Botswana Power Corporation
CBM	Coal Bed Methane
CAGR	Compound Annual Growth Rate
CPI	Consumer Price Index
DRC	Democratic Republic of Congo
EIA	Energy Information Administration
GDP	Gross Domestic Product
IEO	International Energy Outlook
IRR	Internal Rate of Return
MMEWR	Ministry of Minerals, Energy and Water Resources
MFDP	Ministry of Finance and Development Planning
NDP	National Development Plan
NPV	Net Present Value
OECD	Organization for Economic Co-operation and Development
PLs	Prospecting Licenses
PPP	Purchasing Power Parity
RSA	Republic of South Africa
TOR	Terms of Reference
USA	United States of America
VRIT	Variable Rate Income Tax

APPENDICES

ABBREVIATIONS AND CONVERSION FACTORS

Abbreviations

PL, RL and ML	Prospecting Licence, Retention Licence and Mining Licence respectively
Mcf	thousand (10^3) standard cubic feet
MJ	megajoule (10^6 J)
MMcf	million (10^6) standard cubic feet
MW	megawatt (10^6 W)
MWh	megawatt hour
TJ	terajoule (10^{12} J)
PJ	pica joule (10^{15}J)

Conversion Factors

1 million Btu (10^6 Btu)	=	1.055056 giga-Joules (10^9 J or GJ)
1.0425 thousand cubic feet (Mcf) CH_4	=	1 giga-Joule (10^9 J or GJ)
0.0288 cubic meters (m^3) CH_4	=	1 giga-Joule (10^9 J or GJ)
1 kilowatt-hour (kWh)	=	3.6 mega-Joule (10^6 J or MJ)
266 megawatt (MW)	=	1 million cubic feet (MMcf) CH_4
0.2778 megawatt-hour (MWh)	=	1 giga-Joule (10^9 J or GJ)

Minerals and Energy Exports and Revenue Projections

Executive Summary

It is well known that the spectacular performance of the Botswana economy, starting in 1972 when Orapa mine began operations, has been powered overwhelmingly by the extraordinary growth and profitability of diamond mining. From 1972 to 2005, diamond production grew from nothing to approximately 34 million carats valued at around US$3.0 billion annually. The production and sale of rough diamonds then accounted directly for at least three quarters of national export revenues, half of all revenues flowing into the central government exchequer and one third of national gross domestic product.

All mineral deposits constitute finite and non-renewable resources. However, even though there was no major new discovery after Jwaneng, which was discovered in 1973 and brought into production in 1982, during the 1980s and '90s the Debswana Diamond Company developed a string of highly profitable projects at the existing mines which resulted in several large step increases in total national production and generated extraordinary growth in both Debswana's profits and government's share of those profits (through tax, royalty and dividends).

In the 1980s and '90s, Botswana's economy grew faster than those of the 'Asian Tiger Economies' in their heyday. But after the turn of the century, it began to be realised that the relevant question for economic policy was not 'when will the diamonds run out?' but rather 'when will the profitability of diamond mining begin to decline and how quickly could it decline thereafter?' While all government's best efforts to promote diversification of the economy and the tax base produced disappointing results, mining at Jwaneng, which was the greatest contributor to Debswana's production and profits, was steadily bringing forward the day when highly profitable open-pit mining would have to give way to much less profitable, possibly underground, mining.

The seed of this present study was effectively planted in 2008, when the preparation of Botswana's National Development Plan 10 was begun. In the midst of the global financial chaos and economic recession which began in 2008, those responsible for the Plan were having to project diamond prices and diamond revenues, being the key drivers of the Botswana economy, forward to 2016. The global economic problems unfolded during 2008–9, beginning with the US sub-prime mortgage crisis and moving through major international bank failures, credit restrictions and economic recession. More recently global economic concerns have focused on Eurozone sovereign debt default and declining consumer spending in the developed world which threatens growth in China and India and hence also brings the threat of prolonged global economic recession, or even depression.

By 2010, the first year of NDP 10, there was already concern that the projections on which NDP10 was rather shakily based, needed to be re-examined in the light of global events during 2008–2010. The most crucial question was whether or not the diamond revenue projections made in the midst of global financial chaos, were, against all odds, still tenable.

2.0 Objectives

This study was conceived as the first part of a 3-part series of studies, of which the ultimate purpose was to seek a path for the Botswana economy towards a future in which government revenues from taxation of the mining sector would be substituted, to the greatest possible extent, by revenues from other sources, as part of a continuing process of economic diversification.

The main purpose of this first of the 3 parts is to define as closely as possible the most likely extent and timing of the anticipated decline in mineral revenues. The terms of reference defined 'the main questions to be addressed' as follows:

i. What is the most likely path for mineral revenues in the coming 10-15 years?
ii. If a decline is probable, what is its most likely extent and speed, in the absence of specific government policy measures to ameliorate the decline?
iii. What policy options could be considered by government within the mineral sector to influence the path of mineral revenues 10 to 15 years from now?

As indicated by the last of these questions, an ancillary purpose of this study has been to survey the developing mining sector in Botswana, and the enterprises involved therein, in order to identify any possible policy measures which might influence the timing, scale or profitability of mining operations.

3.0 Scope of the study

The scope of this study, as specified in the terms of reference, is as follows:

i. To review existing mining and energy projects and develop a detailed time series on estimated production, government mineral revenues (royalties, taxes and dividends), employment and value of mineral exports over the 15-year period from 2012 to 2026;
ii. To prepare an analysis of probable and possible projects that will be developed over the next 15 years;
iii. To consider appropriate incentives that may accelerate the pace of investment in mineral and energy projects;
iv. To consider the impact of any other proposed large investment projects on future mining projects;
v. To prepare a report for BIDPA for onward consideration by the government; and
vi. To prepare a paper for public dissemination regarding the existing and new potential investment projects.

All of the above aspects were to be examined in consultation with the relevant stakeholders and by deploying the consultants' own extensive knowledge of how and where mineral revenues arise and flow through the Botswana economy.

4.0 Methodology

The methodology adopted to forecast government mineral revenue is based on project economic modelling. Each mine or project was modelled in the form of a template that included data on both the revenue and cost streams. In order to identify the most appropriate values for economic variables such as local and US inflation which feed into our assumptions for escalation of prices, capital and operating costs, an extensive search was made of current literature and of the parameters currently adopted by those companies who have either produced recent long-term strategic business plans or who are in the process of preparing bankable feasibility studies or other project appraisals. The economic model was sufficiently detailed to generate revenue flows to government in the form of royalties, profit taxes and dividends where applicable.

For projects still at the exploration phase, recent similar projects that were either completed or still under construction were used as a base upon which to obtain factored cost estimates. This applied mainly to uranium and coal. For coal bed methane (CBM) projects, costs were escalated from a previous study to a base year of 2012.

The methodology for the section on the mining law and fiscal regime involved frequency analysis of the responses from a questionnaire that was administered to exploration and mining companies in Botswana. Additional analysis was carried out on the results of the Fraser Institute's 2010 Mining Survey Update.

4.1 Data

Through interaction with most of the relevant stakeholders, the consultants obtained production and cost data on existing mining projects owned by Debswana Diamond Company, BCL Ltd., Tati Nickel Mining Company, Botswana Ash (Pty) Ltd, Morupule Colliery Ltd as well as the projects known as Ghaghoo (formerly, Gope) and BK11. AK06 data was available on line. The data templates included input data on production, prices (base year only with escalation assumptions excluded), capital and operating costs (base year only with escalation assumptions not given) and fiscal regime. All costs and prices were escalated to a base year of 2012.

Whilst extensive information was availed to the consultants from Debswana's latest strategic business plan, in the absence of detailed discussions with Debswana's strategic planners, which have not been possible, the consultants were unable to generate alternative scenarios as to potential Debswana projects and their scheduling. Nevertheless, the consultants' own experience in these matters has enabled them to make reasonably informed assumptions as to the likely range of possible outcomes for government revenues from Debswana which, of course, is currently the single most important component of government mineral revenues and seems certain to remain so throughout the 15-year projection period.

For other potential mining projects, understandably, little firm information was available. Some projects were still at the exploration stage with not even desk-top studies completed. In such cases, we relied on similar projects that were under development and applied cost factoring to arrive at order of magnitude estimates for the main project economic variables of production rate, capital and operating costs. For all projects, we made assumptions regarding the economic variables such as escalation rates for prices, capital and operating costs, exchange rates, local and US inflation.

4.2 Expected impact of this study

We expect the results of the study to have impact in the following areas:

i. They will alert policy makers regarding the budgetary gap that is likely to be created as a result of the economic exhaustion of existing diamond mines;
ii. The results will quantify the likely benefits from future mining projects in base metals, coal and CBM and thus help to quantify the likely direct benefits from infrastructure projects that would facilitate the development of coal and CBM projects;
iii. Regarding incentives to mining projects, the study would identify any possible areas where policy would need to focus; and lastly
iv. It would make policy recommendations on the rate of diamond exploitation bearing in mind the anticipated decline in diamond production after the year 2027.

5.0 The Mines and Minerals Act

The Mines and Minerals Act has been in force since 1999 and continues to receive favourable reviews as an enabling legislation for mining investment. For instance, in their latest rankings, *ResourceStocks* magazine places Botswana in fourth position together with Sweden as one of the most attractive countries for mining investment. The 2010 mid-year update by the Fraser Institute ranks Botswana in 8th position as a destination for foreign direct investment in mining from among 51 mining jurisdictions worldwide.

Some of the Fraser Institute results are surprising. For example, Botswana achieved its lowest ranking (28th out of 51) on the 'Security situation' which is difficult to understand. However, what is clear is that Botswana's overall ranking (8th out of 51) is highly creditable and that no respondents have identified any issue which is a serious deterrent to mining investment in Botswana.

A ranking of the issues viewed as mild deterrents to identify those few issues that, if addressed, could result in the mitigation of the 80% of the deficiencies in our mining laws was carried out and the results are depicted in Figure 11 in the main document, where the prioritisation is:

i. socioeconomic agreements/community conditions,
ii. uncertainty over the tax regime and future tax levels,
iii. labour regulations/employment agreements,
iv. taxation regime, and
v. political stability.

A structured questionnaire was distributed by BIDPA to exploration and mining companies participating in the Botswana Resource Sector Conference held on 27–28 June 2011. The questionnaire was designed to enable respondents to raise concerns they might have with various aspects of the existing law and policy environment for prospecting and mining in Botswana. Ten responses were received out of sixteen questionnaires that were given out. The most frequently occurring response in all areas was that investors are satisfied that the Mines and Minerals Act is 'fine and useful' and that the processes provided for are 'fair and open'.

Nevertheless, some issues were mentioned to which government could give further consideration. These include the administration of overlapping prospecting applications for different minerals in the same geographical area; the 10% Royalty which is legislated for precious stones; and the limit of 7 years on prospecting licenses and renewals thereof (3+2+2 years). The general tenor of the responses to the question does suggest, however, that government should consider the need to strengthen the capability of the Department of Geological Survey, and possibly the Department of Mines also, to provide investors with more rapid responses and greater guidance in the process of applying for and administering the various kinds of licences which are available under current legislation.

6.0 Forecasting government mineral revenues

Individual financial models were constructed, according to best practice, for all existing and possible future mining operations in the 15-year projection period. Three scenarios were built based on our assumptions regarding diamond price escalation as well as the likelihood of new projects being developed over the period of this study. These are presented below:

6.1 Definition of scenarios

It is of course possible to create any number of conceivable scenarios for projections looking 15 years ahead. As expected, revenues from existing and future diamond projects form the great bulk of all government mineral revenue within the 15-year projection period. Furthermore, at the most important of the existing mines, revenues are a substantial multiple of costs. Profit, and hence government revenue, is therefore much more sensitive to any given percentage change in price or volume than it is to the same percentage change in costs. The justification for our relatively simple approach to scenario definition is that when one determining key parameter is highly uncertain, there is little point in running sensitivity cases to hunt down the small variations produced by changing other, much less important parameters.

The other parameter which has been varied as between the High and Low cases is the matter of which of the identified possible projects should be assumed to come to fruition and which not. The Base-case analysis shows that possible projects are always likely to be a small component of the total picture within the projection period; so a relatively simple approach to sensitivity has been adopted. For the purpose of this study, the 'High' case includes all existing and all possible projects in all mineral sub-sectors, though, in a number of cases, including them in the analysis does not mean they contribute much, if anything, to the sector aggregates. For both the Base case and the Low case, all new diamond projects are included and all new non-diamond projects are excluded. Implicit in this approach is the view that all of the possible projects, other than those in the diamond sub-sector, require a significantly optimistic view to see them forming part of the Base case. Hence they are included in the High case only.

The definition of the three scenarios – Low, Base and High – follow below.

6.1.1 *Base case*

The assumptions for the most likely scenario are as follows:

i. Diamond price escalation of 2% p.a. real over the period 2012–2026;
ii. Cost escalation at 2% p.a. real over 2012–2026;
iii. Includes existing mines (this includes mines under construction); and
iv. Includes possible future diamond projects.

6.1.2 *High case*

The assumptions for the High case scenario are as follows:

i. Diamond price escalation at 4% p.a. real – 2012–2016; 2% p.a. – 2017–2021 and 0% p.a. – 2022 – 2026;
ii. Cost escalation at 2% p.a. real over 2012–2026; and
iii. Includes all mines, existing mines plus possible future mines.

6.1.3 *Low case*

The assumptions for the low case scenario are as follows:

i. Diamond price escalation at 0% p.a. real over 2012–2026;
ii. Cost escalation at 2% p.a. real over 2012–2026;
iii. Includes existing mines (this includes mines under construction); and
iv. Includes possible future diamond projects.

6.2 Global assumptions

As a result of changes in both the structure of the international diamond industry and the stability of global economic and financial systems in the past 10 years or so, it is anticipated that international diamond prices are likely to be considerably more volatile in the future than in the past. For the purpose of projections for this study, no attempt has been made to predict the timing of price cycles or the scale of fluctuations around the expected trend. The projections which emerge from this study strongly reflect a broad consensus view that in the short term, global demand growth, especially from India and China, is likely to outstrip global supply growth (because there are no major new supply sources which will even make up for declining production from existing sources, far less contribute to increasing global supply from present levels. Growing demand and stable or falling supply at current prices is, of course, the classic recipe for rising real prices. As to the rate at which real prices might rise, that is a matter on which no amount of research or analysis will produce a reliable prediction.

As to the other components of revenue from existing and future diamond mines (e.g. carat production, capital and operating costs, etc) all inputs to the calculation have been drawn from the most reliable source, whether that be the stated plans of an operating company, parameters used by mine developers conducting feasibility studies, or costs factored from other similar projects which are better defined.

Certain global assumptions were used in all the projections – namely assumptions regarding general inflation in the US, South Africa and Botswana, and exchange rates, which were assumed to change only to reflect purchasing power parity as between the different currencies. Assumptions to be applied to individual mining operations were derived from the best available source which, in order of preference, included long-term plans as formulated by existing mine operators; specific assumptions used by operators in feasibility studies or other project appraisals at various stages of estimation; and, for less advanced projects, factored cost and the resulting revenue estimates derived from other similar projects at a more advanced stage of analysis.

6.3 Results

This summary presents the results for the consolidated real government mineral revenue forecasts, real mineral exports and employment levels for the Low, Base and High case scenarios.

Government real mineral revenue forecasts

In all cases government mineral revenues show an upward trend and this is attributable mainly to diamond price assumptions together with marginal increases in diamond production from smaller mines such as Lucara Diamonds' AK06, Gem Diamonds' Ghaghoo mine (formerly Gope), and Monak Venture's BK11 mine. The copper and silver projects by African Copper and Discovery Metals' Boseto copper/silver project are also projected to have a marginal impact on government mineral revenues as these are included under existing mines.

The High case scenario includes possible revenues from coal projects. The viability of these projects depends on the existence of rail and port infrastructure for the export of coal. Similarly projects on CBM would require a gas distribution system for both the domestic and export market.

The full period real government mineral revenue forecasts are P372.83 billion, P447.380 billion and P506.70 billion for the Low, Base and High cases respectively (see table below). The difference between the Low and Base case values is driven by the difference in diamond price escalations between the two scenarios where in the former a zero real diamond price escalation is assumed while in the latter a 2% real diamond price escalation is assumed for the full period of the study.

Summary of real government mineral revenues – all scenarios

(real 2012 BWP millions; Exchange rate: US$1.00 = BWP7.16)

Scenario		2012-2016	2017-2021	2022-2026	Totals
Low case	Existing mines	22,235	25,354	26,977	372,830
	Future mines	0	0	0	0
	Totals	22,235	25,354	26,977	372,830
Base case	Existing mines	27,792	27,792	37,826	447,380
	Future mines	0	0	0	0
	Totals	27,792	27,792	37,826	447,380
High case	Existing mines	25,041	30,539	38,390	469,849
	Future min es	757	2,850	3,763	36,851
	Totals	25,798	33,389	42,153	506,700

Source: *Based on computations by the authors*

Mineral export revenues

The table below presents a summary of real mineral export revenues in five-year periods. For the same reason advanced above, there is an upward trend in mineral exports for all scenarios. The full period real mineral export revenue forecasts are P716.0 billion, P817.0 billion and P1,105.0 billion for the Low, Base and High cases respectively.

Summary of real mineral export revenues – all scenarios

(real 2012 BWP billions; Exchange rate: US$1.00 = BWP7.16)

Scenario		2012-2016	2017-2021	2022-2026	Totals
Low case	Existing mines	47	50	58	773
	Future mines	0	0	0	0
	Totals	47	50	58	773
Base case	Existing mines	48	57	72	887
	Future mines	-	-	-	-
	Totals	48	57	72	887
High case	Existing mines	50	61	73	922
	Future mines	4	15	17	182
	Totals	55	76	90	1,105

Source: *Based on computations by the authors*

Employment

The projected employment levels are presented in the table below. It is clear that without new mining projects, employment under the Low and Base case scenarios declines over the period. The inverted U-shape for these two cases is due to the fact that some of the smaller projects in diamonds such as BK11 and AK06 and those in base metals such as Boseto's Maun project and African Copper's Mowana and Thakadu and Makala projects have project lives that fall within the period of study. These operations will have ceased before 2026, which is the end point for this study.

Summary of employment levels – all scenarios

Scenario		2012-2016	2017-2021	2022-2026	Yr2026
Low case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	0	0	0	0
	Totals	12,458	13,387	12,034	11,613
Base case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	0	0	0	0
	Totals	12,458	13,387	12,034	11,613
High case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	2,361	6,072	7,506	7,571
	Totals	14,819	19,459	19,540	19,184

Source: *Based on computations by the authors*

Projected contribution to GDP

In the Base case scenario, the projected mineral contribution to real GDP is 28.1%, 25.4% and 20.1% for the time periods 2012–2016, 2017–2021 and 2022–2026 respectively. For the High case scenario, the respective contribution to real GDP is 30.3%, 31.4% and 28.2.0%. The increase above the base case is due to mineral exports from future mining projects which appear only in the High case. The contribution from future mining projects in the High Case is 2.2%, 6.2% and 5.4% for the respective time periods (see Appendix 4b for details).

The mineral contribution to GDP would ideally be derived as output from a macro-economic model, taking exogenously determined inputs on the mineral sector and established relationships between minerals and other economic sectors. This being obviously far beyond the reach of this present study, which focuses solely on the minerals sector, we take the value of mineral GDP to consist of the full export value of all domestic mineral production which is exported plus the gross sales value of all domestic mineral production which is sold domestically to local end-users. Obviously the big numbers here are, for exported minerals, the export sales value of exports of diamonds, soda ash & salt; and for domestically consumed minerals, the sales value of coal sold by Morupule Colliery to all domestic customers, chiefly BPC, BCL and Botash.

Regarding non-mineral GDP, we derive a real compound annual growth rate using non-mineral GDP data for the period 1996 to 2011 and then apply this real trend growth to project non-mineral GDP for the period 2012 to 2026.

We find that there is a fairly consistent pattern in all three mineral growth cases, in which the contribution of minerals to GDP in the first five-year time period is between 27.4 and 30.3 percent. This appears consistent with the general statements made up to and including 2012 that mining directly accounts for about a third of total GDP. In our base case, this contribution is projected to fall to 25.4% in the five-year period 2017 to 2021 and to fall further to 20.1% in the 5 years 2022–2026. In the low mineral case (as expected, bearing in mind that we use a single projection for non-mineral GDP), the mineral contribution falls rather faster through the above 5-year time periods from 27.4% to 23.2% and 20.1%. Even in the high mineral growth case, which feels the impact of some new mines that do not feature in the other two cases, the direct mineral contribution to GDP is below the one third mark and rises marginally from 30.3% in the period 2012–2016 to 31.4% in the period 2017–2021 before declining marginally to 28.2% over the period 2022–2026.

The table below shows the summarised percentage mineral contribution to GDP for the three 5-year time periods and for each of the 3 mineral cases. Appendix 4b shows the full results year-by-year for the 3 mineral cases. We may summarise by noting that (a) One has to look quite far into the future, and be slightly pessimistic about the role of new mines, to see any real likelihood that minerals might contribute less than 20% of GDP; and (b) It is quite possible that under a high mineral scenario, minerals could directly contribute just under 30% of GDP for at least the next 15 years (although it seems less likely that it would rise much above this because a high mineral scenario would likely drag up other economic sectors feeding off the higher mineral revenues).

Projected percentage contribution by minerals to GDP

Scenario		2012-2016	2017-2021	2022-2026
Low case	**Existing mines**	27.4%	23.2%	20.1%
	Future mines	0.0%	0.0%	0.0%
	Totals	27.4%	23.2%	20.1%
Base case	**Existing mines**	28.1%	25.4%	20.1%
	Future mines	-	-	-
	Totals	28.1%	25.4%	20.1%
High case	**Existing mines**	28.1%	25.1%	22.8%
	Future mines	2.2%	6.2%	5.4%
	Totals	30.3%	31.4%	28.2%

Source: *Based on computations by the authors*

7.0 Discussion of results

The point of origin for this study, and therefore one of its first points of focus, is the widely expressed concern that revenue flows to government from the existing diamond mines will begin a long-term decline quite soon; and that there are no new mineral or other projects in view which would significantly ameliorate that decline. The table presents the projected percentage contribution by all possible future projects (High-case scenario) to government mineral revenues in five-year periods to 2026. This contribution averages 2.2% for the first five-year period from 2012 to 2016 and rises to 6.2% for the period 2017 to 2021 and 5.4% in the last five-year period, 2022 to 2026. The existing mines account for the remainder, and while we do not explicitly disaggregate the existing mines by mineral type, we do not foresee a situation where diamonds would lose their majority share of government mineral revenues. We therefore conclude by confirming the widely held view that diamond mineral revenues from the existing mines will be the single dominant factor in determining the performance of Botswana's economy for at least the next 15 years.

Over the period of study, we find that future coal projects hold the highest potential at an average contribution to government mineral revenue of 3.7% followed by CBM at 2.3%, uranium at 0.9% and lastly base metal and silver projects at 0.7%.

Percentage contribution by future projects to government mineral revenues – High case

Mineral	2012-2016	2017-2021	2022-2026	Totals
Base metals	0.3%	0.9%	0.6%	0.7%
Coal	1.6%	4.8%	3.8%	3.7%
CBM	0.2%	1.7%	3.6%	2.3%
Uranium	0.2%	1.2%	1.1%	0.9%
Total contribution by future projects	2.3%	8.6%	9.2%	7.7%

Source: *Based on computations by the authors*

7.1 Mineral revenues from diamonds

All the possible future diamond projects at the Debswana diamond mines have been included as part of the normal long-term planning for these mines. Such projects include the treatment of existing satellite kimberlite pipes, tailings dumps, additional major open-pit cuts or the switch to underground mining to exploit the ores that would no longer be economical to mine by the current open-pit mining methods.

7.2 Mineral revenues from base metals and silver

The copper, silver, lead and zinc exploration projects in the Ghanzi area were estimated at the desk-top level and have a very low level of certainty as, by their nature, any techno-economic evaluation of a project in this phase would be considered a desk-top study with a level of accuracy of +-40% –50%. These projects have been excluded from both the Low- and the Base-case scenarios. They are, however, included in the High-case scenario, where their contribution, expressed as a percentage of total government mineral revenues would average 0.3%, 0.9% and 0.6% for the five-year periods 2012–2016, 2017–2021 and 2022–2026 respectively.

The average contribution over the 15-year study period is 0.7%.

7.3 Mineral revenues from coal

The projected government mineral revenues from future coal mines are very dependent on the existence of rail and port infrastructure to export the washed coal to the world steam coal markets in Asia and Western Europe. These were also estimated at the desk-top level based on phasing information from company web pages. While African Energy's Sese stage 1 is projected to come on stream in 2013, stage 2 would require the existence of rail and port infrastructure and is estimated to come on stream in 2016. CIC's Mmamabula project also includes a staged approach with some exports using existing infrastructure in 2013 and then ramping up in 2016 provided there is rail and port infrastructure to export into the world steam coal market. Aviva's Mmamanstwe coal project is also targeting 2016.

Until concrete steps are seen on the development of the rail and port infrastructure upon which these projects depend, we believe they should be accorded a low probability of being realised by 2026. We have therefore excluded them from the Low- and Base-case scenarios.

The percentage share of government mineral revenues from future coal projects (High-case scenario) average out at 1.7%, 4.7% and 3.8% respectively for the 2012–2016, 2017–2021, and 2022–2026 periods. Coal projects hold the highest potential followed by CBM and lastly both uranium and base metals. The detailed forecasts are presented in the Appendix.

7.4 Mineral revenues from coal bed methane

The estimated government mineral revenues from this category are at the desk top level of accuracy. CBM holds upside potential as preliminary results seem to indicate that Botswana's coal resources would yield economic quantities of methane gas. There is uncertainty regarding the market for the CBM gas. The main assumptions are for power generation. Due to the high level of uncertainty, CBM is excluded from the Low- and Base-case scenarios but is included in the High-case scenario.

7.5 Mineral revenues from uranium

There is high uncertainty around the estimates of government mineral revenues from the Letlhakane uranium resource as the estimates are at the desk-top level. There is however upside potential as the resource is considered to be world class and is likely to be low cost due to the low overburden cover. The project was reported to be advancing into the pre-feasibility study stage but no results have been made public as yet. We have therefore included this project only in the High-case scenario.

8.0 Policy recommendations

This work has demonstrated that for the next 10–15 years, diamonds will continue to dominate as a source of revenue to government. This will be from both existing and new projects whose life spans are relatively short and therefore would be exhausted within the 10–15-year time horizon. Projects in other minerals, such as copper and silver would also be of a relatively small scale compared with similar projects internationally and, based on current information, these too would be exhausted within the 10–15-year time horizon.

This study period just falls short of the period in which diamond production is projected to decline. For instance, based on current information, there will be a substantial decline in carat production beginning in 2027. This will not be mitigated by future underground mining operations at some of the Debswana mines.

We present our policy recommendations below on the following major issues:

1. Encouraging more mining and exploration activity;
2. Diamond production rate; and
3. Planned infrastructure projects.

8.1 Encouraging more mining and exploration activity

The legal and fiscal regime for mining in Botswana is currently very competitive with the country being ranked in position 4 by *Resource Stocks* magazine and 8th position by the Fraser Institute. An analysis of 10 responses to a questionnaire that was administered to 11 exploration and mining companies in Botswana also demonstrates that the majority find the mining laws in Botswana to be 'fine and useful' and the administrative process to be 'fair and open'.

Our analysis of the Fraser Institute's response data about the mining environment indicates that any measures taken should be towards addressing the following issues from the Pareto chart:

1. Socio-economic issues;
2. Future tax regime;
3. Labour issues;
4. Current tax regime;
5. Land claim issues;
6. Land issues; and
7. Political stability.

From the above list, we believe that the issues relevant to mining laws are 1) future and current tax regime, and 2) land claim and land issues. We therefore recommend the following course of action:

1. Botswana's level of mineral royalties take into consideration the profitability of a mining project and the latter, other things being equal, depends on the value of mineral being mined. In this way, base metals and coal attract the lowest royalty rate of 3% followed by precious metals, that is, gold, silver and platinum group metals at 5% and lastly diamonds at 10%. All these are *ad valorem*, that is based on the mine gate value as defined in the Act. We therefore do not believe that there is additional incentive in lowering these rates as the level of prospecting activity is high. We also would not recommend that these be raised as this may discourage the prospecting activity, which would do more harm than good. We however believe that there is always room to modernise the royalty formula, for instance, going to a sliding scale formula so that even some diamond mines that may have similar levels of profitability to other minerals such as base metals and coal are not overburdened by a fixed royalty rate of 10%.
2. The fiscal regime is well defined for non-diamond minerals while for diamonds section 51 of the Act stipulates that there will be a negotiation. We believe that it is the secrecy of the negotiated regime that may be creating uncertainty and government should find ways of addressing this.
3. There is a lot of interest in exploration in Botswana, with the whole of the country taken up by exploration companies with only the swamps and some deep sand-covered areas of the Kalahari remaining open as they are inaccessible. There is therefore a need to ensure that only value-adding applications for exploration are approved to eliminate huge land holdings without the accompanying progress towards mine development.
4. Government should continuously explain the benefits of overlapping prospecting licences. It seems that this has not been sufficiently explained to the mining industry.
5. Government should consider an Act for CBM gas and its accompanying regulations to assist in guiding activity in this area.

Our interview with one junior mining company highlighted the issues of water and power. While some projects may be located near existing water and power infrastructure, the challenge faced by the project developers is that there are no set mechanisms for them to obtain such water and power. We would therefore recommend that government consider a mechanism whereby the water and power utility companies develop the infrastructure to support the mining project and then recover the cost of such development through higher charges until their costs have been recovered. This would facilitate project development as they would be spared the upfront costs, which would also improve project economics.

8.2 Diamond production rate

At the time of writing this report, it is known that actual diamond production at the Debswana mines (in round numbers) peaked at around 34 million carats per annum in the years 2005 to 2007, slipped to 32 million carats in 2008 and then plummeted to 18 million carats in 2009 when production was suspended for several months in response to the collapse in demand associated with the global financial crisis and economic recession. As demand picked up in 2010, Debswana's production picked up to 22 million carats. The year 2011 began with demand being strong, prices rising and Debswana looking to increase production significantly. However, demand faltered and prices slipped backwards during the second half of 2011 and, apparently in response, Debswana lowered its target production for the year which ended at about 22 million carats. Debswana has apparently cited both technical operating problems and intermittent market weakness as reasons why production has not returned closer to its previous peak of 34 million carats.

Although no statistics are publicly available to test the proposition, it does seem at least possible that

Debswana is placing itself in the position of 'swing producer', adjusting its target production so as to leave the global supply/demand balance in a position of shortage rather than surplus, and hence tending to push prices up, or at least maintain them if there are other negative forces at work. The cushion of 10 million carats p.a. between Debswana's peak production and its recent production levels is certainly enough to influence the global supply/demand balance according to whether those 10 million carats p.a. are being produced or not. And the experience of the past three years does suggest that international market prices have responded to Debswana's actual and planned production rates. However, it is beyond the scope and resources of the present study to test these hypotheses more rigorously – and in any case, the data with which this could be done probably do not exist, certainly not in the public domain.

All that can be done here is to note the evidence that exists and point out lines of inquiry which might usefully be investigated. It is possible that the current nature of global demand and supply for diamonds, combined with the current market structures on both the demand and the supply side, could enable Botswana's dominant diamond producer to earn as much revenue from selling 25 million carats p.a. at higher prices rather than selling 30 million carats p.a. at lower prices. This would obviously extend the life of the resource significantly and would further delay the eventual decline in production which must always come eventually with any finite resource.

In the short term it would seem advisable that:

1. Government should study the various production scenarios with a view to possibly revising the current long-term mining plans, which seem to be informed by the validity period of the mining leases for Debswana, which all run till 2029.
2. Government should consider a policy of postponing possible projects at the Debswana mines so that these are phased in at the end of the open-pit mining operations. These projects are profitable on their own (stand-alone projects) and would not depend on the existing open-pit operations.

In a longer timescale, government should look towards using the knowledge of diamond demand and marketing, which it will gain in the process of selling its entitlement of Debswana's production directly to customers in the market, in order to optimise Debswana's production plans relative to global demand and prices.

8.3 Planned infrastructure projects

While we have not had access to a feasibility study for the rail and port infrastructure to service mineral exports from either the East or the West Coast, it is hoped that such a study would address the multitude of inter-governmental issues which would arise with either route. Of course, such a study would need to present plans regarding pre-investment issues such as project finance, a mine-rail-port complex to link the construction of the rail and port infrastructure to the development of an export coal mine.

We recognise the need for the sponsors of such projects to be bullish with regard to the likelihood of achieving their most ambitious aims because such projects never succeed unless their sponsors are powerful optimists. However, for the purpose of this study, the results of which will feed into various economic policy and planning considerations, we believe the correct stance to be realistic rather than optimistic; and to be cautious rather than bullish.

We have therefore not felt able to incorporate in the Base case for this study, within the 15-year projection period, any possible mine which depends for its viability on the successful completion of the infrastructure. Whilst we do not say these projects will never happen, on the basis of present information and progress, we judge it to be more likely that they would not happen within our 15-year projection period.

9.0 Conclusions

In this work, in addition to providing answers to the specific TOR, we set out to answer the following general questions: 1) What is the most likely path for mineral revenues in the coming 10-15 years?; 2) If a decline is probable, what is its most likely extent and speed in the absence of specific government policy measures to ameliorate the decline?; and, 3) What policy options could be considered by government within the mineral sector to influence the path of mineral revenues 10 to 15 years from now?

We conclude from our findings that:

1. Over the next 10–15 years, government mineral revenues are projected to rise on the back of a projected improvement in diamond prices that

would be underlain by strong supply/demand fundamentals.

2. While the decline in government mineral revenues from diamonds seems unlikely to occur within the period of projection for this study, we would like to caution that there would be a significant crunch when the open-pit mining operations cease, beginning in about 2027.

3. We believe that there is scope for government to influence the long-term planning process such that existing operations are not planned to be co-terminus with the mining licences for Debswana and that possible projects at Debswana could be postponed to commence when open-pit operations cease.

4. While there is potential for government mineral revenues from future projects, these would not result in any significant mitigation of the loss of mineral revenues from diamonds.

5. Regarding rail and port infrastructure, future coal export projects and some copper and silver projects in the Ghanzi copper belt would rely on this. We therefore believe that government should be a joint venture partner in order to ensure that future projects benefit. We, however, caution that due to the scale and possible risks involved, government should conduct a thorough due diligence ahead of any participation in such infrastructure projects.

6. Regarding access to water and power, we believe that a mechanism should be put in place whereby the utility companies provide the service to a mining project on a cost-recovery basis. This would eliminate the need for mining companies to make upfront investments for power, which would improve the pace of project development as well as their project economics.

7. Regarding taxation issues, we believe that Government should find means to publicise those mining regimes that, after negotiation, still end up with the standard tax regime for mining to provide comfort to the current junior mining companies exploring for diamonds.

Background

1

Since the early 1970s, when both the Orapa diamond mine and the BCL Nickel/Copper mine at Selebi-Phikwe commenced production, mineral production and the revenues flowing therefrom have been the dominant factors in determining the performance of the Botswana economy. It has been the diamond sub-sector in particular, with a steady flow of extremely profitable new mine developments and expansions of existing diamond mining operations, which have propelled Botswana's GDP per capita, over a period of four decades, from 'least developed' status into the 'middle-income developing country' category.

Because, for the greater part, Botswana's mineral production has resulted from foreign direct investment in prospecting and mine development; and because mineral production has, with only one significant exception, been sold into export markets, there is a sense in which the entire economy has been 'externally driven' by a small number of investment projects, each unique and each performing according to changing features of the global economy and not much influenced by developments in the domestic economy.

For many years, as mineral revenues grew strongly and consistently, the Botswana economy performed spectacularly well. Indeed, over a 20-year period in the 1980s and 1990s, some international statistics show Botswana as achieving the highest sustained GDP growth rates averaging over 10% p.a. and exceeding the growth of even the Asian 'Tiger Economies' which were generally thought to be the star economic performers of the time.

1.1 The role of mineral revenues in Botswana's economy

It is a widely accepted proposition that the driving force behind Botswana's spectacular economic performance over the past 40 years has been mineral revenues. Rapid and sustained growth in the value of output of mineral products – in particular rough gem diamonds of which Botswana's entire output was exported – was reflected most obviously in rapid growth of export revenues.

Fortuitously, Botswana's diamonds also turned out to be relatively cheap to recover from kimberlite ore which could be mined by low-cost open-pit methods and which contained relatively high concentrations of good-quality gemstones. These circumstances resulted in Botswana's best and largest diamond mines being extraordinarily rich and profitable. Jwaneng Mine, in particular, has been quite probably the world's richest and most profitable mine ever.

A very high proportion of the gross value of Botswana's diamond exports therefore consisted of profit which was subject to a profit-sharing formula agreed between government and De Beers (the 50/50 shareholders in the operating company Debswana). It is generally understood (though not officially stated) that government has, for many years, received through this agreement, between 75% and 80% of the positive cash flows arising at the Debswana mines. More recently, during 2011, informed comment has publicly accepted that the upper end of this range is a fair approximation of the status quo.

Thus it came about that the Botswana economy achieved rapid and sustained growth both in export revenues and in cash inflows from mineral revenues to central government resulting in, respectively, many years of surplus on both Botswana's balance of trade in goods and services and the central government budget.

1.2 Government's management of Botswana's mineral boom

A second widely accepted proposition is that the Botswana Government managed the mineral revenue boom relatively well as compared with some governments elsewhere which permitted large-scale leakages from public finances into the private hands of political elites or into showpiece public projects that were unproductive investments. The engine of social and economic development in Botswana consisted largely of the central government capturing, through tax and other forms of revenue, a large share of the economic rent arising from diamond mining, and then re-investing those revenues in social infrastructure for national development. Large public investments, in transport, education, power and water infrastructure, and healthcare, for example, provided jobs for Botswana residents who, in spending those incomes, generated demand for consumable goods and services including improved housing, utilities such as power, water, telecommunications, vehicles and fuel to power them, services such as education, health facilities and so on. Thus it was that relatively effective management of its mineral revenues by the central government resulted in strong GDP growth over a period of three decades from the start of diamond mining in 1972.

1.3 A plateau followed by decline in mineral revenues?

There is a third proposition regarding mineral revenues which now commands increasingly wide support; and that is that Botswana's mineral revenues may already be at or past their peak. The logic behind this proposition is as follows:

1. Mineral revenues derive, by definition, from finite non-renewable resources;
2. The great bulk of Botswana's mineral revenues to date have come from diamond mines – in particular, the Orapa and Jwaneng mines, which are two of the largest kimberlite deposits ever found and exploited anywhere, and which are now generally thought to be past their peak of profitability;
3. Despite extensive investment in prospecting for new deposits, there has been no diamond discovery comparable with Botswana's two large mines for over 30 years (the Jwaneng deposit was the last to be found in 1973);
4. There is no evidence of any other mineral resource capable of yielding, for the next generation, revenues on the scale of those arising from Orapa and Jwaneng diamond mines over the past 40 years (and certainly not on the same scale *relative to the present size of the Botswana economy);* and
5. Although it will be many years before the existing diamond reserves are fully depleted, diamond recovery at the existing mines is becoming progressively less efficient, more expensive and hence less profitable due to increasing depth of the open-pit operations, increased haulage times and costs, and ageing plant and equipment requiring regular renewal and replacement.

For twenty years or so, commentators have been issuing warnings that Botswana's mineral revenues (or more specifically its diamond revenues) were at or close to a plateau because it was thought that the mines had reached their highest economic production levels. Such predictions were regularly dashed throughout the 1980s and 1990s as the existing mines found various ways of increasing the rate of extraction of diamonds by making technological improvements in the recovery process, expanding the rate of ore extraction and treatment from the existing ore bodies, and making more efficient use of the mining and treatment facilities by using continuous operations.

By the turn of the millennium however, there were still no major new mines on the horizon and options for increasing production from existing known deposits were more clearly seen as being at the expense of extending the life of mining operations further into the future. Then, just as this thinking was being absorbed into Botswana's economic planning process (i.e. into the early stages of preparing National Development Plan 10) there came the global financial crisis and economic recession which began to unfold in 2007/2008 beginning with the sub-prime mortgage crisis and credit crunch in the United States.

With diamonds being a luxury consumption item, mainly sold to the wealthier citizens of the world's richest nations in Europe, North America and the Far East, it was expected that the international economic crisis would have a serious impact on global demand for diamonds, which, in fact, it duly did. But the industry responded by drastically cutting the rate of supply of newly mined diamonds in the period from late 2008 to mid-2009. In this period, Botswana, the most important supplier to the global market, shut down its production completely during the first quarter of 2009 and reinstated it only gradually, at lower levels of operation, thereafter.

The origin of this present study can be traced essentially to the preparation of NDP 10 – which was taking place at the worst point of the global recession when the outlook for diamond production and revenues, the key determinants of the level of economic activity, were quite literally impossible to predict.

1.4 Mineral revenue projections in the National Development Plan 10 (NDP 10)

The NDP 10 was designed to guide Government economic and financial planning for the period 1st April 2009 to 31st March 2016 (i.e. a year longer than the usual 6 year planning cycle in order to tie in with 'Vision 2016'). It is not surprising that NDP 10 as published in the second half of 2009 reflected the confusion that then reigned throughout the world economy.

The section on mineral revenues (6.24 to 6.33) reports that the projections of mineral revenues which underlay the entire plan were revised part way through the Plan's preparation to incorporate the estimated impact of the recession. Hence Table 6.3: 'Changes in projected mineral revenue in NDP 10, as a result of the global recession'. This must have been one of the more hazardous economic forecasting exercises ever undertaken, with the world's economies in crisis and the entire global financial system under threat and being subjected to high risk, and experimental attempts at resuscitation.

It must be said in any case that any economic projections which were made in late 2009 to cover a seven-year forward planning period had very little chance of standing the test of hindsight either in the short term or the long term. Almost two years have now elapsed since the NDP projections were published, during which time some of the international economic uncertainties have become clearer, although some remain just as conjectural as they were in 2009. However, we can now see more clearly how the international diamond industry responded to the global recession and how it has performed up to mid-2011. As the largest player in the global supply of rough gems, Botswana's industry largely reflects the global market. And, since diamond revenues are the largest contributor to Botswana's mineral revenues and to total government revenues, they too reflect the performance of the global diamond industry.

It is therefore anticipated that one of the more important practical purposes of this study is to provide, for the forthcoming mid-term review of NDP 10, a current assessment using the best available current information, of how Botswana's mineral revenues might evolve in the period through to 2015/16. But, more importantly, this study will attempt to look further ahead and assess the validity of the third proposition referred to in section 1.3 above – that is to say whether and at what rate mineral revenues (diamond revenues in particular, since they will dominate total mineral revenues for the foreseeable future) will enter a phase of steady decline at some point in the next 10–15 years.

1.5 The importance of diamonds in direct mineral revenue flows to government

NDP10 (para 6.27) stated that 'The projections of mineral revenue ignore any possible revenue from the rest of the mining sector'. At the time, and for the projection period to 2015/16, this seemed to be a perfectly sensible simplification. The 'post recession' projections showed government revenues from diamonds starting at P6.4 billion in 2009/10 and rising to a peak of P16.0 billion in 2014/15. At the time, there was little prospect of any significant government revenue from base metal operations or, from soda ash and salt, the other large mineral exports. The information available suggested a possible flow to government of perhaps P50–100m p.a. – that is, only about a half to one percent of the revenue flow from diamonds. Given the range of uncertainty that will always exist around projections of diamond revenues, there will be little return for the effort of trying to improve the accuracy of a 1% component of the total. However, if we are now looking forward to a period when diamond revenues may be falling and other mineral revenues rising relative to diamonds, we obviously do need to consider whether any other sources of revenue may become significant in the total.

The consultants wish to record and emphasise here that the uniqueness of Botswana's diamond mines appears not to have been fully understood, despite many statements to the effect that Botswana has become the world's leading and lowest cost producer, that the Botswana economy is dangerously dependent on diamond revenues and that diamonds and good governance have been the only feature that separates Botswana from dozens of other poor developing nations.

It is not just that nature decreed that two of the largest deposits of diamond-bearing kimberlite ever found should be discovered within Botswana's sovereign territory. Nor is it just that those kimberlites contain highly desirable quantities and qualities of diamonds. Nor is it just that the mines constructed at Orapa and Jwaneng have been continuously expanded, upgraded and made more efficient by the mining company concerned, using and developing improved technologies to drive the efficiency of mining and treatment. What Botswana has experienced at Orapa and Jwaneng is a coming together of favourable circumstances, involving good geology, good people and good governance. Jwaneng was discovered in 1973 and since then no new major diamond finds have occurred in Botswana. This further highlights the unlikelihood for similar diamond discoveries in Botswana, a situation that emphasises the need to diversify the economy away from this exhaustible resource.

1.6 Objectives

This study was conceived as the first part of a three-part series of studies, of which the ultimate purpose was to seek a path for the Botswana economy towards a future in which government revenues from taxation of the mining sector would be substituted, to the greatest possible extent, by revenues from other sources, as part of a continuing process of economic diversification.

The main purpose of this first of the three parts is to define as closely as possible the most likely extent and timing of the anticipated decline in mineral revenues. The terms of reference defined 'the main questions to be addressed' as follows:

1. What is the most likely path for mineral revenues in the coming 10–15 years?
2. If a decline is probable, what is its most likely extent and speed, in the absence of specific government policy measures to ameliorate the decline?
3. What policy options could be considered by government within the mineral sector to influence the path of mineral revenues 10 to 15 years from now?

As indicated by the last of these questions, an ancillary purpose of this study has been to survey the developing mining sector in Botswana, and the enterprises involved therein, in order to identify any possible policy measures which might influence the timing, scale or profitability of mining operations.

1.7 Scope of the study

The scope of this study, as specified in the terms of reference (TOR) is as follows:

i. To review existing mining and energy projects and develop a detailed time series on estimated production, government mineral revenues (royalties, taxes and dividends), employment and value of mineral exports over the 15-year period from 2012 to 2026;
ii. To prepare an analysis of probable and possible projects that will be developed over the next 15 years;
iii. To consider appropriate incentives that may accelerate the pace of investment in mineral and energy projects;
iv. To consider the impact of any other proposed large investment projects on future mining projects;
v. To prepare a report for BIDPA for onward consideration by the government; and
vi. To prepare a paper for public dissemination regarding the existing and new potential investment projects.

All of the above aspects were to be examined in consultation with the relevant stakeholders and by deploying the consultants' own extensive knowledge of how and where mineral revenues arise and flow through the Botswana economy.

Review of literature

2

The mining industry is characterised by projects that take long periods to develop – typically three to five years, long life of projects in excess of fifteen years and cyclical commodity prices. It is therefore essential that proper project evaluation is carried out to support the decision regarding whether or not to invest in a mineral project. In developing countries, such as Botswana, where the economy is heavily reliant on revenues from minerals, a good project evaluation model is not only useful to the project owners but also to the government departments charged with forecasting mineral revenues. In Botswana, it is essential that mineral revenue forecasts are accurate as they form a major share of the national budget. Government mineral revenues reported in the national accounts are from mineral royalties, profit taxes, and dividends.

Minerals are internationally traded with the US Dollar being the trading currency in which many mineral commodity prices are quoted. The revenue line in the project evaluation model is therefore in US Dollars. This is converted to local currency using an exchange rate that may be defined in the sales or purchase agreements for a particular project. This adds an additional risk variable to the revenue stream in addition to resource risk, production risk and price risk. In this review of the literature, we seek to judge the latest practices with regard to forecasting those variables that affect the revenue stream to a mineral project. Mineral taxation is a very important aspect to project owners, as it not only affects the magnitude of their after-tax cash flows but also their appetite for future capital investments. It is also an important tool for government as it can be used to generate tax revenue. In all cases, of course, the issue is the level of taxation that would be appropriate considering the profitability of a mineral project.

Our approach in this section will be to review the variables that affect the revenue stream; these are resource risk, production risk, mineral commodity prices, and exchange rates.

2.1 Resource risk

Resource or geological risk is realised when the ore values, that is the volume and grade of an ore turns out to be lower than anticipated in the geological model. It is therefore concerned with whether or not the grade and volume of the ore will be achieved. During ore evaluation to determine the volume and grade of a deposit, geostatistical modelling of the volumes and grades are usually obtained. The grades are spatially correlated and this is intuitive as one would expect the grade to be richer in the direction of the primary source, for instance. In project evaluation, there is a shift from deterministic values to stochastic values that are obtained by assigning a distribution function such as the Triangular or the Pert Distribution once expert opinion has been obtained regarding the minimum, most likely and maximum values of an input variable. Monte Carlo simulation using software such as @Risk then produces project economic values such as NPV and IRR that have a probability of occurrence attached to them.

The major limitation to applying Monte Carlo simulation to the volume and grade of a mineral deposit is the spatial correlation that explains the grade variation in a given direction, the semi-variogram. Thus far, the link between a Monte Carlo type simulation with geological simulation of grade and tonnage is still to be done. One possible approach would be to run the project evaluation model with the simulated tonnage and grade values to arrive at the values that maximise NPV and therefore define the mineral reserve.

Another approach to accounting for geological risk practised in diamond ore evaluation work is that of conditional simulation. This is a geostatistical modelling approach that involves generating possible block tonnages and grades that are equally likely to occur given the values from the sampling data. Typically one would generate 20–200 such models and the range of grades generated indicates the risk in the grade values in the spatial dimension (Dyck et al, 2004).

Current practice in project evaluation is therefore to treat the geology as given and then work in an iterative manner to select a mining method that will be both technically and economically feasible. Obviously such an approach leads to conservatism as it is more economical to expand capacity later than fail to build up production to full capacity once the project is commissioned.

2.2 Production risk

In the construction stages of a mineral project, the major worry is whether or not the project will be completed on time, on budget and at the correct technical specification. This is followed by ramp-up risk, which is concerned with whether or not the planned production build up to full production capacity will be achieved in the planned time frame. After the project has been successfully commissioned, there still exist some risks on the revenue stream. One of these is the production risk, which arises when the technical solution fails to deliver the planned valuable mineral production either through lower than planned run of mine ore, dilution or lower plant efficiencies.

A very good indication of the success of a production plant can be obtained from detailed test plant flow sheets or where a similar ore body is already being mined elsewhere, there is always an opportunity for technical teams to collaborate and arrive at a proper technical solution. In any event, there are plenty of examples of plants that have operated for more than a decade without reaching their planned capacities. Production risk can be modelled as a plant efficiency factor with levels set at the minimum, most likely and maximum levels.

2.3 Mineral commodity prices

Botswana produces a wide variety of minerals. Precious stones (diamonds) will always be treated separately while 'non diamond' minerals currently in production include base metals such as nickel, copper and cobalt; soda ash and salt, coal and some gold. There are projects at various stages of exploration in the energy minerals (uranium and coal); copper and silver, and diamonds.

2.3.1 Base metals

Demand for mineral commodities is a derived demand. This makes mineral commodity demand volatile in response to economic cycles. For instance, high commodity prices are normally associated with mineral commodity booms while low prices are associated with economic recessions. There is a general belief that mineral commodity prices, which started rising in 2003 and were still rising in 2006, were a response to increased demand from Western Europe and both China and India, whose economies are going through a period of high intensity of use of materials derived from mineral commodities (Radetzki, 2006). Just before the global economic crisis that occurred towards the end of 2008, the mineral commodity boom that began in 2003 was being viewed as a super cycle, capable of lasting 15–20 years (Radetzki et al, 2008). What is of interest is that, by mid-2011, some mineral commodities had recovered from their lows in 2008 and were trading at near record levels. Regarding the question about how long the current cycle might last, two arguments by Radetzki (2006) are worth noting. The first is that mineral prices have shown a long-term decline in real terms which suggests that current high prices may just be a reflection of the irregularity of supply due to such reasons as the unavailability of inventories as well as the industry's long response time of 3–5 years for new production capacity to be established. The second argument is that if other developing countries were to copy the economic deregulation and globalisation in India and China, this would lead to increased exports of manufactured mineral-based products from developing countries, and hence increased demand for mineral commodities by such developing countries while at the same time developed countries would adjust to lesser material intensity and hence demand less mineral commodities. In conclusion the long-term prices of mineral commodities would be expected to reflect the trend in resource scarcity literature where prices decline in real terms.

There is some hope in Botswana that the Ghanzi copper belt will provide the scale of projects that would help diversify the country's mineral sector away from diamonds. Current information on these projects reveals that they would at best result in copper metal output less than 100 k tonnes per annum. Some of the global copper projects currently under construction and their start dates are given in Table 1 below for comparison.

Table 1: Global copper projects under construction

Country	Company	Mine	Expected Output	Year
Mongolia	Rio Tinto & Ivanhoe	Oyu Tolgoi	450ktpa	2012
Chile	Teck Resources	Pelambres North	215ktpa	2013
Chile	Xstrata/Anglo American	Collahuasi	Increase from 535ktpa to 1.0 mn tpa	2014
China	Continental Minerals	Xietongmen	230ktpa	2014
Peru	Xstrata	Las Bambas	400ktpa	2014
Mexico	Grupo Mexico	Cananea	450kpta	2015
Peru	Anglo American	Quellaveco	225ktpa	2015
Zambia	Vedanta	Konkola	Double to 400ktpa	2015

Source: *Business Monitor International, July 2011*

2.3.2 Diamonds

Discovering and deploying reliable price statistics for gem diamonds is more difficult than for any other mineral product. For commodities such as coal or salt or copper, at any given time there will be a few different prices in the market place relating to products with differing quality characteristics, or, in the case of energy commodities, differing thermal content or burning characteristics. Typically, price differentials around a benchmark, for different grades of the commodity, would be relatively small, well understood in the market and capable of objective calculation. For gem diamonds, at any point in time, there are many thousands of prices in the market according to the size, colour, shape, clarity and model (cuttability) of the stones. Although it is known that diamond producers and traders operating outside 'the De Beers system' conduct their trade with fewer price differentiations (perhaps 2,500 instead of the 15,000 used by De Beers), it is still next to impossible to define a usable price index for rough gem diamonds. From the poorest qualities to the best, unit prices rise not by percentages, but by factors in the thousands or hundreds of thousands. The differentials are huge, variable over time, and not capable of calculation by reference to any objective characteristics.

However, for the purposes of this study, many of the analytical problems arising from the nature of the diamond market can be avoided. Firstly, we are interested not in any physical category of diamonds but in the average mix of diamonds produced in Botswana – and mostly in those sold by Debswana from its mines. It happens that Debswana produces a very wide variety of gems, spanning the majority of the thousands of categories recognised by the market. Although the weighted average varies from time to time according to the types of diamonds which are being recovered from the mines and from different sections of the ore body at each mine, these factors do not create variations as great as those which exist between the various price categories at any one point in time. So, in order to project, for example, the unit value of Botswana's diamond exports, one may start with the actual value as stated in the most recent actual statistics, and apply specific assumptions about any anticipated trends in the quality mix of diamonds produced and any expected shortages or surpluses in the market at current price levels which would tend to push average prices up or down in real terms over time. This, of course, rather begs the question as to what assumptions one should make regarding, for example, the potential threat to natural diamond prices from artificially manufactured (synthetic) gems; or regarding public reaction to intermittent revelations about the role of diamonds in aggravating civil conflict or supporting dictatorial regimes in places where they are known to exist (as in recent conflicts in Angola, Sierra Leone, DRC etc). These are all matters which are not susceptible to algebraic calculation, but only amenable to broad general assumptions based on the factors expected to result in future strength or weakness of demand for natural gem diamonds.

With regard to government revenues flowing from diamond mining, diamond prices and values, together with assumed production and sales volumes, determine the corporate sales revenue part of the equation. And, for a company such as Debswana, where revenues have traditionally been a substantial multiple of costs (often between 5 and 10 times at the richest mines) it is the revenue element which dominates. However, looking 15 years into the future, during which time mining will certainly become more costly in real terms (because physically it will become more difficult as open pits grow larger and deeper) one must also assess the trend in the mining costs.

2.3.3 Coal – world steam coal markets

In this section we provide a brief review of the literature on the world steam coal trade in recognition of the potential that coal may hold in the future economic development of Botswana. The country has abundant coal resources in the order of 212 billion metric tonnes and past investigations have included exploiting these coal resources either for power generation or for the export market. The world steam coal trade essentially consists of the Atlantic and Pacific basin markets.

There are on-going or proposed pre-feasibility studies to investigate the viability of railway lines linking Botswana to Walvis Bay in Namibia and Maputo in Mozambique. The average distances from the coal fields in Botswana to Namibia and Maputo are 1,500 km and 1,100 km respectively. The choice of which route is economic depends on a combination of factors such as the unit rail tariffs to seaports, the maritime unit freight costs to import port and lastly where the demand region for the coal is likely to be, between Western Europe and Asia. For instance, it would be uneconomic to export coal to Asian markets from Walvis Bay while an export port at Maputo could possibly serve both Western European markets and Asian markets (Fichani, 2003).

In this sub-section, we provide a brief review of the recent trends in the production of hard coal, as well as exports, imports and price projections. The major exporters and importers are depicted in Tables 2 and 4 below. In the leading coal-producing countries such as China, the US and others (see Table 1), the bulk of the coal produced is for domestic consumption in electricity generation as well as industrial applications. For instance, in 2009, only about 15% of the world coal production accounted for the world trade in steam coal (IEO, 2011).

2.3.3.1 Supply regions

Table 2 presents the top ten hard coal producers in the world. The top five major coal producers in the world and the compound annual growth rate (CAGR) of their hard coal production between 2006 and 2010 are: China (6.5%), USA (-1.4%), India (4.5%), Australia (2.8%), and Indonesia (8.2%). The top five world hard coal exporters and their CAGR of hard coal exports between the period 2006 and 2010 are Australia (5.2%), Indonesia (10.5%), Russia (3.4%), USA (10.2%) and RSA (0.24%) (see Table 3 below).

Table 2: Top ten hard coal producers
(Million metric tonnes)

		2006	2007	2008	2009	2010	CAGR
1	China	2,335	2,491	2,766	2,927	3,196	6.48%
2	**United States**	1,055	1,040	1,063	975	985	-1.37%
3	**India**	454	482	516	556	565	4.48%
4	**Australia**	367	390	391	403	420	2.72%
5	**Indonesia**	227	261	274	302	336	8.20%
6	**Russia**	285	289	305	276	324	2.62%
7	South Africa	245	248	252	251	255	0.80%
8	**Germany**	200	205	194	184	182	-1.84%
9	**Poland**	155	145	143	135	133	-3.10%
10	Kazakhstan	97	98	111	101	111	2.77%

Source: *Prepared by author based on data from International Energy Outlook, 2011, US Energy Information Administration*

Table 3: Top ten hard coal exporters
(Million metric tonnes)

		2006	2007	2008	2009	2010	CAGR
1	**Australia**	231	244	252	262	298	5.18%
2	**Indonesia**	174	201	210	237	287	10.46%
3	**Russia**	94	102	101	108	111	3.39%
4	**United States**	47	55	76	55	75	10.16%
5	South Africa	69	66	60	67	70	0.24%
6	**Colombia**	62	65	68	68	69	2.25%
7	Kazakhstan	29	26	33	30	33	2.68%
8	**Vietnam**	21	32	19	25	22	0.99%
9	China	78	68	58	23	21	-23.35%
10	**Mongolia**	2	3	4	7	17	49.48%

Source: *Prepared by author based on data from International Energy Outlook, 2011, US Energy Information Administration.*

Coal mining is geographically diverse as can be seen from the above tables. The industry is projected to grow to meet steam coal demand mainly in China and India. Some of the coal projects currently under way are depicted in Table 4 below. Projects in Mozambique and Mongolia face infrastructure challenges. For instance in Mozambique, the coalfields are located in the north-western part of the country, where there is poor rail and road infrastructure, Similarly, in Mongolia, coal exports into China are constrained by lack of rail infrastructure (*Business Monitor International*).

Table 4: Large coal projects under construction
(Million metric tonnes)

Country	Company	Location	Production Capacity	Year
United States	Rhino Energy	Red Cliff	8 Mtpa	2012
Mongolia	South Gobi	Ovoot Tolgoi	Expansion from 1 Mtpa to 6.4 Mtpa	2013
China	Banpu	Gaohe	6 Mtpa	2013
Mozambique	Vale	Moatize, Tete	24 Mtpa	2014
South Africa	Anglo American	New Largo	14.7 Mtpa	2015
Mongolia	Mongolian Government	Tavan Tolgoi	Not stated. Reserves of 6 billion tonnes	2015
China	Chinese Government	Ningxia Province	N/A. Reserves of 2 billion tonnes	N/A

Source: *Business Monitor International, 2011*

2.3.3.2 Demand regions

The top ten hard coal importers are depicted in Table 5 below. The top five importers are in the Pacific Basin market and over the period 2006 to 2010, their imports grew as follows: Japan (0.7%), China (36%), Korea, South (8.4%), India (14%) and Taiwan (0.6%).

The IEO 2011 projects that coal imports into the OECD region would remain at their 2008 levels over the period 2008 to 2035 while coal imports into non-OECD regions is projected to grow at 2.1% annually over the same period (see Figure 1 below). A decomposition of projected imports into Asia reveals the following annual growth rates over the period 2008 to 2035: China and Hong Kong (6.6%), North Korea, South Korea and Taiwan (1%), Indian Subcontinent and South Asia (5%) and Japan (-0.9%).

Table 5: Top ten hard coal importers
(Million metric tonnes)

		2006	2007	2008	2009	2010	CAGR
1	**Japan**	181	190	187	165	188	0.69%
2	China	38	51	40	126	177	35.95%
3	Korea, South	76	85	97	100	114	8.38%
4	**India**	48	54	61	75	92	14.04%
5	Taiwan	63	66	64	59	65	0.59%
6	**Germany**	46	51	50	42	50	1.75%
7	**Turkey**	21	23	20	21	27	5.58%
8	**United Kingdom**	52	44	45	38	27	-12.37%
9	**Italy**	25	25	25	19	22	-3.22%
10	Netherlands	23	27	21	20	21	-2.38%

Source: *Prepared by author based on data from International Energy Outlook, 2011, US Energy Information Administration.*

The trade statistics for steam coal are stated in quadrillion Btu to take into account the different qualities (heat energy content) of steam coals. These can be easily converted back to a physical quantity that is much easier to appreciate, a tonne of coal equivalent (tce). Projected hard coal imports in quadrillion Btu, into Asia are depicted in Figure 2 with the tonnes of equivalent in Table 6. Hard coal imports into China and Hong Kong rise from 45 M tce in 2008 to 251 M tce in 2035, or a six-fold increase. The other major increase is in the Indian Subcontinent and South Asia where imports rise from 60 M tce in 2008 to 223 M tce in 2035, a four-fold increase. North Korea, South Korea and Taiwan see their imports rise from 144 M tce in 2008 to 188 M tce in 2035.

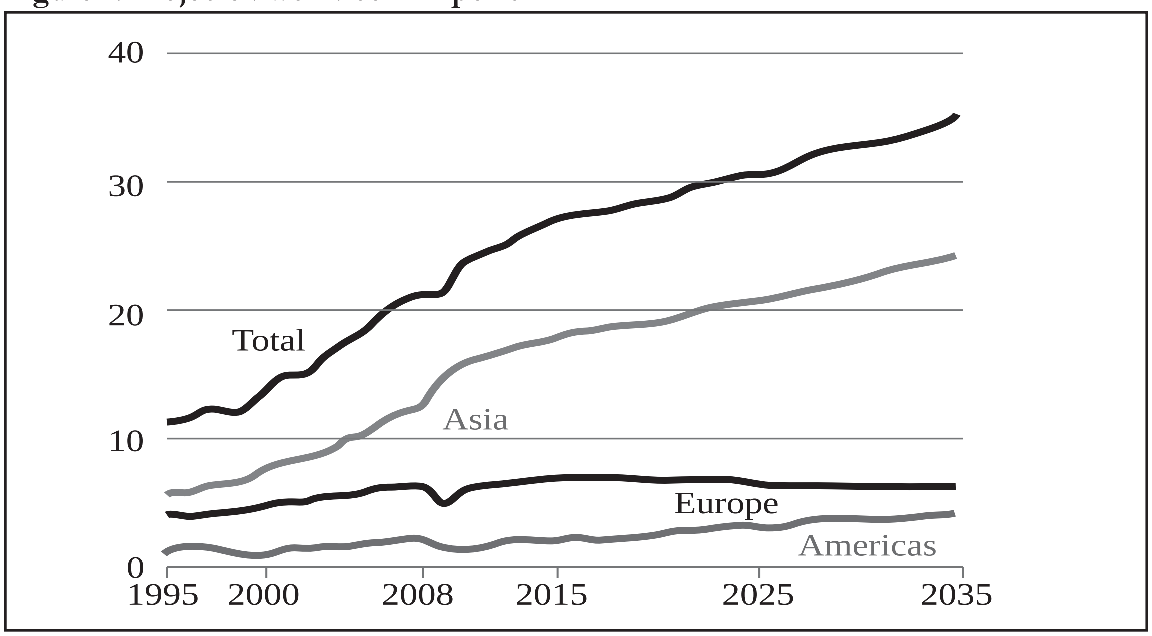
Table 6: Coal imports into Asia by major importing region

(Million tonnes of coal equivalent)

	2008	2035
China and Hong Kong	45	251
North Korea, South Korea, and Taiwan	144	188
Indian Subcontinent and South Asia	60	223
Japan	176	138
Totals	424	800

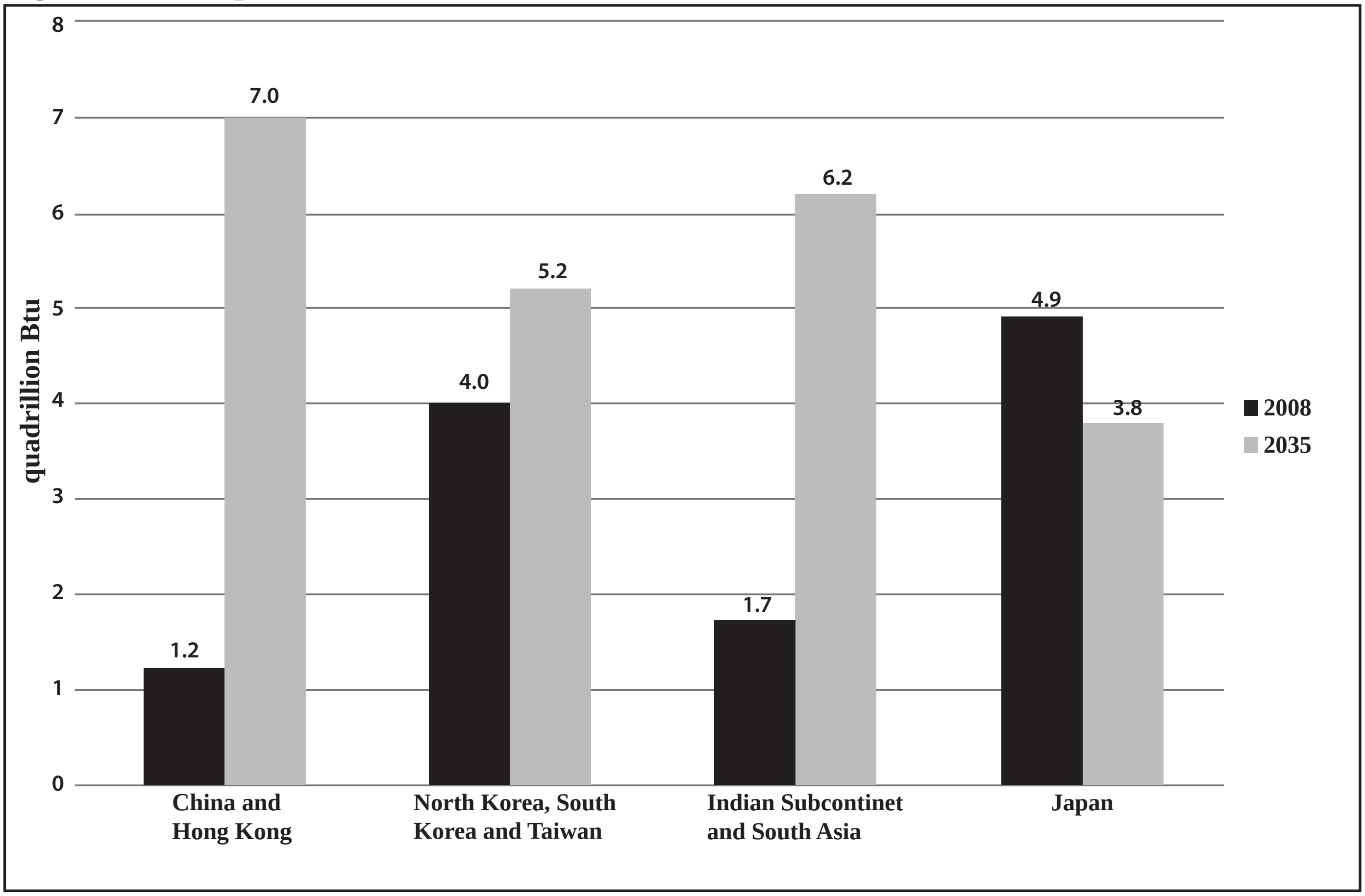
Source: *Converted by author from data for Fig 71, Coal imports to Asia by major importing region, International Energy Outlook, 2011, US Energy Information Administration*

Figure 1: Projected world coal imports



Source: *Figure 70, World coal imports by major importing region, 1995–2035 (quadrillion Btu) International Energy Outlook, 2011, US Energy Information Administration*

Figure 2: Coal imports into Asia



Source: *Figure 71 Coal imports into Asia by major importing region, 2008–2035 (quadrillion Btu) International Energy Outlook, 2011, US Energy Information Administration*

Imports of coal into the Middle East and North Africa have either declined or remained stable and were at 23 M short tons in 2010. (IEO, 2011).

In Western Europe, the top ten coal importers are depicted in Table 7 and as indicated before, export levels are projected to remain at their 2008 levels through to 2035.

Table 7: Top ten hard coal importers into Western Europe
(Million metric tonnes)

		2006	2007	2008	2009	2010	CAGR
1	**Germany**	46	51	50	42	50	1.75%
2	**Turkey**	21	23	20	21	27	5.58%
3	**United Kingdom**	52	44	45	38	27	-12.37%
4	**Italy**	25	25	25	19	22	-3.22%
5	Netherlands	23	27	21	20	21	-2.38%
6	**France**	22	20	23	17	19	-2.94%
7	**Poland**	5	6	10	11	14	20.70%
8	**Spain**	24	25	21	17	13	-11.41%
9	**Finland**	7	7	6	6	6	-2.39%
10	**Slovakia**	6	7	6	5	5	-5.27%

Source: *Prepared by author based on data from International Energy Outlook, 2011, US Energy Information Administration*

Table 7 provides detailed imports into Western Europe and it is clear that hard coal imports are on the decline in the majority of countries except Germany, Turkey and Poland. This may reflect the region's choice of natural gas as a fuel for electricity generation and nuclear energy in the case of France.

Germany plans to close down its hard coal mines in 2018, which would boost its imports of coal (IEO, 2010). The recent announcement regarding the decision by Germany to decommission its nuclear power plants by 2022 leads one to speculate as to the likely source of fuel to be used. Even though the fuel of choice for power generation in Western Europe is natural gas, there could be an increase in steam coal imports.

2.3.3.3 Steam coal prices

The world steam coal trade is a competitive market. The import price of steam coal is driven by the major components of the value chain from investment costs, production costs, rail transportation costs and sea freight. While the US Energy Information Administration (EIA) produces annual projections in their *International Energy Outlook*, there has been recent independent modelling of the steam coal trade to answer very specific research questions (Fichani and Labys, 2006; Haftendon, Holz and Von Hichschhausen, 2010; Paulus and Truby, 2011; DECC, 2011).

There is a general consensus that prices of the world seaborne coal will continue to be driven by the demand scenario in India and China (DECC, 2011 and IEO, 2011). In both these countries, the coal fields are distances in excess of thousands of km from the demand centres. For instance, the coal fields in China are in the far West and North Central provinces, some 3,500 km from the coastal demand centres around Beijing, Hong Kong and Shanghai. Currently 60% of Chinese steam coal is transported over distances in excess of 500 km to the demand centres with the transportation costs accounting for more than half of the delivered price. The high land transportation costs make steam coal imports competitive (Paulus and Truby, 2011).

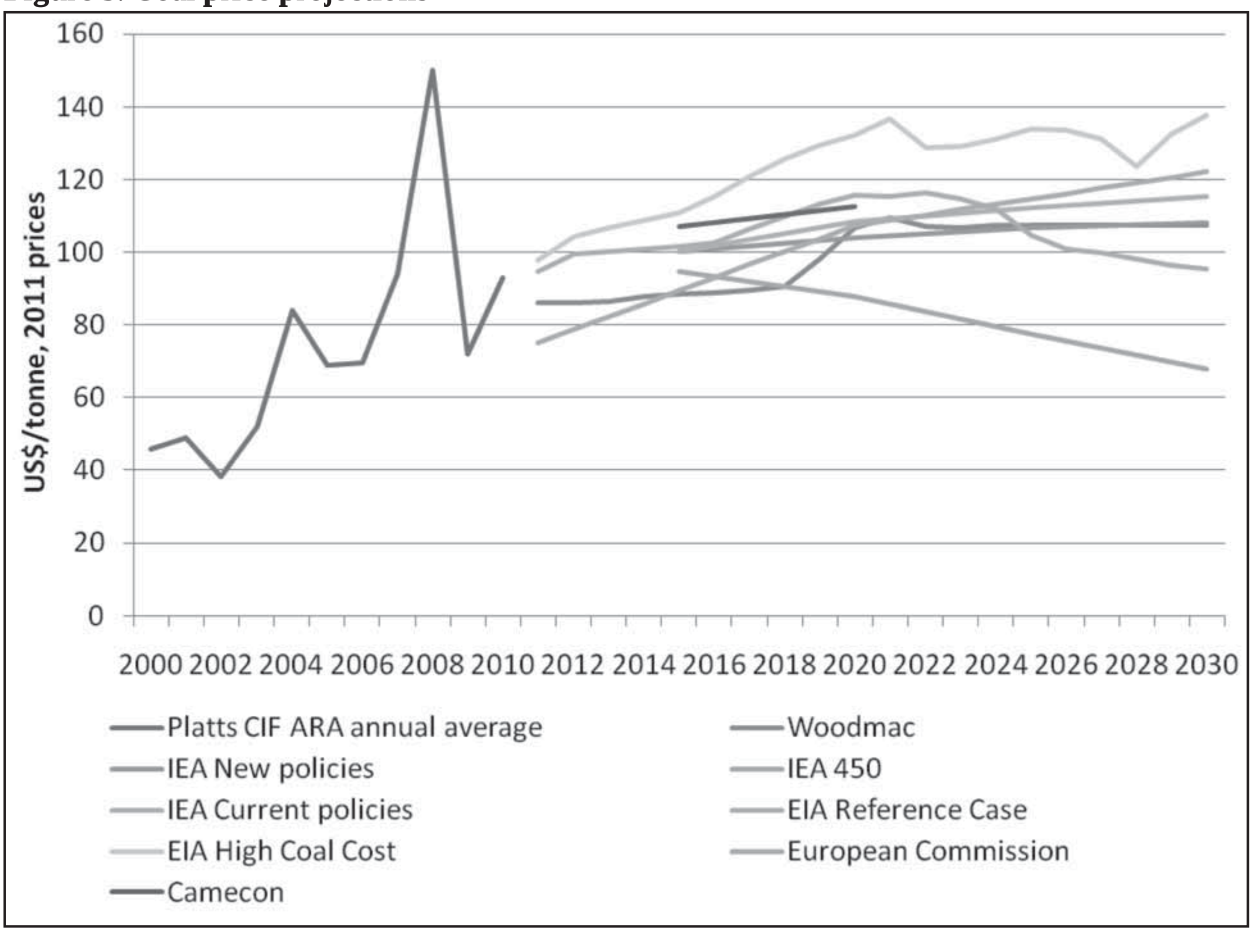
Countries that are projected to grow their market shares include Southern Africa (South Africa, Mozambique and Botswana), which would be more competitive in the Pacific Basin, with the Indian market playing a major role. The ranking of exporters into the Pacific market is Indonesia, Australia and Southern Africa (Haftendon, Holz and von Hichschhausen, 2010). This is in general agreement with an earlier model by Fichani and Labys, 2006, where Botswana would have ranked third in this market after Australia and South Africa.

In the Atlantic Basin (Western Europe) market, the long distances to export ports for coal from Russia would make the latter less competitive, again creating opportunity for growth in market share from suppliers further afield such as the U.S.A. (Haftendon, Holz and von Hichschhausen, 2010). As the U.S. has high marginal supply costs, in their 2006 model, Fichani and Labys found that coal from Botswana would be competitive ahead of that from the U.S. in Western European markets.

The steam coal price projections depend on the scenario that one believes would prevail regarding the policies that are likely to be adopted towards the continued use of coal as an energy source (see Figure 3 below). For instance, the U.S. Energy Information Administration's (EIA) projections for U.S. export prices indicate that these will grow by 2.93% annually in nominal terms from \$96.78 to \$212.81 per short ton from 2008 to 2035 respectively. The EIA's reference case, on the other hand, projects that coal prices would decline in real terms after 2020. This is in alignment with the recent global steam coal trade model by Haftendon, Holz and von Hichschhausen, 2010, and other refinements by DECC, 2011.

In Table 8, the projected steam coal price movement to export coal prices for Botswana producers would be expected to track the international movement in steam coal prices. For export coal mines, these price movements would be transmitted back to mine mouth steam coal prices. For instance, for a washed steam coal price of P250 per tonne, the resulting projected prices are depicted in Table 8.

Figure 3: Coal price projections



Source: *Figure 4; Coal Price Projections from External Organizations, DECC, 2011, p.12*

Table 8: Price profile for Botswana steam coal exports

(BWP/tonne washed coal)

	2012	2013	2014	2015	2020	2020-2026
Real steam coal price escalation[1]	1.00	1.00	0.977	0.954	0.846	0.846
Steam coal price (real BWP 2012)[2]	250	250	244.25	238.50	211.5	211.5

Note 1 Computed from price forecasts by DECC, 2011, Figure 8 (Table)

2 The contract washed steam coal price from Botswana mines would enjoy a discount from the spot price and is estimated at P250 per tonne or about US$35.00/metric tonne (based on conversation with colliery).

Estimated breakeven export price for Botswana coal - A spot quotation of rail transportation charges from Botswana Railways (e-mail dated 24/1/2012), is presented below:

The distance from Morupule to Maputo is given as 1,457 km. The rail charge is P729.75 per tonne, or US$104.25. This quoted rate is equivalent to P0.50/tonne km or US$0.072/tonne km. This is much higher than the Coaltech estimate of US$0.03/tonne km. The specific route is as follows:

1. Morupule to Bakaranga = 263 km (BR)
2. Bakaranga to Chicualacuala border = 660 kms (NRZ)
3. Chicualacuala to Maputo = 534 km (CFM)

The total distance is 1,457 km, which is about 33% greater than the often cited distance of 1,100 km for Botswana–Maputo (over a proposed route alignment for a possible future railway line).

The resulting f.o.b. price for an underground coal mine in Botswana exporting through the port of Maputo would then be $26.13 + 104.25 + 3 = $133.38/tonne. Using the same rate, the f.o.b. price for Walvis Bay would be $26.13 + 108.00 + 3 = $137.13/tonne.

For an open-pit mine there are some estimates of mining costs of US$17/tonne in December 2009 (Coaltrans 2010 presentation by J. Devon of Marston) for South African coal mines. Assuming a local RSA inflation of 7% per year, the 2012 mining cost would be $22.28/tonne. If we assume that this rate would also apply to Botswana surface coal mines, the indicative breakeven f.o.b. price of Botswana coal at the Maputo port would then be $22.28 + 104.25 +3 = $129.53/tonne. Using the same rate, the f.o.b. price for Walvis Bay would be $22.28 + 108.00 + 3 = $133.28 /tonne.

Table 9 presents estimates for the likely export price, f.o.b. for typical underground coal producers in Botswana using the estimate of rail costs by the Coaltech study. The Coaltech study estimates rail charges on current infrastructure at US$0.03/tonne.

Table 9: Estimated breakeven export price (f.o.b.) for an underground coal mine in Botswana

	Link	Distance (km)	Mining & Processing Costs (US$/tonne washed coal)[a]	Rail Transport Cost (US$/tonne)[b]	Port Handling (US$/tonne)[a]	Price f.o.b. Export Vessel (US$/tonne)
1	Botswana–Walvis Bay	1,500	26.13	45.00	3.00	74.13
2	Botswana–Maputo (Techobanine)	1,457	26.13	43.71	3.00	72.84

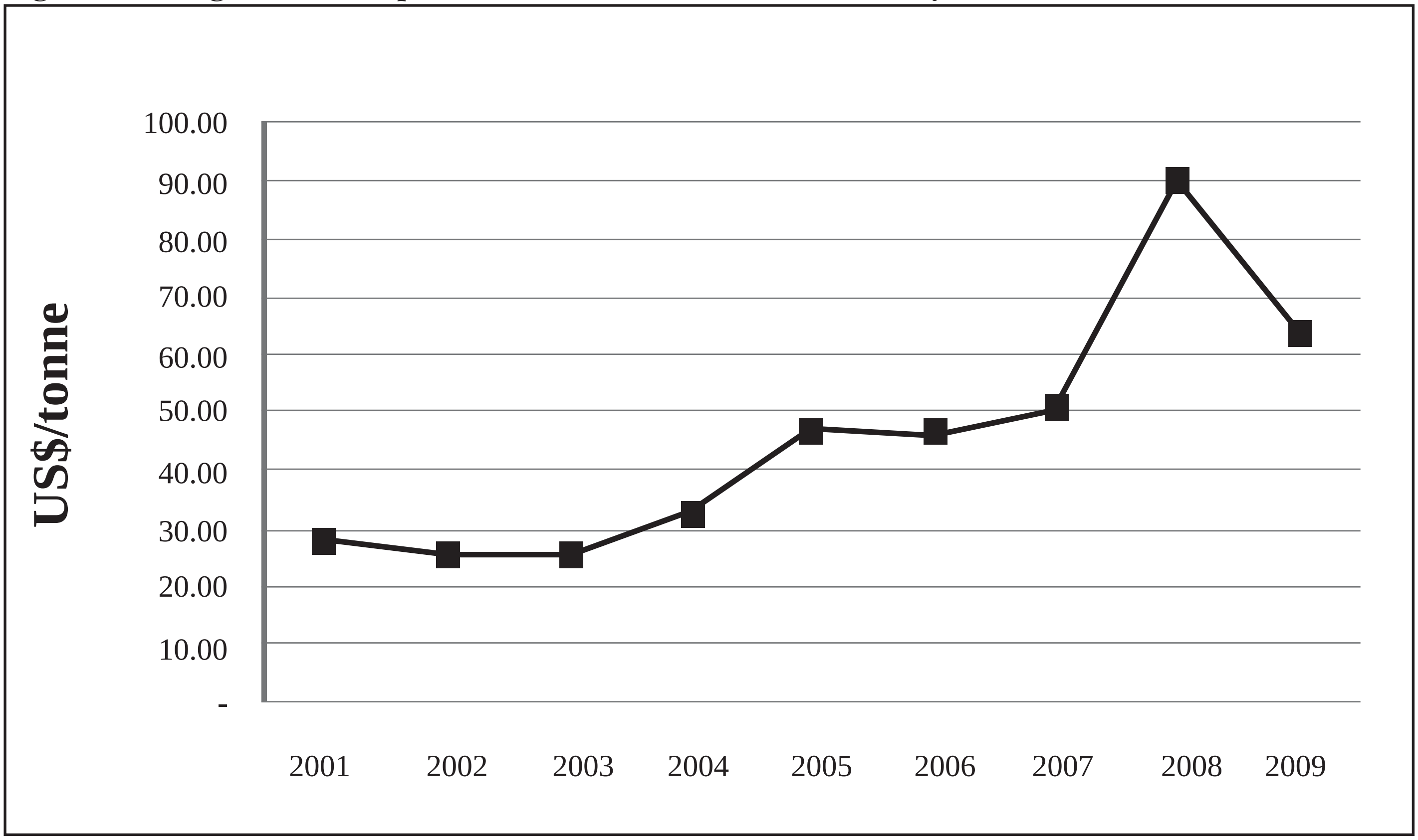
Sources a) *The competitive cost of coal-analyzing the major producing areas of the world, presentation by John Devon to the Coaltrans* Asia, 31 May 2010.

b) *Based on rates for rail transportation under existing rail infrastructure of R0.21/tonne.km, Appendix A – Coaltech Transport Investigation, December 2009.*

Notes: Assumes an inflation rate of 7% and exchange rate of USD/ZAR = 8.00 would give a 2012 estimate of R0.24/tonne.km or US$0.03/tonne.km

There is a possibility for Botswana to gain a market share in the Atlantic Basin if its f.o.b. price is lower than that for the U.S., which is a swing producer in the international steam coal market whereby it only exports its coal to fill any short-term demand deficit in markets in Western Europe or Asia. For Botswana to be internationally competitive, the f.o.b. price from either Walvis Bay or Maputo would generally have to be less than the U.S. export price. For instance, the U.S. is projected to become a major exporter into the Atlantic Basin market with some 73 M tonnes exported into this market in 2030 (Haftendon, Holz and von Hichschhausen, 2010). This is in general agreement with an earlier model by Fichani and Labys, 2006, where Botswana would have ranked first, followed by South Africa, the U.S. and finally Australia in Western European markets. Even with this model, South African exports were projected to shift to the Pacific Basin market.

Figure 4: Average value of exported coal from South Africa in recent years



Source: *Plotted from data retrieved from: Department of Minerals and Energy, http://www.dmr.gov.za/Mineral_Information/Statistic.html*

2.3.4 Coal – climate change issues

Coal mining poses both safety and health, and environmental issues. In the underground extraction of coal, methods such as longwall mining are used as they provide a high rate of production and extraction efficiency as opposed to conventional room and pillar mining. The safety aspect is related to hazards that are associated with coal mining and these include fall of ground, flooding, coal dust and methane gas explosions, mine fires, etc. Methane gas extraction releases this greenhouse gas to the atmosphere, thus contributing to concerns about global warming.

The environmental effects from underground coal mining are land subsidence, which may affect surface infrastructure and traditional land use. In wet climates, flooding of the subsided land can be a serious environmental issue while in dry climates subsidence leads to deepening of the water table. Old and abandoned mine workings in coal are associated with acid mine drainage, which tends to pollute underground water systems. Surface mining methods also have negative environmental impacts such as noise, air pollution, etc (see Bian, Z et al, 2010 for a review).

Among the fossil fuel energy sources, coal is the cheapest and yet the most polluting in terms of the amount of carbon dioxide gas that is generated from burning the fuel. For instance, the cleanest fossil fuel is natural gas and this generates 2.28 kg C per barrel of oil equivalent (boe) followed by gas to liquids at 2.63 kg per boe, crude oil, oil sands and heavy oil at 3.15 kg per boe and lastly coal and coal to liquids at 4.0 k per boe (EIA, 2008 as cited in Chiari, L. and Zecca, A., 2011). The majority of coal is used in power generation in the countries where it is mined, and it is this end-use sector that also dominates the international trade in coal for steam generation in power plants.

There is widespread acceptance that countries would have to come up with policies to promote climate-friendly policies. For instance, the COP17 meeting that was held in Durban in November 2011, places the onus on all member countries to come up with measures to reduce carbon dioxide emissions (Mojaphoko, 2012). There is therefore a risk that climate policy is likely to make fossil fuels more expensive relative to renewable and photo-voltaic sources of energy. The instruments that are likely to be adopted include the much-publicised cap and trade systems with carbon capture, and carbon taxes.

The impact of climate policy on compound annual growth rate in coal consumption for the period 2008 to 2035 and for the central, low and high oil price scenarios is 3%, 1.5%, 2.2% respectively for China and India. The projected prices for the three cases of global carbon dioxide emission levels of 1,000 ppm, 450 ppm and 550 ppm in the year 2030 are US$110, US$65 and US$85 per ton respectively (World Energy Outlook 2008 and 2009 as cited in Kyungtae Park, K., Shin, D. and Yoon, E.S., 2011).

2.4 Foreign exchange rates

Mining firms in developed countries may only have to deal with resource, production and price risks if their mineral products are quoted in their local currencies while those in developing countries have to deal with exchange rate risk in addition to these other risks. Kofman and Viaene (2000) determined that the correlation between the exchange rate and commodity prices is significant for both developed and developing countries.

The sales revenue to a mining company in a developing country will most likely be in a major world currency such as the US Dollar. These payments are translated into local currency, which may affect the profitability of the project depending on whether or not the exchange rate would have moved favourably (depreciated) or adversely (appreciated) relative to values used in the full feasibility model or periodic mining business plans. While the widely accepted approach is to apply PPP in forecasting future exchange rates for converting future mineral revenues into local currency, there is concern that in reality, exchange rates do not preserve PPP between the foreign and domestic economy. That is to say, variations between the local and foreign inflation levels do not feed into that of the exchange rate variation (Kohlscheen, 2010). This is an area that is not yet clearly settled as some studies demonstrate the exchange rate pass-through to local inflation phenomenon even though this takes time. For instance, in a study of a group of countries that recently floated their currencies, Floden and Wilander (2005) find that the majority of countries in the study experienced pass-through rates of up to one-third within a twelve-month period.

This observation about the slow pace of the exchange rate pass-through would mean that consensus forecasts of the exchange rates be used for one or two years and thereafter revert to the PPP approach where the domestic currency in the producer country would be adjusted by the inflation differential between the domestic and US inflation rates.

2.5 Review of recent performance in forecasting government mineral revenues

The Government of Botswana is a shareholder in the following mining companies: Debswana Diamond Mining Company, which operates four mines being Orapa, Letlhakane, Damtshaa and Jwaneng; Botswana Ash, which operates a soda ash and salt plant at Sowa; BCL Limited, a miner of copper, nickel and cobalt at Selebi Phikwe and Morupule Colliery near Palapye, which produces coal for the generation of power for domestic markets.

As a shareholder, the government gets access to vital information on both short- and long-term management information such as annual production plans, five-year production plans as well as long-term strategic business plans. The annual financial forecasts provide very useful data for forecasting revenues to government. These revenues are in the form of mineral royalties, income taxes and dividends. These financial data are then compiled to produce budget mineral revenues that are used as input to the national budgets.

Figure 5 depicts the significance of diamonds in both total exports and mineral exports. The substantial share of diamonds in exports extends to its dominance in the share of mineral revenues to the government. This fact has meant that forecasting mineral revenues to government has been largely an exercise in forecasting royalties, income taxes and dividends from Debswana (as was explicitly stated in NDP10). The share of mineral revenues in the total revenues and grants to the government of Botswana is presented in Figure 6. In the recent past, the picture that emerges is that of a substantial contribution of minerals to the government budget at an average of 50% during financial years

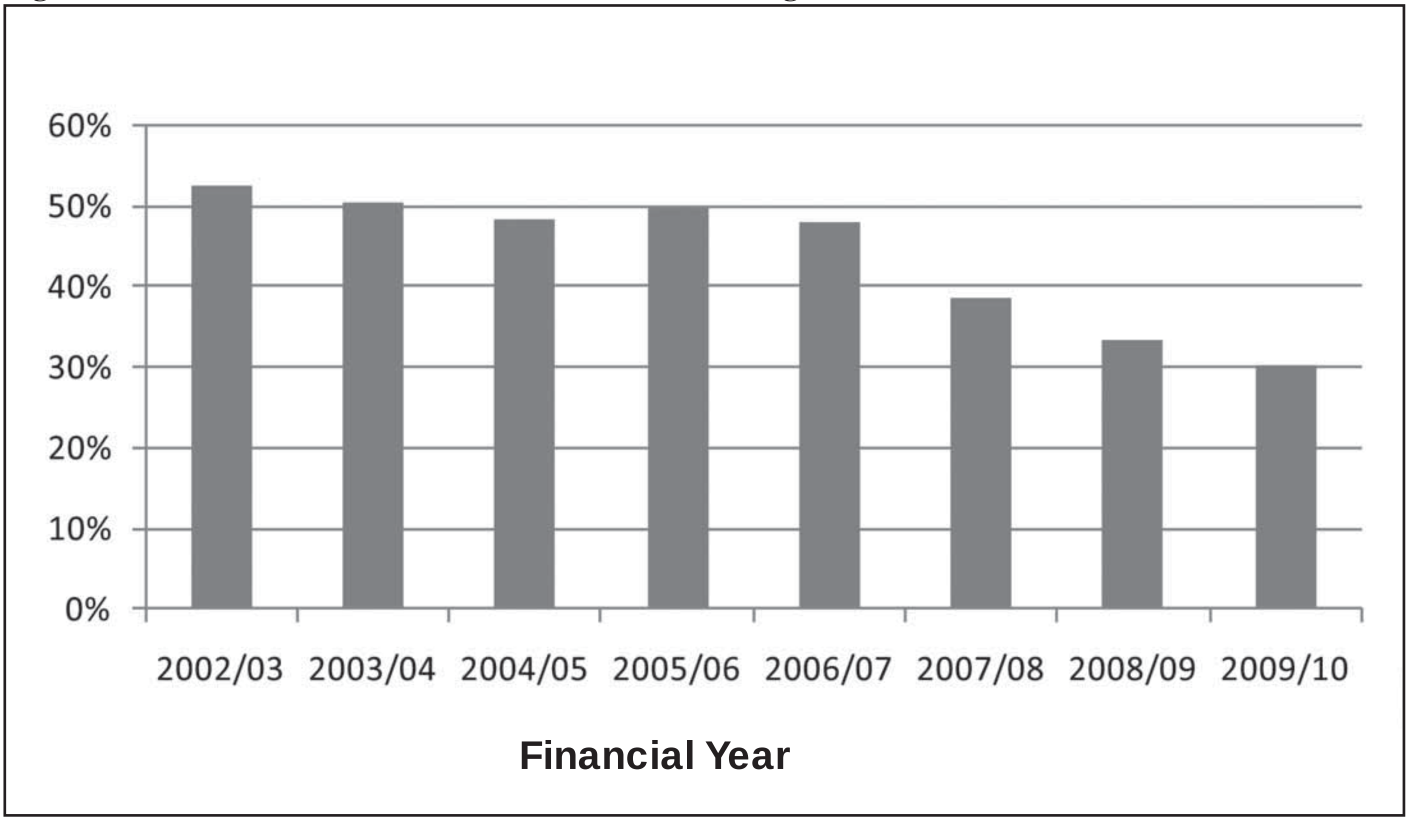
2002/03 up to 2006/07. There is a decline to 38% in financial year 2007/08, just one year before the onset of the global financial crisis, which saw diamond demand collapsing in the third quarter of 2008/09. For the 2009/2010 financial year, the contribution of minerals, and by extension diamond revenues, was at a low of 30%.

Table 10 provides a summary of the mineral revenue forecasting performance over the financial years 2004/05 to 2010/11. Apart from the 2008/09 financial year, the actual mineral revenues are above the original values in the budget proposals by about 6%–19%, which reflects both a high level of accuracy of the input data from the annual financial forecasts by Debswana, and probably an element of deliberate conservatism. The effect of exchange rates, prices and volume can be observed in Table 8. For instance, in the 2004/05 financial year, diamond prices rose by 19% but the Pula revenue was dampened by the appreciation of the BWP against the USD. It is also apparent that in periods of uncertainty, such as the recent global financial crisis, forecasting diamond mineral revenues has been a challenge. For instance, in the 2009/10 financial year, actual mineral revenues were 33% higher than in the revised budget estimates. The forecasting error was reduced marginally in the 2010/11 financial year to 22% above the revised budget estimates. In short, where there is uncertainty about volume and prices, the error in revenue forecasts is more likely to be higher than when there is greater certainty around these variables.

Figure 5: Share of diamonds in mineral and total exports in Botswana

Source: *Plotted from data from Botswana Financial Statistics, April 2011, Bank of Botswana*

Figure 6: Share of mineral revenues in total revenues and grants



Source: *Plotted from data from Botswana Financial Statistics, April 2011, Bank of Botswana*

Table 10: Recent revenue mineral projection performance

(Nominal BWP billions)

Financial Year	Proposed	Revised	Actual	% Variance Revised vs Proposed	% Variance Actual vs Proposed	% Variance Actual vs Revised	Remarks
2004/2005	8.07	7.71	8.682	-4.5	7.6	12.7	Appreciation of the BWP against the USD (adverse movement of the USD); Diamond prices rose 19% during the financial year
2005/2006	9.93	10.89	11.045	9.7	11.2	1.4	Increase in carats; Diamond price in Q4 of the financial year, which is Jan-March, 2006; Depreciation of BWP in 2005
2006/2007	11.045	11.374	13.114	3.0	18.7	15.3	Diamond sales increased by 6%
2007/2008	10.89	10.89	11.604	0.0	6.6	6.6	Diamond prices up 9%; Volume up 3%
2008/2009	10.56	10.86	10.182	2.8	-3.6	-6.2	Decline in diamond sales due to financial crisis in Q4 2008.
2009/2010	6.84	6.84	9.1	0.0	33.0	33.0	Prices down by 15% relative to price book; Volume down due to suspension of production at Debswana mines; Overall impact estimated of 50% decline in revenues. This was due to the global financial crisis.
2010/2011	6.48	9.32	11.37	43.8	75.4	22.0	Diamond sales rising during the year
2011/2012	11.37						

Source: *Compiled from Budget Speeches, Bank of Botswana*

Botswana's mineral legislation and policy

3

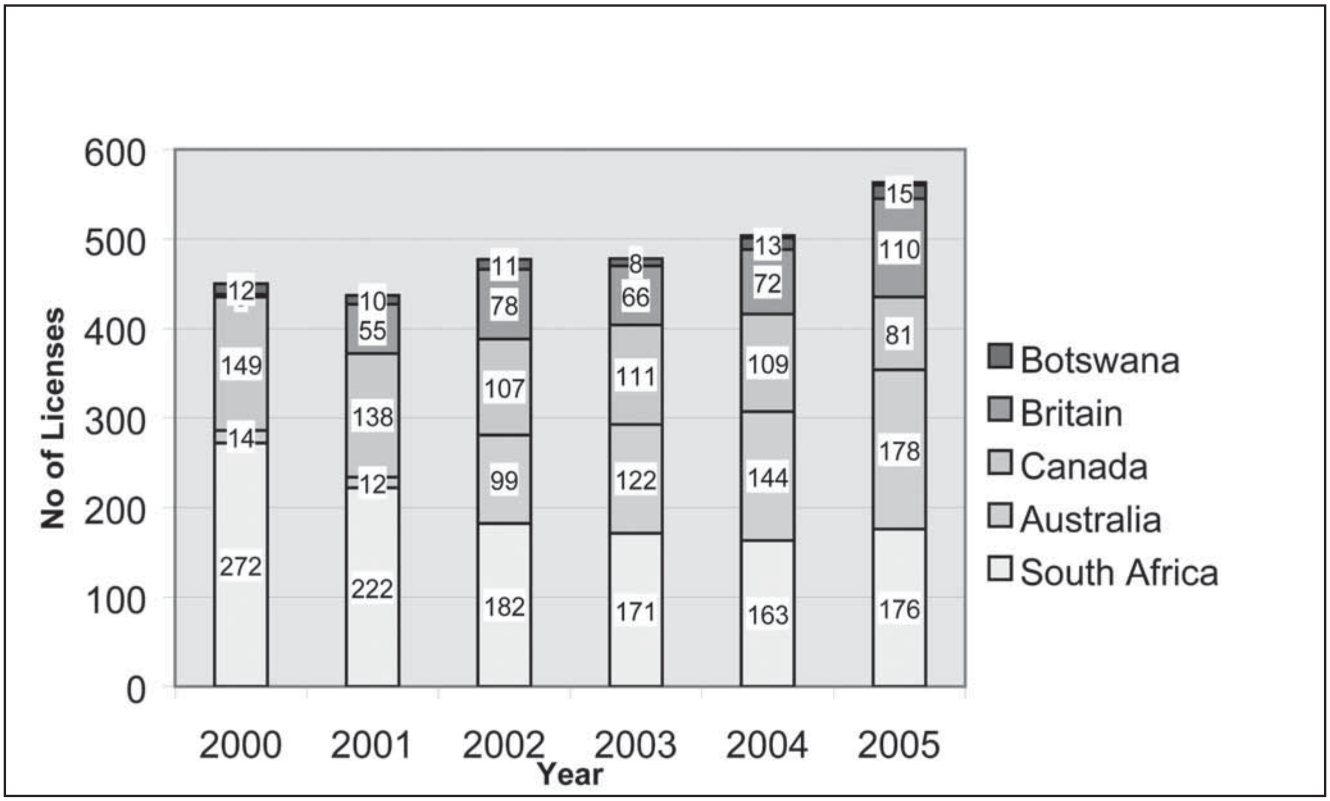
3.1 Background

The consultants for this present study were both full-time active members of the government team that last carried out a similar study, with a similar long-term objective, in 1997–8. That study resulted in the introduction of a completely revised Mines and Minerals Act (1999) which embodied many fundamental shifts in Botswana's law and policy relating to mineral prospecting and mining. The new Act incorporated both the results of extensive dialogue with the international mining industry (both before and after publication of a draft Bill); and extensive consultation with the Commonwealth Secretariat, whose experts provided a number of international benchmarks and comparisons of relevance to Botswana's desire to compete for a limited pool on international mining investment finance. The present study does not allow time or resources to replicate that 1997–8 review of mining law and policy, which was a comprehensive review of both the legal and fiscal regime for mining in Botswana.

The promotional efforts for the Mines and Minerals Act (1999) were initially limited to the Africa Mining Indaba, in Cape Town, and were later helped by expansion to the Botswana Resource Sector Conference and the Africa Down-under Conference in Perth, Australia (began participating at the September 2004 conference). The Act was viewed by exploration and mining companies as 'competitive, transparent, fair and workable' (Africa Down-under presentation, 2005). Some of the proof could be seen in the increased number of companies acquiring ground for exploration in Botswana over the first five or so years after the Act came into effect. One can therefore conclude that the review of the Act was extremely successful in re-establishing Botswana as a highly attractive environment for prospecting and mining investment. Certainly there has been, since then, a significant upturn in both the number and diversity of new mineral developments in Botswana (Figures 7 and 8).

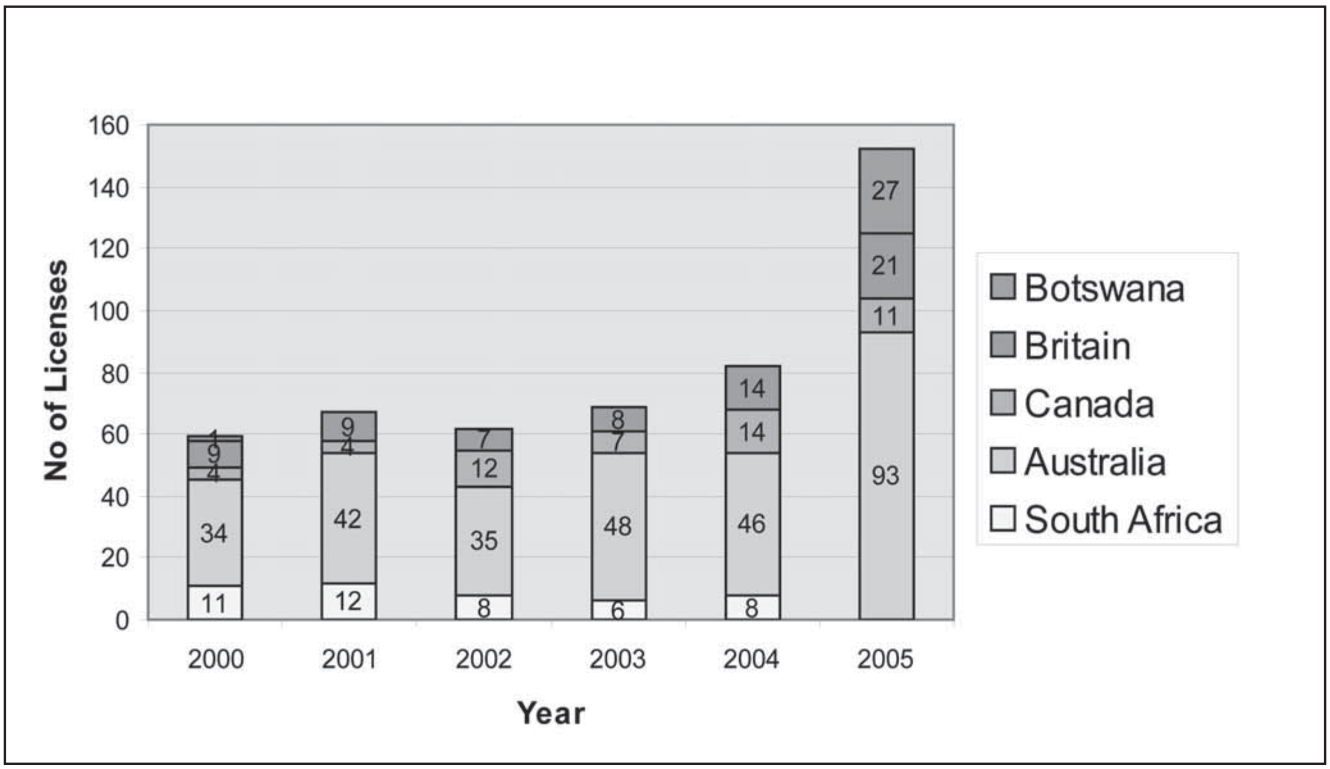
On the hypothesis that the 1999 law and policy was at least partly responsible for the arrival of new companies prospecting for a variety of minerals; and perhaps also for increased expenditure on prospecting by companies which were already at work in Botswana when the more investor-friendly arrangements were introduced, we see an approximate reflection of the timescales involved in prospecting for and proving a mineral resource and in constructing and commissioning mining and infrastructure developments.

Figure 7: Diamond PLs by country of origin of holder



Source: *Presentation to the Africa Down-under Conference, Perth, Australia, 8–9 September, 2005.*

Figure 8: Non-diamond PLs by country of origin of holder



Source: *Presentation to the Africa Down-under Conference, Perth, Australia, 8–9 September, 2005.*

Table 11 depicts the total number and distribution of prospecting licences as at the end of March 2011. The total number of prospecting licences more than doubled between 2003 and 2010. As at the time of writing this report, the whole country was covered by prospecting licences with the empty patches being in the Okavango Swamps as well as the deep sand cover patch in the south-western part of the country.

Table 11: Distribution of PLs in Botswana

	2003	2009	2010
Total Prospecting Licences (PLs)	574	1275	1219
Diamonds	78%	34%	32%
Fossil fuels	3%	21%	15%
Radioactive	0%	13%	14%
Base metals and gold	13%	25%	29%
Industrial minerals	6%	7%	10%
Total	100%	100%	100%

Source: *Department of Geological Survey, 31 March 2011.*

3.2 Project cycle: exploration to mine production

Some, if not most, of the mineral deposits which are at or close to the commencement of mine development at end-2011, have resulted from feasibility studies and proving and planning carried out between 2005 and 2010 following first discoveries in the period 1999 to 2005, i.e. the results of prospecting work carried out in the six or so years following the legislative and policy changes. For small- to medium-scale mines, developers are probably contemplating a construction period of between two and four years, followed by a commissioning period and ramping up of production to planned capacity over the following two to three years.

Obviously, a number of other factors have contributed to the pattern of mine development. First would be the general profitability of the mining industry, which is in turn related to ease of access to financial equity capital by junior mining and prospecting companies – which, together, provide much of the funding for ongoing and new exploration efforts. A generally favourable outlook for mineral commodity prices is also a necessary (but not sufficient) condition for an upturn in new mine developments; as is a generally favourable mineralogy in the geological context of the target area. So, very roughly, deposits discovered by prospecting in the five years to 2005 would have been proven and confirmed by feasibility studies in the five years to 2010, and will be constructed and commissioned in the five years to 2015, reaching planned production capacity and, perhaps, generating their first taxable income in the five years to 2020. This represents a full cycle, from prospecting to tax-paying, of at least 15 years.

3.3 Proposed approach on incentives to increase the pace of investment

In order for the incentives to have any impact on government revenues in the period to 2025, policy would have to be targeted at:

a) encouraging today's existing mining operations to expand profitably;
b) accelerating and/or expanding the development plans of those companies which are currently either starting their development phase or well into the proving/feasibility stage.

This terms of reference (TOR) also refers to a structured questionnaire, which BIDPA distributed to exploration and mining company participants at the Botswana Resource Sector conference (27–28 June 2011). The consultants have:

a) analysed the responses with a view to identifying the areas of concern to the investors, and
b) where feasible, conducted follow-up interviews with companies at the advanced stages of exploration and mine development to better appreciate the kinds of incentives that would facilitate a speedier development of their projects.

Lastly, the consultants have also reviewed recent literature on country rankings such as those by the Fraser Institute to obtain mining company views on those factors about the legal and fiscal regime for Botswana, and other factors that, if changed, would improve the country's competitiveness. The 2010 mid-year update by the Fraser Institute ranks Botswana in 8th position worldwide as a country with a favourable environment for mining investment.

3.4. Anticipated challenges

The small number of target companies means that any kind of macro-modelling simulation is unlikely to provide reliable projections. The consultants believe, therefore, that the best way to approach the issue of policy initiatives is to hold a dialogue with as many of the target companies as can be persuaded to discuss their future plans in some detail.

There is the added difficulty that, by definition, the companies targeted for such dialogue will all be interested parties and, hence, not necessarily objective or unbiased (or even honest) in their comments. The consultants have had a great deal of experience in dealing with and discussing these issues with many kinds of companies. It is not at all unusual for any company, when in debate with a host government, to minimise the likely profitability of their investment in order to maximise their chance of being granted incentives or favourable tax treatment, whilst at the same time seeking to maximise the potential scale of their putative operations and their potential demand for government-sponsored infrastructure – in the hope that they are then more likely to attract favourable treatment by government and less likely to be disappointed by non-availability of infrastructure or utility services on the required scale. Those same companies can simultaneously put a quite different emphasis in their presentations to actual or potential shareholders, to whom they wish to maximise the profit potential of their project and minimise its demand for expensive and potentially elusive infrastructure and utility services, thus facilitating access to financial capital and 'ramping up' the share value of their company.

Nevertheless, despite the difficulty of discovering the true expectations of investors, it is accepted that any assessment of policy initiatives which could potentially succeed in the required timeframe needs to be based largely on the consultants' interpretation of a dialogue with the investors.

As anticipated in our Inception Report, it is proving extremely difficult to define any specific government incentive which would significantly influence the existing process for the target projects. The nature and scale of mineral deposits discovered tends to determine the nature of the facilities to be constructed for mining and transportation in order to support the long-term profitability of the project. Even if attractive incentives were to be offered for enlargement or acceleration of plans, mining companies will always wish to take a long-term view of the sustainability of such incentives. However, this initial view will be strenuously tested by the consultants in dialogue with investors to the extent that investors are willing to enter into such dialogue.

Our approach therefore has relied on analysis of the mining industry questionnaire and the report by the Fraser Institute to identify those areas that hold opportunity for further improvements in the administrative or fiscal environment as perceived by mining companies. It would, however, still be highly advisable to obtain feedback from industry once more definite steps are identified from the analysis and after these have been discussed with the relevant ministries to also obtain their views. The analysis and the results are presented in section 5.

Methodology

4

The methodology adopted to forecast government mineral revenue is based on project economic modelling. Each mine or project was modelled based on the data requested in a template that included data on both the revenue and cost streams. We then searched the literature to identify the most appropriate values for economic variables such as local and U.S. inflation to input into our assumptions for escalation of prices, capital and operating costs. The economic model was at such a detail as to generate revenue flows to government in the form of royalties, profit taxes and dividends, where applicable. The data requested also included projected employment levels.

For projects still at the exploration phase, recent similar projects that were either completed or still under construction were used as a base upon which to obtain factored cost estimates. This applied mainly to uranium and coal. For CBM projects, costs were escalated from a previous study to a base year of 2012.

The methodology for the section of the mining law and fiscal regime is discussed in section 3.

4.1 Data

We were able to obtain production and cost data on existing mining projects owned by Debswana, BCL, Tati, Botash, Ghaghoo (formerly, Gope), BK11. AK06 data was available on line. The data templates yielded data on production, prices (base year only with escalation assumptions excluded), capital and operating costs (base year only with escalation assumptions not given) and fiscal regime. The original templates are presented in the Appendix.

While we had anticipated that we would be able to interview those responsible for long-term planning at Debswana, this was not possible at this time. This meant that we were unable to generate alternative scenarios as to potential Debswana projects and their scheduling. This is one area where the input of more informed projections could potentially have a material impact on the results. In any event, the projects that appear in the Debswana portfolio include a construction period, which hypothetically provides some guide to revenues that may be expected but with the provision that such revenues would only be realised following an investment decision to proceed with the project at some given point in time.

For other mining projects, we were, understandably, not able to obtain much information as the projects were still at the exploration stages and had not prepared desk-top studies. In such cases, we relied on similar projects that were under development and applied cost factoring to arrive at orders of magnitude estimates for the main project's economic variables of production rate, capital and operating costs. For all projects, we made assumptions regarding the economic variables such as escalation rates for prices, capital and operating costs, and exchange rates.

4.1.1 Definition of mineral revenues

For the purposes of this study, we will distinguish two concepts of mineral revenues, namely:

1. Mineral export revenues for which we adopt the standard definition as used in international trade statistics, namely the reported f.o.b. value of minerals and mineral products at the point of export from Botswana. It may be noted in passing that with the single significant exception of coal, virtually all of Botswana's production of all minerals hitherto has been exported. Traditionally, all rough diamonds, all copper-nickel matte, all soda ash and virtually all salt have been exported. Of commercial mineral production, only coal is sold in the domestic market and not exported. Morupule Colliery is the only producer, currently producing and selling very roughly one million tonnes p.a. to the Botswana Power Corporation and a few other large customers who use it for bulk heat-raising purposes. The expansion of mining to fuel the Morupule B power station might lead to a doubling or, in time, a trebling of the output and sale of coal for domestic consumption.
2. Government Mineral Revenues for which we adopt the definition used in official published statistics (for example, Bank of Botswana, Botswana Financial Statistics). This includes:
    a. Mineral royalties, paid in terms of the Mines and Minerals Act, based on a percentage of the 'gross market value' (as defined) of mineral production;
    b. Corporate income tax paid by mining companies in terms of the Income Tax Act, based on assessed taxable income. The Income Tax Act has always incorporated certain rules on the assessment of income and offsetting allowances which are specific to the business of mining; and
    c. Dividends accruing to government by virtue of its position as shareholder in Botswana's major mineral enterprises. In two important cases (Debswana Diamond Company and Botswana Ash Pty Ltd) these three elements are, at the point of payment, combined into a single charge which is based, in Debswana's case, on a percentage share of the pre-tax operating cash flow and in Botash's case on a percentage share of the total distribution to shareholders (with tax, royalty and dividends all incorporated within GRB's share).

However, in the case of Debswana, which provides the bulk of mineral revenues paid to government, these three separate sources are effectively combined into a simple division of the pre-tax and pre-royalty positive cash flow from the operations. The government's share (which, as stated elsewhere, has been recently stated to be approximately 80%) is only later allocated to royalty, tax and dividend for GRB's own internal accounting processes.

4.1.2 Availability and access to data sources

It is a curious fact that mineral revenues, as the most important element in the performance of the Botswana economy, are reported on so sparsely, in so little detail, and hence are subjected to only superficial analysis. The main reason for this may be the fact that the bulk of Botswana's mineral revenues derive from diamond mining and the diamond industry is notoriously secretive about its affairs, not just in Botswana but at all points in the international diamond value chain, and in all sectors of the industry. This issue is especially pronounced in Botswana because one company, Debswana Diamond Company, dominates diamond mining and sales, and hence revenues.

For this study, Debswana provided data on their current operations as well as projects in their portfolio. We therefore believe that the main source of government mineral revenues was covered sufficiently. As mentioned above, other existing mines also cooperated in filling out the data request template. This was facilitated by letters of introduction from both the Ministry of Finance and Development Planning and the Ministry of Minerals, Energy and Water Resources.

We also relied on responses to the BIDPA questionnaire to obtain data regarding the following:

a. Stage of development of project;
b. Target mineral reserves to support mine development;
c. Target size of investment;
d. Target annual production of metals;
e. Estimate of overall unit operating costs; and
f. Target mine development and production start-up dates.

A few mining projects are listed, which made it easier to obtain project economic data that we then escalated at the appropriate economic indices to arrive at base year 2012 rates for analysis.

4.2 Expected impact of this study

We expect the results of the study to have impact in the following areas:

a. They will alert policy makers regarding the budgetary gap that is likely to be created as a result of the economic exhaustion of existing diamond mines;

b. The results will quantify the likely benefits from future mining projects in base metals, coal and CBM, and thus help to quantify the likely direct benefits from infrastructure projects that would facilitate the development of coal and CBM projects;

c. Regarding incentives to mining projects, the study would identify any possible areas where policy would need to focus; and lastly

d. It would make policy recommendations on the rate of diamond exploitation bearing in mind the anticipated decline in diamond production after the year 2027.

4.3 The project and payment schedule

In terms of Schedule C of the agreement, the time allocated to this project shall not exceed 70 man-days from 1 June 2011. (Note that the consultants signed on 7 June 2011). Following delays regarding introduction letters (received in mid-August) a revised project schedule was agreed and this will see the first draft delivered electronically to BIDPA on 4 January 2012.

4.4 Deliverables

The consultants are well aware of the position of this study relative to subsequent planned phases of further study, the end-result of which is hoped to be policy guidance for government with regard to likely future developments in mineral exports and the contribution of 'mineral revenue' to public finances. However, whatever the direction and trend foreseen for mineral revenues over a 15-year period, it is unlikely that the factors underlying the projections will result in a single clear probable path, or even a narrow probable range for mineral revenues going forward. Whilst we will deliver 'the best possible' projections, we appreciate that many of the underlying factors are things about which reasonable people – even reasonable experts – can disagree. The ranges considered possible are therefore likely to be wide. Nevertheless, we hope that, having carried out the analysis, we should at least be able to say something about what underlying conditions will have to occur in order for the projected mineral revenues to come about.

The Mines and Minerals Act

5

The Mines and Minerals Act has been in force since 1999 and it continues to receive very favourable reviews as an enabling legislation for mining investment. For instance, in their latest rankings, *Resource Stocks* magazine places Botswana in fourth position together with Sweden as one of the most attractive countries for mining investment. The 2010 mid-year update by the Fraser Institute ranks Botswana in 8th position as a destination for foreign direct investment in mining from among 51 mining jurisdictions worldwide.

In this section, we analyse the rankings from the Fraser Institute in a bid to identify the areas of concern to investors regarding those factors about the legal and fiscal regime for Botswana, and other factors that, if changed, would improve the country's competitiveness. We also analyse responses to a structured questionnaire which BIDPA distributed to exploration and mining company participants at the Botswana Resource Sector Conference that was held on 27–28 June 2011. While we had anticipated follow-up interviews with the respondents, these were not feasible at this time. However, we believe that there would still be opportunity to receive industry views on any proposed incentives that would facilitate a much improved pace of project development during the consultation process with stakeholders.

We will conclude this section by making policy recommendations that we believe would address concerns raised by the respondents in the above-mentioned surveys.

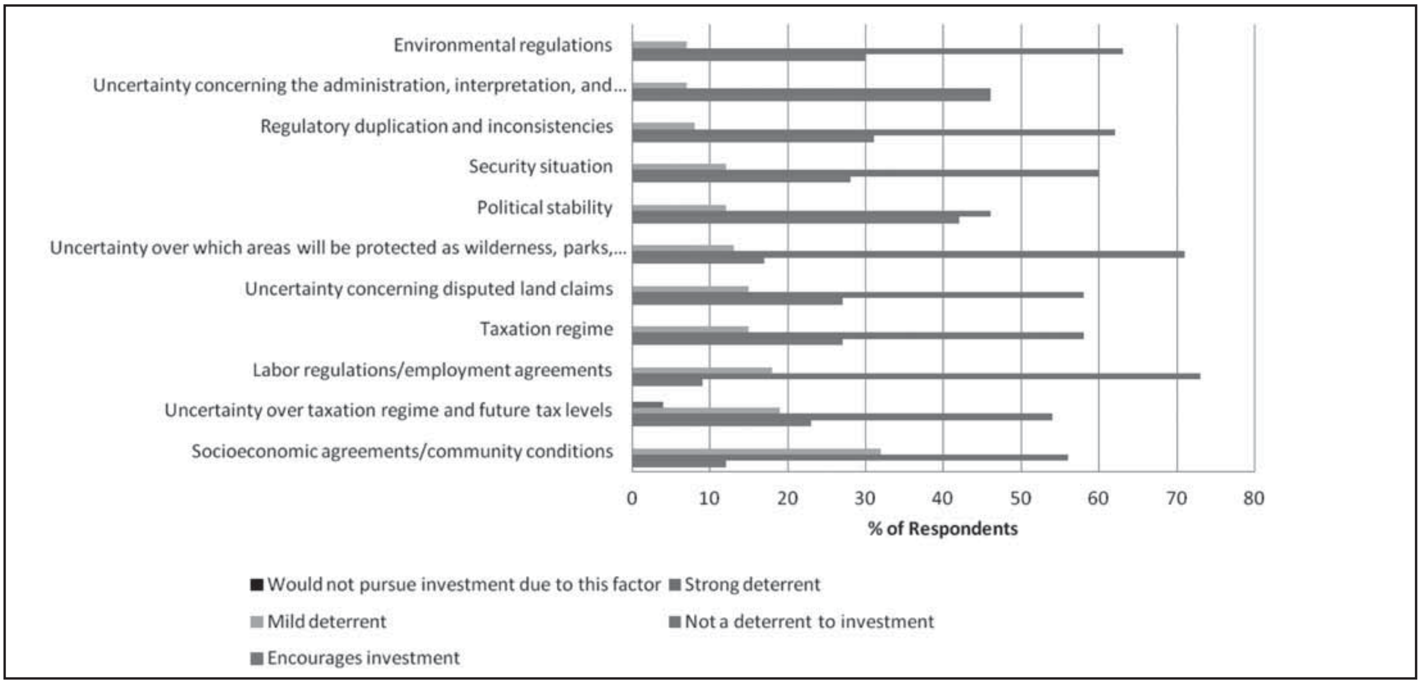
5.1 Analysis of the Fraser Institute's ranking scores for Botswana

In Figure 9, the respondents' views on the Botswana mining environment are presented. We observe that for all the issues presented, the range of positive responses where the view is that the mining regime in Botswana is not a deterrent to mining investment ranges from 46% to 73% of the respondents. We also observe that there are issues that are rated as mild deterrents and these account for views by 7% to 32% of the respondents, with the upper limit reflecting views regarding the issue of socioeconomic agreements/community conditions. The other high-scoring issues are the taxation regime (15%) as well as the uncertainty over the tax regime and future tax levels (19%) and labour regulations/employment agreements (18%). These issues are however viewed as a mild deterrent by the respondents, with the exception that 4% of the respondents view the uncertainty over the tax regime and future tax levels as a strong deterrent. In the rankings, Botswana comes out third after Utah and Finland (ranked 1st).

In Figure 10, we decompose the rankings by issue and observe a somewhat surprising result where the security situation is the issue in which Botswana obtains the lowest ranking of 28 out of the 51 mining jurisdictions covered. Botswana is ranked ahead of China and California but behind Ontario and the North West Territories. Finland is ranked in position 1. The overall impact of this issue though is that it is viewed as a mild deterrent by 12% of the respondents.

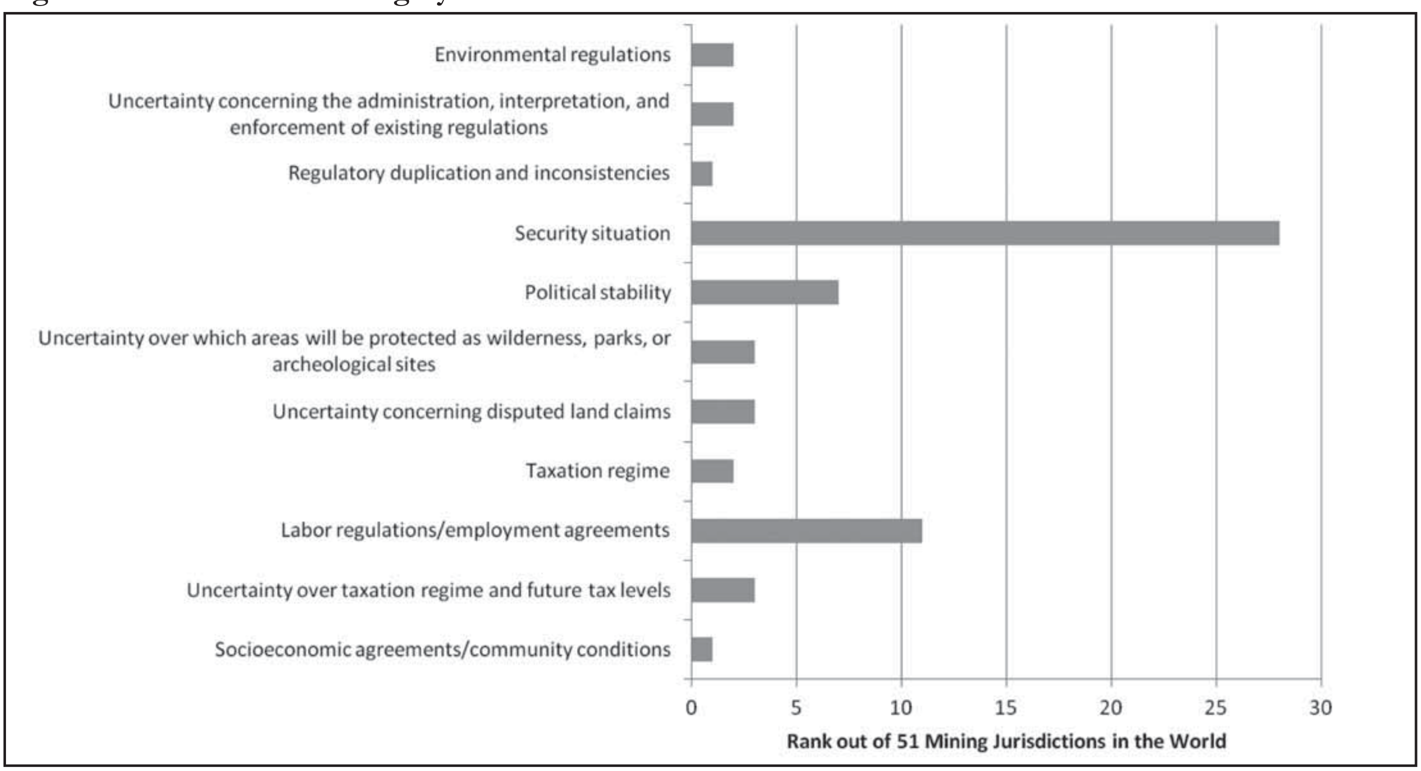
We applied the 80/20 rule to identify those issues viewed as mild deterrents to investment in the mining sector. The results are depicted in Figure 11, where the prioritisation is socioeconomic agreements/ community conditions, uncertainty over the tax regime and future tax levels, labour regulations/employment agreements, taxation regime, with the last issue among the priority list being political stability.

Figure 9: Analysis of Botswana's score in the Fraser Institute's mining survey update 2010



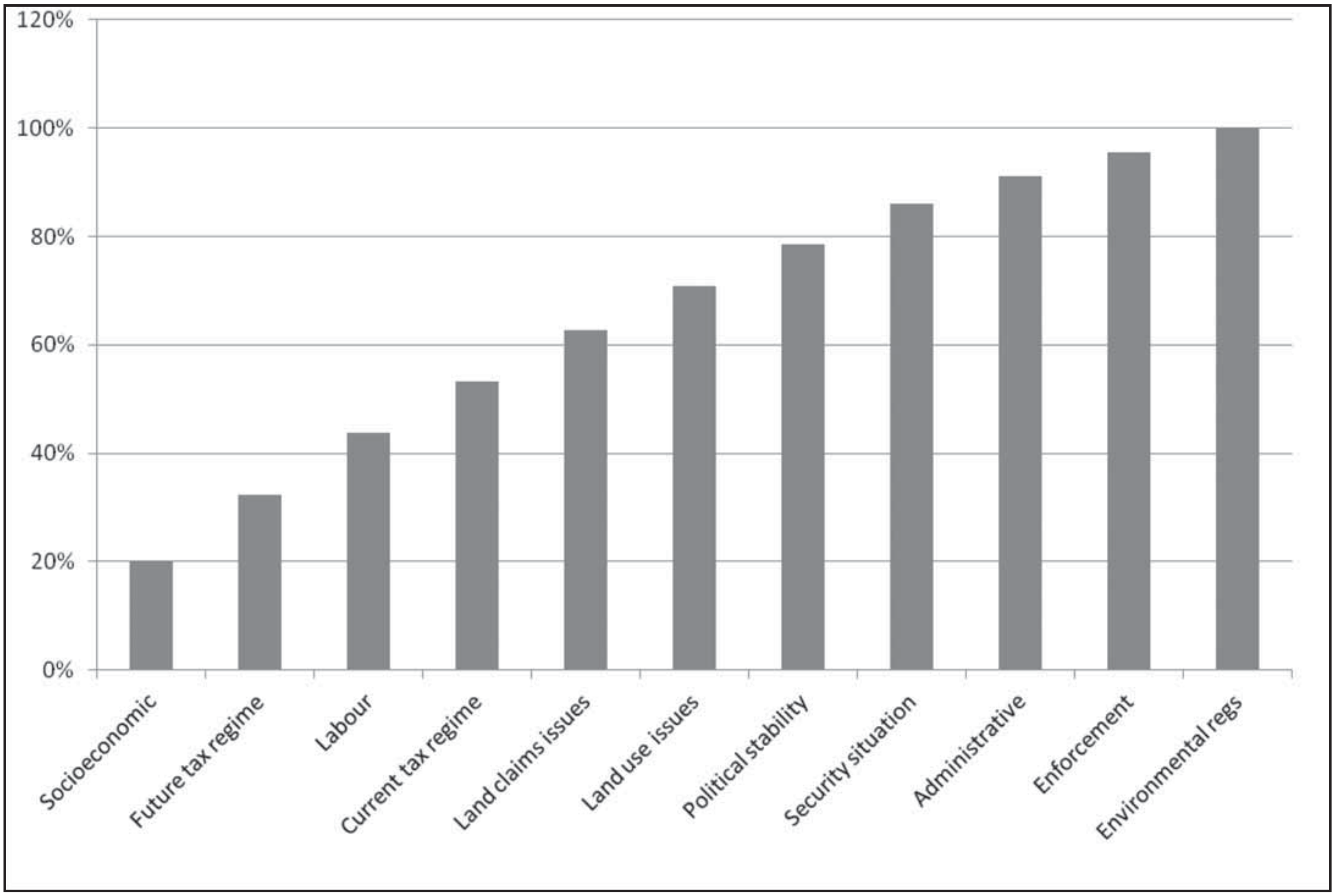
Source: *Compiled by authors from the Mining Survey Update 2010, Fraser Institute*

Figure 10: Botswana's ranking by issue area



Source: *Compiled by authors from the Mining Survey Update 2010, Fraser Institute*

Figure 11: Pareto chart of issues rated as mild deterrents in the mining survey update



Source: *Compiled by authors from the Mining Survey Update 2010, Fraser Institute*

5.2 Analysis of the local survey responses by exploration and mining companies

A structured questionnaire was administered to companies that attended the Botswana Resource Section Conference that was held at the end of June in Gaborone. A total of 10 questionnaires were received back and, as this number is small, we will summarise the results under this section while the full analysis of the response can be found in Appendix 5.

The responses to selected questions are presented in the tables below. It is anticipated that these would guide the Ministry of Minerals Energy and Water Resources to address the deficiencies by either putting in place the proper administrative procedures or amending the Act, where this is found to be appropriate. The big drawback from our sample of respondents is that no firm recommendation can be made as the issue regarding sample representativity is valid in this case.

In Table 12, the issue that might require further explanation is that of overlapping of prospecting licences. It seems that this has not been sufficiently explained to the mining industry. The issue about an Act for CBM gas is justified and its accompanying regulations would assist in guiding activity in this area.

Table 12: Concerns regarding the Act relating to PLs

What concerns, if any, do you have regarding the Act as it relates to prospecting licences?

Comments by respondents	Frequency
People hold licences without using them effectively	1
Overlapping prospecting licences for different commodities	1
Policy does not allow coal and uranium licences to overlap	1
No clear law that clarifies how reporting and minimum expenditure are treated	1
Royalties are high at 10%	2
Matters of overlapping applications not addressed in a sensible manner	1
No Act that could be customised for gas (CBM)	1
None	1
Exploration permits have too short expiry dates. Coal Seam Gas is not adequately covered within the existing Mining Act.	1

In Table 13, while the majority of the respondents find the Act to be fine with respect to retention licences, the suggestions of some of the respondents could lead to better administration of the retention licence. The views may also point towards the speed at which government communicates administrative changes to the industry. For instance, the licensing function that used to be carried out by the Department of Geological Surveys has now been placed under the Department of Mines, which addresses some of the concerns by mining exploration and mining companies.

Table 13: Concerns regarding the Act relating to RLs

What concerns, if any, do you have regarding the Act as it relates to retention licence?

Comments by respondents	Frequency
Need for licence monitoring mechanism	1
No provision for company to retain a licence area for further exploration	1
Criteria for tenure contain ambiguity and seem to call for extensive discretion from ministry	1
Prospecting and retention licences are issued by different government departments	1
It can easily be misused to allow companies to sit on a prospective acreage without doing work	1
The Act is fine and useful	5

Table 14: Concerns regarding duration and tenure of licences

The Act provides for a total of 13 years (up to seven years of prospecting and up to six years of retention) of tenure from the first issue of a prospecting licence to the expiry of a renewed retention licence. What concerns do you have regarding this duration of tenure?

Comments by respondents	Frequency
Successful exploration does not necessarily conform to temporal constraints	1
There should be an opportunity to extend prospecting licence beyond 7 years	2
Government should be a bit more lenient during global recession	1
Duration should be extended to 15 years. Government needs to address infrastructural developments for bulk commodities.	1
The process is fair and open	2
None	4

Table 15: Concerns regarding the Act as it applies to the application for a mining licence

What concerns, if any, do you have regarding the Act as it relates to an application for a mining licence?

Comments by respondents	Frequency
Its not clear how large a licence can be	1
Feedback is slow when processing. No clear alignment between the EIA and DGS	1
Government departments need to streamline some processes to shorten time from application to granting	1
The questions and answer process explored some unusual and onerous imposts	1
The process of notification for gazettal of new prospecting areas needs to be streamlined	1
The Act is fine	4
Other	1

While the majority of respondents find the Act to be fine, Table 15 provides good customer satisfaction feedback for the Department of Mines regarding the permitting process.

Table 16: Concerns regarding the Act relating to the application for renewal of a mining licence
What concerns, if any, do you have regarding the Act as it relates to the renewal of a mining licence?

Comments by respondents	Frequency
Renewal should be automatic for companies that complied with all conditions	1
Contracts with major customers often exceed the statutory duration	1
The Act is fine	4
Have not reached renewal period yet	3

We provide our policy recommendations in section 8.

Forecasting government mineral revenues

6

We constructed individual economic models for both existing and possible mining projects and applied these to forecast government mineral revenues. In recognition of the significant role that mineral revenue from diamonds continues to play in government mineral revenues, we create three diamond price scenarios, Low, Base and High case scenarios. These will be elaborated upon under the specific section dealing with government mineral revenues from diamonds.

In this chapter, we will first provide a brief description of the projects included in the study to highlight any critical issues of concern; this will be followed by the global assumptions, government mineral revenue forecasts, forecast mineral export revenues, employment levels and projected contribution to GDP.

6.1 Brief description of projects included in the study

The mining projects included in this study include existing and possible future projects which are briefly described under the headings below.

6.1.1 Diamond projects

Jwaneng mine – Critical issues regarding the Jwaneng mine are the increasing size and depth of operation that will result during the Cut 8, which may result in higher mining costs. This issue will persist into Cut 9. It is not clear what route the mine will take post Cut 9 – whether it will shut down or switch to underground mining.

Jwaneng mine tailings dump – These dumps present an opportunity for exploitation as long as the economics are good.

Jwaneng DK7 – This is a satellite diamond pipe near Jwaneng and it also presents an opportunity for exploitation as long as the economics are good.

Orapa mine – Generally similar issues to Jwaneng mine due to deepening of the open pit which raises issues about underground mining as well as treatment of the tailings dump. The latter would involve the conversion of the older of the two plants into a dump treatment plant.

Orapa mine underground – Long-term planning indicates that there would be an underground mine at Orapa that would start production within the 15-year time horizon for this study and continue for some years into the future. This project would include Orapa tailings dump.

Damtshaa mine – Damtshaa mine exploits one of the smaller diamond pipes in the Orapa area and its scale relative to other mines in Debswana is not significant.

Letlhakane mine – This mine is planned to shut down early within the period of this study.

Letlhakane mine tailings dumps – These dumps present an opportunity for exploitation as long as the economics are good.

Ghaghoo diamond mine (formerly Gope) – This mine is under development and it is scheduled to start production in 2013. The volume of production will be only a fraction of that of Debswana.

BK11 diamond mine – This mine started production in 2010. The volume of production will be only a fraction of that of Debswana and its planned life falls within the period for this study.

AK06 diamond mine – This mine is under construction and is planned to start production in 2012. It will be at the same scale as BK11 and will have a relatively short life of mine that falls within the period for this study.

6.1.2 Base metals, silver and soda ash and salt

BCL mine – The critical issue regarding BCL has always been defining sufficient ore reserves at qualities high enough to sustain the mine operations. The mine is getting deeper which will lead to higher mining costs, thus exacerbating the company's profitability.

Tati's Phoenix mine – Tati produces concentrate for toll smelting at the BCL mine. The critical issues are that the mine depends on the smelting facility at BCL and also that of defining sufficient ore reserves to sustain mining operations.

Thakadu and Makala mine – This is a copper silver mine that will produce concentrates. The project is planned to have a short life of mine if more ore reserves are not defined to sustain mining operations.

Bosetu project – This is a copper silver mine currently under development near Maun. The project is planned to have a short life of mine if more ore reserves are not defined to sustain mining operations.

Hana project – This is a copper silver exploration target in the Ghanzi area. The project is still under exploration but indicative production rates point to a small copper mine by international standards. Based on the current known information, the project would have a short life of mine.

Mount Burgess project – This is a zinc, lead and silver exploration target in the Ghanzi area. The project is still under exploration but indicative production rates point to a small mine by international standards. Based on the current known information, the project would have a short life of mine.

6.1.3 Coal

Morupule coal mine – The mine just completed an expansion project that tripled its existing capacity to 3.2 Mtpa. The mine is also looking at the export coal market.

Sese Stage I & II – This project is still under investigation by the owners. Like other coal projects the issue is that of rail and port capacity to export the coal. Also, there may be opportunity for electricity generation for the local market albeit at low capacity (300MW).

Mmamabula export coal mine and power complex – This project is still under investigation by the owners and has been substantially scaled down. Like other coal projects the issue is that of rail and port capacity to export the coal.

Mmamantswe coal project – This is an export coal project that is still under investigation by the owners. Like other coal projects the issue is that of rail and port capacity to export the coal.

6.1.4 Coal bed methane

Tlou energy – This project is targeting CBM extraction for power generation. It is still under investigation.

Anglo Coal Botswana – This project is targeting CBM extraction for LNG production for domestic and export markets. It is still under investigation.

Kalahari Energy – This project is CBM extraction for power generation. It is still under investigation.

6.1.5 Uranium

A-Cap Resources – This project is targeting uranium resources at Letlhakane in the Serule area. The uranium resource is among the ten largest deposits in the world and the company is optimistic that it would be profitable to mine even though it is still under investigation.

6.2 Global assumptions for mineral revenue forecasts

Like any forecasting exercise, it is important to state the economic assumptions such as inflation and exchange rates as these have a bearing on the growth path of metal prices, operating and capital costs. The following global assumptions are used in the individual economic models:

i. **Geology and mining plan** – The geology (grades and volumes) are assumed as given for each project. The mining plan for each of the projects is also taken as given so that the projected mineral output remains unchanged from that given by the project operators or obtained from official project web sites.

ii. **Exchange rates –** The future period exchange rate is obtained by adjusting the current rate by the inflation differential between the two countries to preserve power purchasing parity.

iii. **Mining operating cost –** Some of Botswana's mines have been in operation for periods in excess of 25 years. The workings continue at increasing depths every year and this is likely to result in real cost increases over the projection period. These would be assumed to escalate at a rate in excess of the local consumer price index

(CPI). The long-term local inflation rate is taken as the middle of the target range for monetary policy by the Bank of Botswana. We assume that mining operating costs will escalate at 2% p.a. in real terms.

iv. **Mining capital cost** – The steel index would be used in conjunction with expert views from project owners regarding the short-term escalation of capital projects. The consensus view among industry experts is that capital cost escalation is likely to remain at 14% per annum for 2012. Thereafter we assume that this would remain at 2% p.a. in real terms for the rest of the projection period.

v. **Mining fiscal regime** – For existing operations, the actual regime of royalties, share of profits, profit taxes, etc is applied. For new projects, including diamond projects, the variable rate income tax (VRIT) formula is assumed to apply.

Table 17: Global economic assumptions

Economic Variable	2012	2013	2014	2015	2016-2026
Exchange rate (PPP)	7.16	7.52	7.72	7.93	PPP
Working cost escalation	9.30%	9.30%	7.00%	7.00%	7.00%
Capital escalation	14.00%	7.30%	5.00%	5.00%	5.00%
General inflation (de-escalation)	7.30%	7.30%	5.00%	5.00%	5.00%
US inflation	2.00%	2.10%	2.30%	2.30%	2.40%
RSA inflation	7.30%	5.00%	5.00%	5.00%	5.00%

6.3 Diamond market assumptions

The Government's mineral revenue from diamonds will be derived from the existing Debswana Diamond Mining Company mines of Jwaneng, Orapa, Letlhakane and Damtshaa as well as mines such as Monak Venture's BK11, Lucara Diamonds' AK06 and Gem Diamonds' Ghaghoo (formerly Gope) project which is at the mine development stage. Many of the future possible projects will be from the existing Debswana operations and may include additional mining cuts, underground mining, as well as re-treatment of tailings dumps. It is considered unlikely that any new mine first discovered in 2012 or later could become a significant taxpayer within the time horizon of this study.

With regard to diamond prices, we must make some preliminary observations. First is that, following recent changes in the structure of the industry and the new environment imposed by the activities of various international competition authorities, gem diamonds have become 'commoditised'. That is to say it is no longer possible for any dominant single-channel supplier to manage their price in the way that prices were managed by the De Beers Central Selling Organisation for a century until the early years of this millennium. Now and in the future, prices are much more free to respond to short-term fluctuations in supply and demand. The three years from 2008 to 2011 provide a most striking example. As the global recession took a grip on the world economy in 2008, rough gem diamond prices are said to have fallen by 50% or more. As Debswana slashed its production in 2009, prices climbed rapidly in response to the 'shortage' and were reported by late 2010 to be approaching pre-recession levels. The rising trend continued, with reports of prices increasing by up to 50% in the first half of 2011. But by the end of 2011, reports in the market suggested that half or more of the gains made in the first half-year had been lost in the last quarter. This was said to have been due to a fall in demand resulting from the escalating financial crisis in the Eurozone economies.

It must therefore be expected that superimposed on whatever long-term trend we might envisage for diamond prices will be sharp short-term swings both year-on-year and intra-year. Given the factors which will determine supply and demand for gem diamonds, we believe it is reasonable to project price trends in time periods of roughly five years.

For the period 2012 to 2016 inclusive, we adopt what is, in fact, a very broad consensus of views that growth in demand, especially from India and China, will outstrip growth in the supply of newly mined stones (especially high-quality diamonds) thus creating significant upward pressure on prices in the coming five years. However, we need also to recognise the possibility that economic recession in any part of the developed world could affect global demand for exports from China and India – so we may not see the kind of unconstrained growth in demand for diamonds as we might have seen in the absence of global economic problems. Furthermore, we do not see any significant downward pressure on prices before 2016 as a result of the introduction of cheaply produced synthetic material, which we believe might occur at a later date.

Overall, we think a sensible assumption is that diamond prices will grow at a real rate of 2% p.a. (i.e. 2% p.a. more than US inflation) in the period 2012 to 2026 and this is the figure used in our Base-case scenario or central projection of government revenues. Our low scenario assumes that prices would escalate at the US inflation rate.

For the High-case scenario, we assume that diamond prices will grow at 4% real for the period 2012 to 2016. For the period 2017 to 2021, we believe that the factors dominating in 2012–2016 will continue to be influential, though price increases might be restrained by growing expectation of effective competition from synthetic material and / or possibly higher production of mined diamonds using improved recovery technology at mines in either the 'traditional' producing countries or new producing areas, this being in response to price increases in the preceding five-year period.

For 2017 to 2021 therefore, we have adopted, for the High case, a lower trend of real price increases at an average of 2% p.a. – still positive but at half the rate of increase in the previous five-year period.

For the period 2022 to 2026, we assume that the High case would assume neither further real increases nor real declines. Therefore we assume prices will remain flat in real terms, which is equivalent to an assumption that prices will escalate at the U.S. inflation rate.

The balance of our view on the 'threat from synthetics' is that any early large scale producer will be seeking to enjoy the ruling price for mined diamonds rather than under-cutting it in order to capture market share. We therefore assume that any serious downward pressure on diamond prices from this source is likely to come considerably later – i.e. beyond 2026 which is the horizon for the present study.

6.4 Project assumptions and definition of scenarios

The government mineral revenue forecasts would be made under the following three scenarios, the Low-, Base- and High-case scenarios. These are defined below.

6.4.1 Base case

The assumptions for the Base-case scenario are as follows:

v. Diamond price escalation of 2% real over the period 2012–2026;
vi. Cost escalation at 2% real over 2012–2026;
vii. Existing mines only (this includes mines under construction); and
viii. Possible future diamond projects.

6.4.2 High case

The assumptions for the High-case scenario are as follows:

iv. Diamond price escalation at 4% real over the period 2012–2016; 2% over 2017–2021 and 0% over 2022–2026;
v. Cost escalation at 2% real over 2012–2026; and
vi. All mines, existing mines plus possible future mines included.

6.4.3 Low case

The assumptions for the Low-case scenario are as follows:

v. Diamond price escalation at 0% real over 2012–2026;
vi. Cost escalation at 2% real over 2012–2026;
vii. Existing mines only (this includes mines under construction); and
viii. Possible future diamond projects.

6.4.4 Diamond price assumptions

The above diamond price escalation assumptions are summarised in Table 18 on the next page.

Table 18: Diamond price assumptions

Scenario		2012	2013	2014	2015	2016	2017-2021	2022-2026
Low	US inflation	2.00%	2.10%	2.30%	2.30%	2.40%	2.40%	2.40%
	Real diamond price escalation	0%	0%	0%	0%	0%	0%	0%
Base	Real diamond price escalation	2%	2%	2%	2%	2%	2%	2%
High	Real diamond price escalation	4%	4%	4%	4%	4%	2%	0%

6.4.5 Base metal and silver projects assumptions

The High-case scenario is assumed to be the only case under which there would be government mineral revenues from base metal and silver projects from the copper-silver project near Ghanzi owned by Hana Mining as well as the Nxuu and Kihabe lead, zinc and silver projects owned by Mount Burgess.

Table 19: Base metal and silver price assumptions

All prices in nominal US$/lb or US$/oz for silver

	2012	2013	2014	2015	2016	2017-2026
Nickel	9.75	9.75	9.75	9.75	9.48	9.43
Copper	4.00	4.15	3.64	3.26	3.09	3.86
Cobalt	15.00	15.00	15.00	15.00	15.00	15.00
Silver	33.1	33.1	29.0	25.0	20.5	19.0
Zinc	1.1	1.2	1.1	1.1	1.1	1.0

Note: *These are consensus forecasts for late 2011.*

Over the period for this study, the forecast base metal and silver production from possible future projects is 625 k tonnes of copper, 31.25 million oz silver and 660.3 k tonnes zinc (Appendix 4). As with diamonds, the existing mines are likely to cease production due to economic exhaustion in 2032. Information about possible future copper and silver projects by Hana Mining indicates possible annual production rates of 50,000 tonnes of copper metal and 2.5 million oz of silver per annum over a 25-year life of mine. The Nxuu and Kihabe lead, zinc and silver deposit would provide a project life of about ten years. Information from the official website indicates that the company may be facing challenges regarding finance for this project so that the projected outputs and therefore the revenues may be distant. The Boseto project information indicates a target production rate of 36,400 tonnes of copper and 1 million oz over a ten-year life of mine. The existing

Mowana and Thakadu and Makala projects could only be estimated at five-year life of mine but the mine remains optimistic that it will establish more reserves to increase the life of mine. Other existing base metal operations may also be faced with economic exhaustion well within the period of the study if no new reserves are established.

6.4.6 *Coal projects assumptions*

Table 20, shows a list of coal projects included in this study.

Table 20: Coal projects under investigation in Botswana

Project and Location	Company	Brief Description of Project
1. Morupule Coal Mine – 10 km from Palapye	Debswana	The mine expansion project from the current capacity of 1 Mtpa to 2.8 Mtpa. Project nearing completion. Looking to export to regional markets.
2. Sese Coal Project – 50 km south of Francistown	African Energy	Pre-feasibility study of an export coal mine to come on stream in 2013 at 1 Mtpa followed by a stage II at 5 Mtpa.
3. Mmamabula – 120 km north of Gaborone	CIC Energy Corp	• Pre-feasibilty study for a 24 M tpa export steam coal complete. Project depends on the Trans-Kalahari railway line to Walvis Bay in Namibia. • Domestic power project – 300 MW at a capex of $800m (2010 money) with a construction period of two years. • Coal to Hydrocarbons – Tests have confirmed the technical viability of Mmamabula coal for cth (low sulphur diesel fuel). Evaluating proposals from technical partners.
4. Mmamantswe – 70 km north of Gaborone near the RSA border	Aviva Energy	A study has demonstrated the potential for an export coal mine for markets in India as well as a 300 MW power plant.

Source: *Company web pages*

While base and precious metals use London Metal Exchange prices as reference prices, the situation for coal is different as the latter relies on contract pricing. The law of one price holds for coal as it does for other mineral commodities and it is this property that is taken advantage of in forecasting coal prices. What this means is that we are able to rely on the price profiles based on models from other steam coal regions. In this regard we adopt the price profile which is based on the most likely or central scenario for the world steam coal trade (DECC, 2011).

Table 21: Price profile for export steam coal

	2012	2013	2014	2015	2020	2020-2026
Real Steam Coal Price Escalation	1.00	1.00	0.977	0.954	0.846	0.846

Source: *Computed from price forecasts by DECC, 2011, Figure 8 (Table)*

This price trajectory was generally reflected in the data supplied by one coal project and was therefore applied to all future coal projects.

The steam coal production profile for the High case is presented in Appendix 4 and over the study period it is projected that a total of 632.5 M tonnes of washed coal would be exported. In the Base case, we assume that no coal export projects would be developed.

6.4.7 CBM project assumptions

Three CBM exploration companies are included in this study. The assumptions regarding the project phasing are from the project materials by the respective companies and are as follows: Tlou Energy (H2, 2013), Anglo Coal (H2, 2013), and Kalahari Energy (H2, 2014). The forecasts given in this section are based on a desk-top level exercise as these companies are yet to complete detailed studies such as pre-feasibility studies.

The desk-top study relied heavily on a 2008 technical and economic investigation of the CBM potential in Botswana. This work was also at the desk-top level but it was a valuable resource in as far as establishing the essential elements of CBM from resources, technical requirements, process description, economics, etc. Appropriate escalation factors were applied to arrive at CBM economic models for the three projects. All CBM projects are included only in the High-case scenario.

We model the three projects as follows:

- Tlou Energy – CBM production for a 200 MW power plant with a smaller self-generating utility for site usage.
- Kalahari Energy – CBM production for a 270 MW power plant with a smaller self-generating utility for site usage.
- Anglo Coal – CBM production for an LNG plant for both domestic and regional markets.

Table 22: Natural gas prices

Nominal US$/MMBtu

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	....	2026
Natural Gas Prices	4.12	4.25	4.33	4.51	4.67	4.79	4.94	5.11	5.40	5.71	…	7.27

Source: *Average nominal US well head prices for lower 48 on-shore and off-shore sources (Annual Energy Outlook, 2011).*

The CBM production profile for the High-case scenario over the period 2012 to 2026 is presented in Appendix 4. The forecast indicates that over the period under study a total of 1,520.6 BCF of methane gas would be produced from the three projects owned by Anglo Coal, Kalahari Energy and Tlou Energy.

6.4.8 Uranium project assumptions

Reports by A-Cap Resources, who have prospecting licences in the Letlhakane area near Serule, indicate that their uranium deposit is among the top ten in the world. The company has yet to complete detailed studies and as such the economic model constructed for this deposit is at the desk-top study level. We relied on information obtained from uranium projects in Namibia. The current resource size may support a mine producing 2,000 tonnes per annum (tpa) of uranium over a 15-year life of mine (Appendix 4).

Table 23: Uranium prices

Nominal US$/lb

	2012	2013	2014	2015	2016	2017-2027
Uranium Price (US$/lb)	59.5	65.00	70.60	68.57	67.60	68.28

Source: *Consensus forecasts, July 2011*

The uranium production profile over the period 2012 to 2026 is presented in the Appendix. The forecast indicates that over the period under study a total of 25 k tonnes of uranium would be produced by A-Cap resources from its Letlhakane uranium deposit near Serule.

Future uranium markets are bound to be impacted by the Fukushima disaster as well as the phasing out of nuclear plants in some Western European countries. Indications are that the fuel of choice would be natural gas. This may affect the long-term projected prices in Table 23 and hence the profitability of the Letlhakane uranium project.

6.5 Results

In this section we present the summary of results for the three scenarios under the following subheadings: government mineral revenue forecasts, mineral export revenue forecasts, and employment. The detailed forecasts of government mineral revenues, mineral revenue exports and employment are presented as tables in the Appendix. We then provide detailed results for future projects in base metals, coal, CBM and uranium.

6.5.1 Government mineral revenue forecasts

The summary of government mineral revenues in five-year periods from 2012 to 2026 is presented in Table 24 below for all the scenarios. The choice of the five-year period is to align with the assumptions for the diamond market prices, which are the main drivers of mineral revenues and exports in the economy of Botswana.

Table 24: Summary of nominal government mineral revenues – all scenarios
(nominal BWP millions)

Scenario		**2012-2016**	**2017-2021**	**2022-2026**	**Totals**
Low case	Existing mines	25,451	36,542	49,863	559,279
	Future mines	0	0	0	0
	Totals	25,451	36,542	49,863	559,279
Base case	Existing mines	27,384	39,921	70,682	689,936
	Future mines	0	0	0	0
	Totals	27,384	39,921	70,682	689,936
High case	Existing mines	28,797	43,884	71,559	721,203
	Future mines	915	4,111	6,949	59,872
	Totals	29,712	47,996	78,508	781,075

Source: *Based on computations by the authors*

In all cases government mineral revenues show an upward trend and this is attributable mainly to diamond price assumptions together with marginal increases in diamond production from smaller mines such as Lucara Diamonds' AK06, Gem Diamonds' Ghaghoo mine (formerly Gope), and Monak Venture's BK11 mine. The copper and silver projects by African Copper and Discovery Metals' Boseto copper silver project are also projected to have a marginal impact on government mineral revenues as these are included under existing mines.

For the High-case scenario, this includes possible revenues from coal projects that would be aimed at producing coal for the export markets in Asia and Western Europe. These projects would rely on the existence of rail and port infrastructure. Similarly projects on CBM would require a gas distribution system for both the domestic and export market.

The full-period nominal government mineral revenue forecasts are P559.279 billion, P682.182 billion and P781.075 billion for the Low-, Base- and High-case scenarios respectively. In real terms, these are P372.83 billion, P447.380 billion and P506.70 billion for the Low, Base and High cases respectively (see Table 25 below). The difference between the Low- and Base-case values is driven by the difference in diamond price escalations between the two scenarios where in the former a zero real diamond price escalation is assumed while in the latter a 2% real diamond price escalation is assumed for the full period of the study.

Table 25: Summary of real government mineral revenues – all scenarios
(real 2012 BWP millions, exchange rate USD1.00 = BWP7.16)

Scenario		2012-2016	2017-2021	2022-2026	Totals
Low case	Existing mines	22,235	25,354	26,977	372,830
	Future mines	0	0	0	0
	Totals	22,235	25,354	26,977	372,830
Base case	Existing mines	27,792	27,792	37,826	447,380
	Future mines	0	0	0	0
	Totals	27,792	27,792	37,826	447,380
High case	Existing mines	25,041	30,539	38,390	469,849
	Future mines	757	2,850	3,763	36,851
	Totals	25,798	33,389	42,153	506,700

Source: *Based on computations by the authors*

6.5.2 *Mineral export revenues*

Tables 26 and 27 below present a summary of nominal and real mineral export revenues in five-year steps. For the same reason advanced above, there is an upward trend in mineral exports for all scenarios.

The full period nominal mineral export revenue forecasts are P1,164 billion, P1,357 billion and P1,698 billion for the Low, Base and High case scenarios respectively. In real terms, these are P773.0 billion, P887.0 billion and P1,105.0 billion for the Low, Base and High cases respectively.

Table 26: Summary of nominal mineral export revenues – all scenarios
(nominal BWP billions)

Scenario		2012-2016	2017-2021	2022-2026	Totals
Low case	Existing mines	53	72	107	1164
	Future mines	0	0	0	0
	Totals	53	72	107	1164
Base case	Existing mines	55	82	134	1,357
	Future mines	-	-	-	-
	Totals	55	82	134	1,357
High case	Existing mines	57	88	136	1406
	Future mines	5	22	31	292
	Totals	63	110	167	1698

Source: *Based on computations by the authors*

Table 27: Summary of real mineral export revenues – all scenarios
(real 2012 BWP billions, exchange rate USD1.00 = BWP7.16)

Scenario		2012-2016	2017-2021	2022-2026	Totals
Low case	Existing mines	47	50	58	773
	Future mines	0	0	0	0
	Totals	47	50	58	773
Base case	Existing mines	48	57	72	887
	Future mines	-	-	-	-
	Totals	48	57	72	887
High case	Existing mines	50	61	73	922
	Future mines	4	15	17	182
	Totals	55	76	90	1,105

Source: *Based on computations by the authors*

6.5.3 Employment

The projected employment levels are presented in Table 28 below. It is clear that without new mining projects, employment under the Low- and Base-case scenarios declines over the period. The inverted U-shape for these two cases is due to the fact that some of the smaller projects in diamonds such as BK11 and AK06 and those in base metals such as Discovery Metals' Boseto project and African Copper's Mowana and Thakadu and Makala projects have project lives that fall within the period of study. These projects will be exhausted before 2026, which is the end period for this study.

Table 28: Summary of employment levels – all scenarios

Scenario		2012-2016	2017-2021	2022-2026	Yr 2026
Low case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	0	0	0	0
	Totals	12,458	13,387	12,034	11,613
Base case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	0	0	0	0
	Totals	12,458	13,387	12,034	11,613
High case	Existing mines	12,458	13,387	12,034	11,613
	Future mines	2,361	6,072	7,506	7,571
	Totals	14,819	19,459	19,540	19,184

Source: *Based on computations by the authors*

6.5.4 *Projected mineral contribution to the economy*

Appendix 4a shows the mineral GDP estimates under all three scenarios (Low, Base, High) and adds, in each case, our simplified estimate of non-mining GDP in order to derive the percentage contribution of minerals to total GDP, for all three cases, annually, through the projection period. In the Base-case scenario, mineral contribution to GDP in 2012 is 24.6% and rises to peak at 31.3% in 2014, before declining gradually towards a plateau just below 25% between 2020 and 2025. The jump in 2026 is explained by projects at existing diamond mines that are scheduled to come on stream at that time. The Low case shows the same rise to a peak in 2014 but then a steady long-term decline to average out at 20.1% for the last five-year period (2022–2026). The High case, which includes mineral production from 'new mines', peaks at 34.8% in 2015 (of which 30.6% is from existing mines) and drops to average out at 28.2% (of which 22.8% is by existing mines).

Table 29 depicts the projected gross values of minerals produced averaged over the time periods depicted in the table. In the High-case scenario, the gross value of minerals from future mining projects is projected to grow at a real compound annual growth rate (CAGR) of 12.6% over the period 2013–2026 as compared with 7.5% for existing mines (period 2012–2026). The overall CAGR over the study period is 8.1% (see Appendix 4a for details).

Table 29: Projected mineral contribution to GDP

(real 2012 BWP billions, exchange rate USD1.00 = BWP7.16)

Scenario		2012-2016	2017-2021	2022-2026	CAGR 2012-2026
Low case	Existing mines	35.7	38.0	44.1	5.3%
	Future mines	0	0	0	0
	Totals	35.7	38.0	44.1	5.3%
Base case	Existing mines	36.5	43.3	54.7	7.1%
	Future mines	0	0	0	
	Totals	36.5	43.3	54.7	7.1%
High case	Existing mines	38	46.36	55.48	7.0%
	Future mines [a]	3.0	11.4	12.9	12.6%
	Totals	41.0	57.8	68.4	8.1%

Source: *Based on computations by the authors*

Notes: [a] *The real compound annual growth rate (CAGR) is over the period 2014 to 2026 while for all others it is 2012–2026 to avoid division by zero in the former.*

Over the five-year period 2008–2012, the ratio between Gross Value Added and Total Mineral Exports averages out at 0.76. This factor is applied to project the Gross Value Added from future mining projects.

Table 29, can best be expressed in terms of percentage contribution to GDP as shown in Table 30 below. In the Base-case scenario, the projected mineral contribution to real GDP is 25.8%, 23.6% and 22.1% for the time periods 2012–2016, 2017–2021 and 2022–2026 respectively. For the High-case scenario, the respective contribution to real GDP is 27.6%, 28.6% and 25.9%. The increase is due to mineral exports from future mining projects. The contribution from future mining projects is 2.0%, 5.7% and 4.9% for the respective time periods (see Appendix 4b for details).

Table 30: Projected percentage mineral contribution to GDP

Scenario		2012-2016	2017-2021	2022-2026
Low case	Existing mines	25.2%	21.6%	18.9%
	Future mines	0.0%	0.0%	0.0%
	Totals	25.2%	21.6%	18.9%
Base case	Existing mines	25.8%	23. 6%	22.1%
	Future mines	0.00%	0.00%	0.00%
	Totals	25.8%	23.6%	22.1%
High case	Existing mines	25.6%	22.9%	21.0%
	Future mines	2.0%	5.7%	4.9%
	Totals	27.6%	28.6%	25.9%

Source: *Based on computations by the authors*

Discussion of results

7

The point of origin for this study, and therefore one of its first points of focus, is the widely expressed concern that revenue flows to government from the existing diamond mines will begin a long-term decline quite soon; and that there are no new mineral (or other) projects in view which would significantly ameliorate that decline. Table 31 presents the projected percentage contribution by all possible future projects (High-case scenario) to government mineral revenues in five-year periods to 2026. This contribution averages 2.3% for the first five-year period from 2012 to 2016; 8.6% over the period 2017 to 2021 and 9.2% in the last five-year period, 2022 to 2026. In all the respective periods, the existing mines account for the remainder, and while we do not explicitly disaggregate the existing mines by mineral type, we do not foresee a situation where diamonds would lose their majority share of government mineral revenues. We therefore conclude by confirming the widely held view that diamond mineral revenues from the existing mines will be the single dominant factor in determining the performance of Botswana's economy for at least the next 15 years.

Over the period of study, we find that future coal projects hold the highest potential at an average contribution to government mineral revenue of 3.7% followed by CBM at 2.3%, uranium at 0.9% and lastly base metal and silver projects at 0.7% (see Table 31). The detailed forecast values are presented in the Appendix.

Table 31: Percentage contribution by future projects to government mineral revenues – High case

Mineral	2012-2016	2017-2021	2022-2026	Totals
Base metals	0.3%	0.9%	0.6%	0.7%
Coal	1.6%	4.8%	3.8%	3.7%
CBM	0.2%	1.7%	3.6%	2.3%
Uranium	0.2%	1.2%	1.1%	0.9%
Total contribution by future projects	2.3%	8.6%	9.2%	7.7%

Source: *Based on computations by the authors*

7.1 Mineral revenues from diamonds

There are no future diamond mining projects and all the possible future diamond projects at the Debswana diamond mines have been included as part of the normal long-term planning for these mines. Such projects include the treatment of existing satellite kimberlite pipes, tailings dumps, additional major open-pit cuts or the switch to underground mining to exploit the ores that would no longer be economic to mine by the current open-pit mining methods.

7.2 Mineral revenues from base metals and silver

The copper, silver, lead and zinc exploration projects in the Ghanzi area were estimated at the desk-top level and have a very low level of certainty as by their nature, any techno-economic evaluation of a project in this phase would be considered a desk-top study with a level of accuracy of +-40%–50%. These projects have been excluded from both the Low- and the Base-case scenarios. They are, however, included in the High-case scenario, where their contribution, expressed as a percentage of total government mineral revenues would average 0.3%, 0.9% and 0.6% for the five-year periods 2012–2016, 2017–2021 and 2022–2026 respectively. The average contribution over the 15-year study period is 0.7% (see Table 31).

7.3 Mineral revenues from coal

The projected government mineral revenues from future coal mines are very dependent on the existence of rail and port infrastructure to export the washed coal to the world steam coal markets in Asia and Western Europe. These were also estimated at the desk-top level based on project start dates from company web pages. While African Energy's Sese stage 1 is projected to come on stream in 2013, stage 2 would require the existence of rail and port infrastructure and is estimated to come on stream in 2016. CIC's Mmamabula project also includes a staged approach with some exports using existing infrastructure in 2013 and then ramping up in 2016 provided there is rail and port infrastructure to export into the world steam coal market. Aviva's Mmamantswe coal project is also targeting 2016.

It is therefore very clear that any future government revenues from coal would be very much dependent on the availability of rail and port infrastructure. The probability of realising these projected mineral revenues will depend on whether or not definite steps are seen on the development of the rail and port infrastructure upon which these projects depend. At this point these projects can be assumed to have a low probability of being realised by 2016 and are therefore excluded from the Low- and Base-case scenarios.

Table 31 presents the percentage share of government mineral revenues from future coal projects (High-case scenario) and these average out at 1.6%, 4.8% and 3.8% respectively for the 2012–2016, 2017–2021, and 2022–2026 periods. It is apparent that coal projects hold the highest potential followed by CBM and lastly both uranium and base metals. The detailed forecasts are presented in the Appendix.

7.4 Mineral revenues from coal bed methane (CBM)

The estimated government mineral revenue from this category is at the desk-top level of accuracy. What compounds the uncertainty is the project phasing where two of the projects are projected to come on stream in the second half of 2013 with the third coming a year later in 2014. CBM holds upside potential as preliminary results seem to indicate that Botswana's coal resources would yield economic quantities of methane gas. Another uncertainty arises from the need to secure a market for the CBM gas. The main assumptions are for power generation. Due to the high level of uncertainty, CBM is excluded from the Low- and Base-case scenarios but is included in the High-case scenario.

7.5 Mineral revenues from uranium

There is high uncertainty around the estimates of government mineral revenues from the Letlhakane uranium resource as the estimates are at the desk-top level. There is however upside potential as the resource is considered to be world class and is likely to be low cost due to the low overburden cover. The project was reported to be advancing into the pre-feasibility study stage but no results have been made public as yet. We therefore believe that the high level of uncertainty would also be due to the uncertain project phasing and exclude uranium from both the Low- and Base-case scenarios but include it in the High-case scenario.

7.6 Revenue impact of possible planned infrastructure projects on future mining projects

An analysis of the responses to the questionnaire that was administered to exploration and mining companies in Botswana revealed that 5 out of 11 indicated that their projects depended on the existence of a railway line; about half indicated that they preferred the Walvis Bay route and the same number preferred Techobanine port in Mozambique.

Other companies (CBM exploration) indicated that they need a pipeline for exporting gas to regional markets.

All future coal projects depend on the development of rail and port infrastructure. Some copper–silver projects around Ghanzi would also require such infrastructure to transport their concentrates to smelters and refineries, either local or abroad.

This work has helped to quantify the likely level of benefits to government that would be unlocked by the development of rail and port infrastructure to service projects in the minerals sector.

7.7 Projected impact on GDP

For future stages of the wider study on economic diversification, it will be important, with the aid of a macro-economic model, to project into the future the share of forecasted GDP which is expected to be generated directly by the mineral sector. That ought to be the launching point for assessing the potential value of possible diversification policies and measures.

Because growth or contraction in non-mineral sectors is, in Botswana's case, heavily influenced by mineral output (which is usually, and reasonably, assumed to be exogenously determined), it would be logical to determine non-mineral GDP as an output of the model, based on the relationships established within the model itself, for example between mineral production GDP and financial services GDP. However, at this stage of the wider diversification study no outputs are forthcoming; so for purposes of the minerals study, in order to comment on possible GDP contributions, the consultants have developed a shorthand method for generating a 'benchmark' projection of non-mineral GDP. This projection is then grafted onto the mineral projection so as to generate a benchmark series for the proportions of projected GDP which are constituted by mineral and non-mineral GDP.

The mineral contribution to GDP would ideally be derived as output from a macro-economic model, taking exogenously determined inputs on the mineral sector and established relationships between minerals and other economic sectors. This being obviously far beyond the reach of this present study, which focuses solely on the minerals sector, we take the value of mineral GDP to consist of the full export value of all domestic mineral production which is exported plus the gross sales value of all domestic mineral production which is sold domestically to local end-users. Obviously the big numbers here are, for exported minerals, the export sales value of exports of diamonds, soda ash & salt; and for domestically consumed minerals, the sales value of coal sold by Morupule Colliery to all domestic customers, chiefly BPC, BCL and Botash.

Regarding non-mineral GDP, we derive a real compound annual growth rate using non-mineral GDP data for the period 1996 to 2011 and then apply this real trend growth to project non-mineral GDP for the period 2012 to 2026.

We find that there is a fairly consistent pattern in all three mineral cases, in which the contribution of minerals to GDP in the first five-year time period is between 27.4 and 30.3 percent. This appears consistent with the general statements made up to and including 2012 that mining directly accounts for about a third of total GDP. In our base case, this contribution is projected to fall to 25.4% in the five- year period 2017 to 2021 and to fall further to 20.1% in the five years 2022–2026. In the low mineral case (as expected bearing in mind that we use a simple projection for non-mineral GDP) the mineral contribution falls rather faster through the five-year time periods from 27.4% to 23.2% and 20.1%. Even in the high mineral growth case, which feels the impact of some new mines that do not feature in the other two cases, the direct mineral contribution to GDP is below the one third mark, rising marginally from 30.3% in the 2012–2016 period to 31.4% in the period 2017–2021 before declining marginally to 28.2% in the last five-year period to 2026.

Table 32, shows the 20-year series of non-mineral GDP, which has been converted to real 2012 money terms using the GDP deflator. We have calculated the average annual growth rates for various periods ending in 2011 giving the following compounded annual growth rates in real terms: 1991–2011 (2% p.a.); 1996–2011 (6.4% p.a.); 2001–2011 (7.8% p.a.); and 2006– 2011 (10.3% p.a.).

Clearly there has been a significant shift upwards in the growth rate in more recent years. However, we think it would be imprudent to take a recent five-year growth performance and project it forward for 15 years into the future and we find an appealing logic, though not based on rigorous statistical methods, in looking backwards for the same length of time as we are looking forwards. Hence we adopt an average growth rate of 6.4% p.a. for our 15-year projection of non-mineral GDP; and we apply this Base case for non-mineral GDP equally to all cases (Low, Base and High) of projected mineral GDP.

On this, admittedly grossly over-simplified basis, Appendices 4a and 4b show below the summation of mineral GDP (three cases) and projected non-mineral GDP (one case only) and the derivation of the percentage share of mineral GDP in total GDP as calculated.

Table 32: Historic trends in non-mining and mining components of GDP

Year	Nominal GDP (BWP Millions)			Inflation, %	Real GDP 2012 (BWP Millions)			Mining % of GDP
	Non-mining GDP	Total GDP	Mining GDP		Non-mining GDP	Total GDP	Mining GDP	
1990	5,247	8,322	3,075	11.4	62,968	99,865	36,898	37%
1991	5,173	8,299	3,126	11.8	55,538	89,101	33,562	38%
1992	6,003	9,045	3,042	16.2	36,019	54,272	18,254	34%
1993	7,085	11,041	3,956	14.3	37,182	57,944	20,762	36%
1994	8,116	12,261	4,145	10.5	32,465	49,044	16,579	34%
1995	9,404	14,204	4,800	10.5	34,037	51,411	17,374	34%
1996	10,832	17,740	6,908	10.1	32,496	53,221	20,725	39%
1997	12,498	20,163	7,665	8.7	34,486	55,637	21,151	38%
1998	14,831	21,524	6,693	6.7	35,594	51,657	16,063	31%
1999	16,554	24,943	8,389	7.7	36,872	55,558	18,686	34%
2000	18,551	28,637	10,086	8.6	37,102	57,273	20,171	35%
2001	20,688	31,922	11,234	6.6	38,829	59,915	21,086	35%
2002	23,702	36,338	12,636	8.0	40,632	62,293	21,661	35%
2003	25,370	40,447	15,077	9.2	39,831	63,501	23,670	37%
2004	30,532	49,817	19,284	6.9	45,798	74,725	28,926	39%
2005	32,513	52,409	19,896	8.6	44,903	72,382	27,478	38%
2006	37,780	65,695	27,915	11.6	50,373	87,593	37,220	42%
2007	45,426	75,993	30,567	7.1	56,562	94,623	38,061	40%
2008	54,219	91,776	37,557	12.7	65,063	110,131	45,069	41%
2009	61,010	82,548	21,538	8.2	67,664	91,551	23,887	26%
2010	69,620	101,258	31,638	6.9	75,949	110,463	34,514	31%
2011	81,662	120,541	38,878	8.5	82,107	121,197	39,090	32%

Sources: *Real GDP computed by the authors based on data by African Development Indicators (ADI), World Bank, 2010, Central Statistics Office, Bank of Botswana*

7.8 Beneficiation

The approach we use above to calculate mineral GDP does, however, highlight an implicit simplification which is also built into our projections of mineral export values, and which should be recognised. This is that our projections of mineral export values assume, in effect, that Botswana's mineral exports will, through the projection period, be exported at the same stage of refinement (i.e. value added) as at present. For example, our diamond export projections are implicitly assumed to be rough diamonds exported at the projected rough export prices. This, of course, is not entirely correct even now, and will become less correct in the future as a growing portion of rough production will be sold in Botswana for cutting in Botswana factories and will then be exported as polished at prices which incorporate the value added from cutting. Some Botswana polished will even be manufactured into jewellery in Botswana and will be exported at prices which also incorporate the value added by jewellery manufacture. In principle, the same could be said of copper-nickel exports, currently exported as matte but potentially, and just conceivably within the timeframe of our projections, could be exported as refined metal output from a newly established metal refinery in Botswana. For instance, there is a general belief that the copper and silver projects in the Ghanzi area would benefit from a local base metal smelting and refining complex.

However, in defence of our simplification, we would argue that the direct incremental value added by cutting Botswana rough locally and exporting polished is relatively small compared with the aggregates of mineral exports. For our projections therefore, we retain the simplifying assumption that all mineral exports are exported at the same stage of value added as at present. We suspect that as local cutting increases, diamond pricing might give rise to a number of statistical issues in terms of trade statistics and national accounts reporting but these will need to be assessed at the time by qualified experts.

Policy recommendations

8

This work has demonstrated that for the next 10–15 years, diamonds will continue to dominate as a source of revenue to government. This will be from both existing and new projects whose life spans are relatively short and therefore would be exhausted within the 10–15-year time horizon. Projects in other minerals, such as copper and silver would also be of a relatively small scale compared with similar projects internationally and, based on current information, these too would be exhausted within the 10–15-year time horizon.

This study period just falls short of the period in which diamond production is projected to decline. For instance, based on current information, there will be a substantial decline in carat production beginning in 2027. This will not be mitigated by future underground mining operations at some of the Debswana mines.

We present our policy recommendations below on the following major issues:

1. Encouraging more mining and exploration activity;
2. Diamond production rate; and
3. Planned infrastructure projects.

8.1 Encouraging more mining and exploration activity

The legal and fiscal regime for mining in Botswana is currently very competitive with the country being ranked in position 4 by *Resource Stocks* magazine and 8th position by the Fraser Institute. An analysis of the responses to a questionnaire that was administered to 11 exploration and mining companies in Botswana also demonstrates that the majority find the mining laws in Botswana to be workable.

Our analysis of the Fraser Institute response data about the mining environment indicates that any measures taken should be towards addressing the following issues from the Pareto chart:

1. Socio-economic issues;
2. Future tax regime;
3. Labour issues;
4. Current tax regime;
5. Land claim issues;
6. Land issues; and
7. Political stability.

From the above list, we believe that the issues relevant to mining laws are 1) future and current tax regime, and 2) land claim and land issues. We therefore recommend the following course of action:

1. Botswana's level of mineral royalties take into consideration the profitability of a mining project and the latter, other things equal, depends on the value of mineral being mined. In this way, base metals and coal attract the lowest royalty rate of 3% followed by precious metals, that is, gold, silver and platinum group metals at 5% and lastly diamonds at 10%. All these are *ad valorem*, that is, based on the mine

gate value as defined in the Act. We therefore do not believe that there is additional incentive in lowering these rates as the level of prospecting activity is high. We also would not recommend that these be raised as this may discourage the prospecting activity, which would do more harm than good. We however believe that there is always room to modernise the royalty formula, for instance, going to a sliding scale so that even some diamond mines that may have similar levels of profitability as other minerals such as base metals and coal are not overburdened by a fixed royalty rate of 10%.

2. The fiscal regime is well defined for non-diamond minerals while for diamonds, section 51 of the Act stipulates that there will be a negotiation. We believe that it is the secrecy of the negotiated regime that may be creating uncertainty and government should find ways of addressing this.
3. There is a lot of interest in exploration in Botswana, with the whole of the country taken up by exploration companies with only the swamps and some deep sand covered areas of the Kalahari remaining open as they are inaccessible. There is therefore a need to ensure that only value adding applications for exploration are approved to eliminate huge land holdings without the accompanying progress towards mine development.
4. Government should continuously explain the benefits of overlapping prospecting licences. It seems that this has not been sufficiently explained to the mining industry.
5. Government should consider an Act for coal bed methane gas and its accompanying regulations to assist in guiding activity in this area.

One issue that came out in our interview with one of the junior mining companies is that of the water and power. While some projects may be located near existing water and power infrastructure, the challenge faced by the project developers is that there are no set mechanisms for them to obtain such water and power. We would therefore recommend that government consider a mechanism whereby the water and power utility companies develop the infrastructure to support the mining project and then recover the cost of such development through higher charges until their costs have been recovered. This would facilitate project development as they would be spared the upfront costs, which would also improve project economics.

8.2 Diamond production rate

At the time of writing this report, it is known that actual diamond production at the Debswana mines, (in round numbers) peaked at around 34 million carats per annum in the period 2005 to 2007, slipped to 32 million carats in 2008 and then plummeted to 18 million carats in 2009 when production was suspended for several months in response to the collapse in demand associated with the global financial crisis and economic recession. As demand picked up in 2010, Debswana's production picked up to 22 million carats. The year 2011 began with demand being strong, prices rising and Debswana looking to increase production significantly. However, demand faltered and prices slipped backwards during the second half of 2011 and, apparently in response, Debswana lowered its target production for the year which ended at about 22 million carats. Debswana has apparently cited both technical operating problems and intermittent market weakness as reasons why production has not returned closer to its previous peak of 34 million carats.

Although no statistics are publicly available to test the proposition, it does seem at least possible that Debswana is placing itself in the position of 'swing producer', adjusting its target production so as to leave the global supply/demand balance in a position of shortage rather than surplus, and hence tending to push prices up, or at least maintain them if there are other negative forces at work. The cushion of 10 million carats p.a. between Debswana's peak production and its recent production levels is certainly enough to influence the global supply/demand balance according to whether those 10 million carats p.a. are being produced or not. And the experience of the past three years does suggest that international market prices have responded to Debswana's actual and planned production rates. However, it is beyond the scope and resources of the present study to test these hypotheses more rigorously – and in any case, the data with which this could be done probably does not exist, certainly not in the public domain.

All that can be done here is to note the evidence that exists and point out lines of inquiry which might usefully be investigated. It is possible that the current nature of global demand and supply for diamonds, combined with the current market structures on both the demand and the supply side, could enable Botswana's dominant diamond producer to earn at least as much revenue from selling 25 million carats p.a. at higher prices rather than selling 30 million carats p.a. at lower prices. This would obviously extend the life of the resource significantly and would further delay the eventual decline in production which must always come eventually with any finite resource.

In the short term it would seem advisable that:

1. Government should study the various production scenarios with a view to possibly revising the current long-term mining plans, which seem to be informed by the validity period of the mining leases for Debswana, which all run till 2029.
2. Government should consider a policy of postponing possible projects at the Debswana mines so that these are phased in at the end of the open-pit mining operations. These projects are profitable on their own (stand-alone projects) and would not depend on the existing open-pit operations.
3. In a longer timescale, government should look towards using the knowledge of diamond demand and marketing, which it will gain in the process of selling its entitlement of Debswana's production directly to customers in the market, in order to optimise Debswana's production plans relative to global demand and prices.

Conclusions

9

In this work, in addition to providing answers to the specific TOR, we set out to answer the following general questions:

1. What is the most likely path for mineral revenues in the coming 10–15 years?;
2. If a decline is probable, what is its most likely extent and speed in the absence of specific government policy measures to ameliorate the decline?; and
3. What policy options could be considered by government within the mineral sector to influence the path of mineral revenues 10 to 15 years from now?

We conclude from our findings that:

1. Over the next 10–15 years, government mineral revenues are projected to rise on the back of a projected improvement in diamond prices that would be underlain by strong supply/demand fundamentals.
2. While the decline in government mineral revenues from diamonds seems unlikely to occur within the period of projection for this study, we would like to caution that there would be a significant crunch when the open-pit mining operations cease beginning in about 2027.
3. We believe that there is scope for government to influence the long-term planning process such that existing operations are not planned to be co-terminus with the mining licences for Debswana and that possible projects at Debswana could be postponed to commence when open-pit operations cease.
4. While there is potential for government mineral revenues from future projects, these would at best not exceed 10% and therefore would not result in any significant mitigation of the loss of mineral revenues from diamonds.
5. Regarding rail and port infrastructure, future coal export projects and some copper and silver projects in the Ghanzi copper belt would rely on this. We therefore believe that government should be a joint-venture partner in order to ensure that future projects benefit. We, however, caution that due to the scale and possible risks involved, government conduct a thorough due diligence ahead of any participation in such infrastructure projects.
6. Regarding access to water and power, we believe that a mechanism should be put in place whereby the utility companies provide the service to a mining project on a cost recovery basis. This would eliminate the need for mining companies to make upfront investments for power, which would improve the pace of project development as well as their project economics.
7. Regarding taxation issues, we believe that government should find means to publicise those mining regimes that, after negotiation, still end up with the standard tax regime for mining to provide comfort to the current junior mining companies exploring for diamonds.

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Appendix 1a Forecast nominal government mineral revenues – Low case (in nominal BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	12,612	18,249	31,532	33,563	31,299	32,538	35,599	37,015	36,848	40,710	41,244	44,377	48,423	55,002	60,269	**559,279**
Projects																-
Base metals /2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal /3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM /4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium /5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	12,612	18,249	31,532	33,563	31,299	32,538	35,599	37,015	36,848	40,710	41,244	44,377	48,423	55,002	60,269	**559,279**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	12,612	18,249	31,532	33,563	31,299	32,538	35,599	37,015	36,848	40,710	41,244	44,377	48,423	55,002	60,269	**559,279**

Notes

1. **Existing diamond mines** – Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa) and projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal** – Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. Uranium – A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 1b Forecast real government mineral revenues – Low case (in real BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	12,612	17,008	27,987	28,372	25,198	24,948	25,995	25,742	24,406	25,680	24,777	25,390	26,386	28,543	29,787	**372,830**
Projects																-
Base metals /2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal /3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM /4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium /5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	12,612	17,008	27,987	28,372	25,198	24,948	25,995	25,742	24,406	25,680	24,777	25,390	26,386	28,543	29,787	**372,830**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	12,612	17,008	27,987	28,372	25,198	24,948	25,995	25,742	24,406	25,680	24,777	25,390	26,386	28,543	29,787	**372,830**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa) and projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 1c Forecast nominal government mineral revenues – Base case (in nominal BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	12,613	18,402	33,787	36,779	35,339	37,647	39,069	41,818	42,529	38,544	44,931	60,261	61,389	75,709	111,120	689,936
Projects																-
Base metals /2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal /3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM /4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	12,613	18,402	33,787	36,779	35,339	37,647	39,069	41,818	42,529	38,544	44,931	60,261	61,389	75,709	111,120	**689,936**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Grand Total	12,613	18,402	33,787	36,779	35,339	37,647	39,069	41,818	42,529	38,544	44,931	60,261	61,389	75,709	111,120	**689,936**

Notes

1. **Existing diamond mines** – Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa) and projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal** – Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane** – Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area

Appendix 1d Forecast real government mineral revenues – Base case (in real BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	12,613	17,150	29,989	31,090	28,450	28,865	28,529	29,082	28,169	24,313	26,993	34,478	33,451	39,289	54,920	**447,380**
Projects																-
Base metals/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal /3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM /4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	12,613	17,150	29,989	31,090	28,450	28,865	28,529	29,082	28,169	24,313	26,993	34,478	33,451	39,289	54,920	**447,380**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	12,613	17,150	29,989	31,090	28,450	28,865	28,529	29,082	28,169	24,313	26,993	34,478	33,451	39,289	54,920	**447,380**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa) and projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 1e Forecast nominal government mineral revenues – High case (in nominal BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines / 1	12,535	18,664	35,132	39,120	38,536	41,054	42,763	45,967	46,915	42,722	48,460	63,045	62,683	75,474	108,132	**721,203**
Projects																
Base metals /2	-	-	69	206	322	283	518	491	473	451	427	459	452	409	745	**5,306**
Coal / 3	-	59	126	1,201	1,790	2,699	2,933	2,000	1,789	1,898	2,018	2,815	3,173	3,191	3,246	**28,939**
CBM / 4	-	2	37	109	163	283	649	567	928	1,586	2,072	2,617	2,856	3,076	3,268	**18,214**
Uranium /5	-	-	100	194	193	198	238	869	858	845	829	810	787	761	732	**7,413**
Sub Total	-	61	331	1,711	2,469	3,463	4,338	3,927	4,048	4,780	5,346	6,700	7,268	7,438	7,991	**59,872**
Grand Totals																
Existing Mines	12,535	18,664	35,132	39,120	38,536	41,054	42,763	45,967	46,915	42,722	48,460	63,045	62,683	75,474	108,132	**721,203**
Possible Projects	-	61.2	331.5	1,711.1	2,468.9	3,462.7	4,338.2	3,926.8	4,048.3	4,780.4	5,345.9	6,699.7	7,268.2	7,438.1	7,991.4	**59,872**
Grand Total	12,535	18,725	35,463	40,831	41,005	44,517	47,101	49,893	50,964	47,503	53,806	69,745	69,951	82,912	116,124	**781,075**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa) and projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 1f Forecast real government mineral revenues – High case (in real BWP million)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	12,535	17,394	31,183	33,069	31,024	31,477	31,227	31,967	31,073	26,949	29,113	36,071	34,156	39,168	53,443	**469,849**
Projects																
Base metals /2	-	-	61	175	259	217	378	342	313	285	257	262	246	212	368	**3,376**
Coal /3	-	55	112	1,015	1,441	2,070	2,142	1,391	1,185	1,197	1,212	1,610	1,729	1,656	1,605	**18,421**
CBM /4	-	2	33	93	131	217	474	394	615	1,000	1,245	1,497	1,556	1,596	1,615	**10,469**
Uranium/5			89	164	156	152	174	604	568	533	498	463	429	395	362	**4,586**
Sub Total	-	57	294	1,446	1,988	2,655	3,168	2,731	2,681	3,015	3,212	3,833	3,960	3,860	3,950	**36,851**
Grand Totals																
Existing Mines	12,535	17,394	31,183	33,069	31,024	31,477	31,227	31,967	31,073	26,949	29,113	36,071	34,156	39,168	53,443	**69,849**
Possible Projects		57.1	294.2	1,446.4	1,987.6	2,655.0	3,167.8	2,730.9	2,681.3	3,015.4	3,211.6	3,833.2	3,960.5	3,860.0	3,949.7	**36,851**
Grand Total	12,535	17,451	31,477	34,515	33,012	34,132	34,394	34,698	33,755	29,964	32,324	39,904	38,117	43,028	57,393	**506,700**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds;

Existing base metal mines and other mines – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.

2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi

3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.

4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.

5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2a Forecast nominal mineral export revenues – Low case (in nominal BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines/1	35.2	42.6	60.8	65.1	61.4	65.1	68.8	72.7	74.8	81.1	84.0	92.2	93.3	113.1	153.6	**1,164**
Projects																
Base metals/2																
Coal/3																
CBM /4																
Uranium/5																
Sub Total																
Grand Totals																
Existing Mines	35	43	61	65	61	65	69	73	75	81	84	92	93	113	154	**1,164**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grand Total	35	43	61	65	61	65	69	73	75	81	84	92	93	113	154	**1,164**

Notes

1. **Existing diamond mines** – Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines** – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper– silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal** – Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2b Forecast real mineral export revenues – Low case (in real BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	35.2	39.7	53.9	55.0	49.4	49.9	50.2	50.5	49.5	51.1	50.4	52.8	50.9	58.7	75.9	**773.2**
Projects																
Base metals/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Coal/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CBM /4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uranium/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grand Totals																
Existing Mines	35.2	39.7	53.9	55.0	49.4	49.9	50.2	50.5	49.5	51.1	50.4	52.8	50.9	58.7	75.9	**773.2**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grand Total	35.2	39.7	53.9	55.0	49.4	49.9	50.2	50.5	49.5	51.1	50.4	52.8	50.9	58.7	75.9	**773.2**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines –** BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2c Forecast nominal mineral export revenues – Base case (in nominal BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines/1	35.2	43.3	62.9	68.5	65.9	71.1	76.5	82.3	86.2	95.2	100.4	112.3	115.7	143.1	199.2	**1,357**
Projects																-
Base metals/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	35	43	63	69	66	71	76	82	86	95	100	112	116	143	199	**1,357**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Grand Total	35	43	63	69	66	71	76	82	86	95	100	112	116	143	199	**1,357**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope)–Gem Diamonds; **Existing base metal mines and other mines** – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2d Forecast real mineral export revenues – Base case (in real BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines/1	35.2	40.4	55.8	57.9	53.0	54.5	55.8	57.2	57.1	60.0	60.3	64.2	63.0	74.2	98.4	**887.2**
Projects																-
Base metals/2	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Coal/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM/4	-	-				-	-	-	-	-	-		-	-	-	-
Uranium/5	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals																-
Existing Mines	35.2	40.4	55.8	57.9	53.0	54.5	55.8	57.2	57.1	60.0	60.3	64.2	63.0	74.2	98.4	**887.2**
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Grand Total	35.2	40.4	55.8	57.9	53.0	54.5	55.8	57.2	57.1	60.0	60.3	64.2	63.0	74.2	98.4	**887.2**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa); AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines** – BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2e Forecast nominal mineral export revenues – High case (in nominal BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	35.2	44.0	65.1	72.1	70.7	76.3	82.1	88.3	92.5	102.2	105.8	116.3	117.6	142.9	195.3	**1,406**
Projects																
Base metals /2	-	-	2.1	3.8	3.4	4.0	5.5	5.7	5.8	6.0	6.1	6.3	6.4	6.6	6.8	**68.5**
Coal/3	-	0.3	0.5	3.4	5.0	8.4	11.8	10.2	11.3	12.8	13.4	15.9	17.4	18.2	19.1	**147.9**
CBM/4	-	0.0	0.2	0.5	1.0	1.6	2.2	2.9	3.6	4.4	5.2	4.1	4.5	4.8	5.1	**40.3**
Uranium/5	-	-	1.2	2.5	2.5	2.6	2.6	2.7	2.8	2.8	2.9	3.0	3.1	3.1	3.2	**35.1**
Sub Total	-	0.3	4.0	10.1	12.0	16.6	22.2	21.4	23.5	26.1	27.7	29.3	31.4	32.8	34.2	**291.7**
Grand Totals																
Existing Mines	35.2	44.0	65.1	72.1	70.7	76.3	82.1	88.3	92.5	102.2	105.8	116.3	117.6	142.9	195.3	**1,406.2**
Possible Projects	-	0.3	4.0	10.1	12.0	16.6	22.2	21.4	23.5	26.1	27.7	29.3	31.4	32.8	34.2	**291.7**
Grand Total	35.2	44.4	69.1	82.2	82.6	92.9	104.3	109.7	116.0	128.2	133.5	145.6	149.1	175.7	229.5	**1,697.9**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines –** BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper-silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 2f Forecast mineral export revenues – High case (in real BWP billion)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Existing mines /1	35.2	41.0	57.7	61.0	56.9	58.5	59.9	61.4	61.3	64.4	63.6	66.5	64.1	74.2	96.5	**922.2**
Projects																
Base metals /2	-	-	2	3	3	3	4	4	4	4	4	4	4	3	3	**44.1**
Coal/3	-	0	0	3	4	6	9	7	7	8	8	9	10	9	9	**91.0**
CBM/4	-	0	0	0	1	1	2	2	2	3	3	2	2	3	3	**24.5**
Uranium/5	-	-	1	2	2	2	2	2	2	2	2	2	2	2	2	**22.9**
Sub Total	-	0	4	9	10	13	16	15	16	16	17	17	17	17	17	**182.4**
Grand Totals																
Existing Mines	35.2	41.0	57.7	61.0	56.9	58.5	59.9	61.4	61.3	64.4	63.6	66.5	64.1	74.2	96.5	**922.2**
Possible Projects	-	0.3	3.6	8.5	9.6	12.7	16.2	14.9	15.6	16.4	16.6	16.8	17.1	17.0	16.9	**182.4**
Grand Total	35.2	41.4	61.3	69.5	66.5	71.2	76.1	76.3	76.8	80.9	80.2	83.3	81.2	91.2	113.4	**1,104.6**

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines –** BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 3a Projected employment levels from existing and future mining projects – Base case (Base-case scenario)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Existing mines /1	12,012	12,271	12,430	13,479	12,096	12,289	13,128	13,436	14,099	13,983	13,716	11,460	11,615	11,766	11,613
Projects															
Base metals/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Totals															
Existing Mines	12,012	12,271	12,430	13,479	12,096	12,289	13,128	13,436	14,099	13,983	13,716	11,460	11,615	11,766	11,613
Possible Projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	12,012	12,271	12,430	13,479	12,096	12,289	13,128	13,436	14,099	13,983	13,716	11,460	11,615	11,766	11,613

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa), projects; AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines –** BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 3b Projected employment levels from existing and future mining projects – High case (High-case scenario)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Existing mines/1	12,012	12,271	12,430	13,479	12,096	12,289	13,128	13,436	14,099	13,983	13,716	11,460	11,615	11,766	11,613
Projects															
Base metals/2	-	1,000	300	1,300	600	600	600	600	600	600	600	600	600	600	450
Coal/3	83	324	1,177	1,911	2,652	3,825	4,743	5,177	5,707	5,945	5,943	6,391	6,759	6,756	6,756
CBM/4	-	57	99	144	59	72	84	95	102	109	117	125	132	136	65
Uranium/5	500	700	300	300	300	300	300	300	300	300	300	300	300	300	300
Sub Total	583	2,081	1,876	3,655	3,611	4,797	5,727	6,172	6,709	6,954	6,960	7,416	7,791	7,792	7,571
Grand Totals															
Existing Mines	12,012	12,271	12,430	13,479	12,096	12,289	13,128	13,436	14,099	13,983	13,716	11,460	11,615	11,766	11,613
Possible Projects	583	2,081	1,876	3,655	3,611	4,797	5,727	6,172	6,709	6,954	6,960	7,416	7,791	7,792	7,571
Grand Total	12,595	14,352	14,306	17,134	15,707	17,086	18,855	19,608	20,808	20,938	20,676	18,876	19,406	19,559	19,184

Notes

1. **Existing diamond mines –** Debswana mines (Jwaneng, Orapa, Letlhakane and Damtshaa); AK06 – Lucara Diamonds; BK11 – Monak Ventures; Gaghoo (Gope) – Gem Diamonds; **Existing base metal mines and other mines –** BCL's copper, nickel mines at Selebi Phikwe; Tati Nickel Mining Company's Phoenix mine; African Copper's Mowana and Thakadu and Makala copper–silver projects; Boseto's copper–silver project near Maun; Botash's Sua pan soda ash and salt plant, and Morupule Coal Mine.
2. **Base metal and silver projects –** Hana Mining's copper–silver advanced exploration project in Ghanzi; Mount Burgess' Zn, Pb advanced exploration project at Nxuu and Kihabe near Ghanzi.
3. **Coal –** Morupule coal mine and expansion; Mmamantswe coal project by Aviva; Sese coal project by African Energy, and Mmamabula project by CIC.
4. **Coal Bed Methane –** Advanced Exploration projects by 1) Tlou Energy, 2) Kalahari Energy and 3) Anglo Coal.
5. **Uranium –** A-CAP Resources' Letlhakane uranium project in the Serule area.

Appendix 4a Projected gross value of mineral production
(All values in 2012 real BWP billion)

Scenario	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Low															
Non-mining GDP	82.1	87.4	93.0	98.9	105.2	112.0	119.1	126.8	134.9	143.5	152.7	162.5	172.9	183.9	195.7
Mining GDP	26.8	30.2	41.0	41.8	37.5	37.9	38.2	38.4	37.6	38.8	38.3	40.1	38.7	44.6	57.7
Total GDP	108.9	117.6	134.0	140.7	142.7	149.9	157.3	165.2	172.5	182.3	191.0	202.6	211.6	228.5	253.4
Base															
Non-mining GDP	82.1	87.4	93.0	98.9	105.2	112.0	119.1	126.8	134.9	143.5	152.7	162.5	172.9	183.9	195.7
Mining GDP	26.8	30.7	42.4	44.0	40.3	41.4	42.4	43.5	43.4	45.6	45.8	48.8	47.9	56.4	74.8
Total GDP	108.9	118.1	135.4	142.9	145.5	153.4	161.5	170.3	178.3	189.1	198.5	211.3	220.8	240.3	270.5
High															
Non-mining GDP	82.1	87.4	93.0	98.9	105.2	112.0	119.1	126.8	134.9	143.5	152.7	162.5	172.9	183.9	195.7
Mining GDP – Existing	26.8	31.2	43.9	46.4	43.2	44.5	45.5	46.7	46.6	48.9	48.3	50.5	48.7	56.4	73.3
Mining GDP – Future	0.0	0.2	2.7	6.5	7.3	9.7	12.3	11.3	11.9	12.5	12.6	12.8	13.0	12.9	12.8
Sub Total Mining	26.8	31.4	46.6	52.8	50.5	54.1	57.8	58.0	58.4	61.4	61.0	63.3	61.7	69.3	86.2
Total GDP	108.9	118.8	139.6	151.7	155.7	166.1	176.9	184.8	193.3	204.9	213.7	225.8	234.6	253.2	281.9

Source: *Based on computations by the authors*

Appendix 4b Projected percentage contribution by minerals to GDP

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Low															
Non-mining GDP	75.4%	74.3%	69.4%	70.3%	73.7%	74.7%	75.7%	76.8%	78.2%	78.7%	79.9%	80.2%	81.7%	80.5%	77.2%
Mining GDP	24.6%	25.7%	30.6%	29.7%	26.3%	25.3%	24.3%	23.2%	21.8%	21.3%	20.1%	19.8%	18.3%	19.5%	22.8%
Total GDP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Base															
Non-mining GDP	75.4%	74.0%	68.7%	69.2%	72.3%	73.0%	73.7%	74.5%	75.7%	75.9%	76.9%	76.9%	78.3%	76.5%	72.4%
Mining GDP	24.6%	26.0%	31.3%	30.8%	27.7%	27.0%	26.3%	25.5%	24.3%	24.1%	23.1%	23.1%	21.7%	23.5%	27.6%
Total GDP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High															
Non-mining GDP	75.4%	73.6%	66.6%	65.2%	67.5%	67.4%	67.3%	68.6%	69.8%	70.0%	71.5%	72.0%	73.7%	72.6%	69.4%
Mining GDP – Existing	24.6%	26.2%	31.4%	30.6%	27.8%	26.8%	25.7%	25.3%	24.1%	23.9%	22.6%	22.4%	20.8%	22.3%	26.0%
Mining GDP – Future	0.0%	0.2%	2.0%	4.3%	4.7%	5.8%	7.0%	6.1%	6.1%	6.1%	5.9%	5.7%	5.5%	5.1%	4.6%
Sub Total Mining	24.6%	26.4%	33.4%	34.8%	32.5%	32.6%	32.7%	31.4%	30.2%	30.0%	28.5%	28.0%	26.3%	27.4%	30.6%
Total GDP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: *Based on computations by the authors*

Appendix 5 Production from possible future mineral projects

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Copper (000s t)	-	-	25.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	625.0
Silver (000s oz)	-	-	1,250.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	31,250.0
Zinc (000s t)	-	-	-	-	-	34.8	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	660.3
CBM (Power plant, Domestic market, Fertiliser, Explosives, etc), three projects /6																
Wells	-	100	840	1,220	1,420	1,620	1,845	2,105	2,305	2,539	2,755	2,803	2,851	2,899	2,947	28,249
CH4- BCF	-	2	43	61	83	101	116	129	141	151	161	133	133	133	133	1,521
PJ	-	940	3,999	10,523	16,919	19,767	20,380	20,380	20,395	20,380	20,380	20,380	20,380	20,380	20,380	235,581
Uranium (000s t)	-	-	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	25.0
Coal (millions t)	0.2	1.1	6.2	13.2	19.1	31.6	43.4	48.7	57.5	62.4	62.4	67.9	72.9	72.9	72.9	632.5

Appendix 6 Detailed Scores for Botswana by the Fraser Institute's Mining Survey Update 2010

Issues	Score					Rank	Comments
	1	2	3	4	5		
Uncertainty concerning the administration, interpretation, and enforcement of existing regulations	46	46	7	0	0	2	Mild deterrent 7%. Fig 2, ranked 2nd after Finland
Environmental regulations	30	63	7	0	0	2	Mild deterrent 7%, Fig 3 ranked 2nd after Chile
Regulatory duplication and inconsistencies	31	62	8	0	0	1	Mild deterrent 8%, ranked 1st, followed by Chile
Taxation regime	27	58	15	0	0	5	Mild deterrent 15%, Fig 5 ranked 2nd after Finland (5% say the tax regime is a strong deterrent) and with Chile in 3rd place (16% say tax regime is a mild deterrent)
Uncertainty concerning disputed land claims	27	58	15	0	0	3	Mild deterrent 15%, Fig 6 ranked 3rd after Chile (2% say it is a deterrent) and Finland.
Uncertainty over which areas will be protected as wilderness, parks, or archeological sites	17	71	13	0	0	3	Mild deterrent 13%, Fig 7 ranked 3rd after Zambia and ahead of Papua New Guinea.
Socioeconomic agreements/ community conditions	12	56	32	0	0	22	Mild deterrent 32%, Fig 8 ranked 22 out of 51. Finland in rank 1, top ten being South Australia, Canadian provinces and Chile in (5), Nevada and Arizona.
Political stability	42	46	12	0	0	7	Mild deterrent – 12%, Fig 9 ranked 7th position after Manitoba, Utah, Saskatchewan, Quebec, Alberta, Finland (1st)
Labour regulations/ employment agreements	9	73	18	0	0	11	Mild deterrent – 18%, Fig 10 ranked 11th after Ghana (5% say it is a strong deterrent). Ghana, Yukon, Papua New Guinea, Nevada (2% say they would not invest due to this factor), Montana, Manitoba, Saskatchewan, Alaska, Finland, Alberta (1st)

Security situation	28	60	12	0	0	28	Mild deterrent – 12%, Fig 11 ranked 28th after China, California, Botswana, Ontario, NW Territories, Chile, Manitoba; Top four – South Australia, Tasmania, New Zealand , Finland (1st)
Uncertainty over taxation regime and future tax levels	23	54	19	4	0	3	Mild deterrent 19% and Strong deterrent 4%.
Are you concerned that attitudes towards the mining industry are becoming (see key for menu):	4	9	24	5	58		Ghana, Yukon, Chile, Brazil, Namibia, Manitoba, Finland (7% say somewhat more hostile & 7% considerably more hostile), Botswana (4% considerably more hostile and 9% somewhat more hostile), Saskatchewan (1st)
In which jurisdictions do you see increased uncertainty in the future concerning the following (see key for menu):	18.8	18.8	9.4	15.6	18.8		No overall ranking provided.

Source: *Compiled by authors from the Mining Survey Update 2010, Fraser Institute*

Appendix 7 Questionnaire and Analysis of Responses by Exploration and Mining Companies in Botswana

A. **Contact Details of the Respondent (Optional)**

B. **General Information about the Respondent's Company**

1. What year did your company commence exploration and mining in Botswana?

Exploration Commencement Year					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Before 2000	3	27.3	27.3	36.4
	2000–2011	7	63.6	63.6	100.0
	Total	11	100.0	100.0	

2. Where is the parent company listed?

Is the parent company listed in Africa?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	36.4	36.4	36.4
	No	5	45.5	45.5	81.8
	Not listed	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

Is the parent company listed in America?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	7	63.6	63.6	81.8
	Not Listed	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

Is the parent company listed in Europe?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	36.4	36.4	36.4
	No	5	45.5	45.5	81.8
	Not Listed	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

Is the parent company listed in Australia?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	27.3	27.3	27.3
	No	6	54.5	54.5	81.8
	Not Listed	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

3. What are your target minerals?

Are Diamonds your target minerals?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	27.3	27.3	27.3
	No	8	72.7	72.7	100.0
	Total	11	100.0	100.0	

Is Uranium your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	9.1	9.1	9.1
	No	10	90.9	90.9	100.0
	Total	11	100.0	100.0	

Is Coal your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	45.5	45.5	45.5
	No	6	54.5	54.5	100.0
	Total	11	100.0	100.0	

Is Coal your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	45.5	45.5	45.5
	No	6	54.5	54.5	100.0
	Total	11	100.0	100.0	

Is Silver your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	9	81.8	81.8	100.0
	Total	11	100.0	100.0	

Is Copper your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	9	81.8	81.8	100.0
	Total	11	100.0	100.0	

Is Gold your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	100.0	100.0	100.0

Is Coal Bed Methane your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	9	81.8	81.8	100.0
	Total	11	100.0	100.0	

Is Nickel your target mineral?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	100.0	100.0	100.0

4. What is your target stage of processing (concentrates, metal or other)?

Target Stage of Processing					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	27.3	27.3	27.3
	No	8	72.7	72.7	100.0
	Total	11	100.0	100.0	

Will you be delivering by air to port?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	8	72.7	72.7	90.9
	Not Applicable	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Will you be delivering by road to port?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	36.4	36.4	36.4
	No	6	54.5	54.5	90.9
	Not Applicable	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Will you be delivering by rail to port?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	54.5	54.5	54.5
	No	4	36.4	36.4	90.9
	Not Applicable	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Will you be transporting the product using a pipeline?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	18.2	18.2	18.2
	No	8	72.7	72.7	90.9
	Not Applicable	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Are your products locally produced?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Yes	4	36.4	36.4	54.5
	No	5	45.5	45.5	100.0
	Total	11	100.0	100.0	

Is lack of resources the reason you are not producing locally?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Yes	3	27.3	27.3	45.5
	No	6	54.5	54.5	100.0
	Total	11	100.0	100.0	

Is it too expensive to produce locally?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Yes	2	18.2	18.2	36.4
	No	7	63.6	63.6	100.0
	Total	11	100.0	100.0	

Is the market too small to produce locally?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Yes	2	18.2	18.2	36.4
	No	7	63.6	63.6	100.0
	Total	11	100.0	100.0	

5. How will the products be delivered to the port of export?

Project Stage of Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Feasibilty	3	27.3	27.3	27.3
	Conceptual/Pre-feasibility	2	18.2	18.2	45.5
	Mine Development	3	27.3	27.3	72.7
	Mining	2	18.2	18.2	90.9
	Exploration	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Target Size of Diamond Ore Reserves to Support Mine Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	72.7	72.7	72.7
	38 million tonnes @ 16cpht	1	9.1	9.1	81.8
	54 million tonnes @ 12.6 cpht	1	9.1	9.1	90.9
	Depends on viability	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Target Size of Uranium Ore Reserves to Support Mine Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		10	90.9	90.9	90.9
	Still to be determined	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Target Size of Copper and Silver Ore Reserves to Support Mine Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	23 million tonnes	1	9.1	9.1	90.9
	37.4 million tonnes	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Target Size of Coal Ore Reserves to Support Mine Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		7	63.6	63.6	63.6
	500 million tonnes	2	18.2	18.2	81.8
	1.5 billion tonnes	1	9.1	9.1	90.9
	More than 1.5 billion tonnes	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Target Size of Coal Bed Methane Reserves to Support Mine Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	4 trillion cubic feet	1	9.1	9.1	90.9
	2.5– 5 billion cubic feet	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

6. Is there any reason why these minerals could not be further processed in Botswana?
7. What stage of development (early stage exploration, conceptual study, pre-feasibility, feasibility, implementation/mine development) is your project at?
8. What is your target size of ore reserves to support mine development (million tonnes of recovered metal)?
9. What is your target size of investment (e.g. project Capex in USD millions)?

Target Size of Investment					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$100 million – $500 million	5	45.5	45.5	45.5
	More than $500 million	4	36.4	36.4	81.8
	Other	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

10. What is your target size of operation (e.g. tonnes of metal per year)?
11. What is the envisaged unit operating cost (USD/tonne metal or BWP/tonne metal)?
12. What are your target mine development and production start dates? What is the current expected life?

Coal Mines Development and Production Start Dates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		7	63.6	63.6	63.6
	6 months from now	1	9.1	9.1	72.7
	2 years from now	2	18.2	18.2	90.9
	10 years from now	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Coal Bed Methane Mines Development and Production Start Dates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	2 years from now	1	9.1	9.1	90.9
	3 years from now	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Uranium Mines Development and Production Start Dates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		10	90.9	90.9	90.9
	Still to be determined	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Copper and Silver Mines Development and Production Start Dates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	First half of 2012	1	9.1	9.1	90.9
	2015	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Diamond Mines Development and Production Start Dates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	72.7	72.7	72.7
	Already in production	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

What is the current expected life?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10 - 20 Years	3	27.3	27.3	27.3
	20 - 30 Years	2	18.2	18.2	45.5
	30 - 40 Years	3	27.3	27.3	72.7
	50 - 60 Years	2	18.2	18.2	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

C. Prospecting, Retention and Mining Licences

13. What concerns, if any, do you have regarding the Act as it relates to prospecting licences?

Concerns regarding the Mining Act relating to the prospecting license					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	People hold licences without using them effectively	1	9.1	9.1	18.2
	Overlapping prospecting licenses for different commodities	1	9.1	9.1	27.3
	Policy does not allow coal and uranium licenses to overlap	1	9.1	9.1	36.4
	No clear law that clarifies how reporting and minimum expenditure are treated	1	9.1	9.1	45.5
	Royalties are high at 10%	2	18.2	18.2	63.6
	Matters of overlapping applications not addressed in a sensible manner	1	9.1	9.1	72.7
	No act that could be customised for gas	1	9.1	9.1	81.8
	None	1	9.1	9.1	90.9
	Exploration permits have too short expiry dates. Coal Seam Gas is not adequately covered within the existing Mining Act	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

14. What concerns, if any, do you have regarding the Act as it relates to retention licences?

Concerns regarding the retention license					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Need for licence monitoring mechanism	1	9.1	9.1	18.2
	No provision for company to retain a license area for further exploration	1	9.1	9.1	27.3
	Criteria for tenure contains ambiguity and seem to call for extensive discretion from Ministry	1	9.1	9.1	36.4
	Prospecting and retention licenses are issued by different government departments	1	9.1	9.1	45.5
	It can easily be misused to allow companies to sit on a prospective acreage without doing work	1	9.1	9.1	54.5
	The Act is fine and useful	5	45.5	45.5	100.0
	Total	11	100.0	100.0	

15. The Act provides a total for a total of 13 years (up to 7 years of prospecting and up to 6 years of retention) of tenure from the first issue of a prospecting licence to the expiry of a renewed retention licence. What concerns do you have regarding this duration of tenure?

Concerns regarding duration of tenure					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Successful exploration does not necessarily conform to temporal constraints	1	9.1	9.1	18.2
	There should be an opportunity to extend prospecting licence beyond 7 years	2	18.2	18.2	36.4
	Government should be bit more lenient during global recession	1	9.1	9.1	45.5
	Duration should be extended to 15 years. Government needs to address infrastructural developments for bulk commodities.	1	9.1	9.1	54.5
	The process is fair and open	2	18.2	18.2	72.7
	None	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

16. What concerns, if any, do you have regarding the Act as it relates to an application for a mining licence?

Concerns regarding the Act on application for mining license					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	It's not clear how large a licence can be	1	9.1	9.1	18.2
	Feedback is slow when processing. No clear alignment between the EIA and DGS	1	9.1	9.1	27.3
	Government departments need to streamline some processes to shorten time from application to granting	1	9.1	9.1	36.4
	The question-and-answer process explored some unusual and onerous imposts	1	9.1	9.1	45.5
	The process of notification for gazettal of new prospecting areas needs to be streamlined	1	9.1	9.1	54.5
	The Act is fine	4	36.4	36.4	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

17. What concerns, if any, do you have regarding the Act as it relates to the renewal of a mining licence?

Concerns regarding the Act on renewal of mining licence application					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Renewal should be automatic for companies that complied with all conditions	1	9.1	9.1	27.3
	Contracts with major customers often exceed the statutory duration	1	9.1	9.1	36.4
	The Act is fine	4	36.4	36.4	72.7
	Have not reached renewal period yet	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

D. Environmental Obligations

18. What concerns, if any, do you have regarding the environmental laws that govern mining activity in Botswana?

Concerns regarding environmental laws that govern mining activity in Botswana					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Charge for dewatering cause double expense	1	9.1	9.1	18.2
	Current legislation is unclear on what is allowed under exploration license from an environmental perspective	1	9.1	9.1	27.3
	DEA is requesting some irrelevant and unnecessary documents	1	9.1	9.1	36.4
	Rehabilitation funds must be accumulated through time, not expected upfront	1	9.1	9.1	45.5
	Some matters need to be clarified	1	9.1	9.1	54.5
	Outcome is in line with expectations for miners looking to comply with sustainability guidelines	1	9.1	9.1	63.6
	Other	4	36.4	36.4	100.0
	Total	11	100.0	100.0	

E. Fiscal regime

19. What would make the fiscal regime (taxes, royalties and depreciation) more favourable to your project?

What would make fiscal regime more favourable to your project?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Review withholding taxes during construction of mine	1	9.1	9.1	27.3
	Upper range of tax on dividends should be offset against company tax	1	9.1	9.1	36.4
	Royalty and tax should be reduced	2	18.2	18.2	54.5
	Investors should be credited for bringing infrastructural developments to remote areas	1	9.1	9.1	63.6
	Companies exploring through to mine developments should be exempted from tax for the first 10 years	1	9.1	9.1	72.7
	Amend royalty provision so that royalties are not paid on VAT portion of invoices	1	9.1	9.1	81.8
	Tax exemption on exploration expenditure to stimulate activity	1	9.1	9.1	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

F. Infrastructure

20. How much water will the mining project require on an annual basis? From where will this water come?

How much water will the mining project require on an annual basis?					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid		1	9.1	9.1	9.1
	About 3 million cubic metres	2	18.2	18.2	27.3
	2.5 million cubic metres	1	9.1	9.1	36.4
	Final quantities to be determined	4	36.4	36.4	72.7
	We need more water than what Botswana can supply currently	2	18.2	18.2	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Where will this water come from?					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid		1	9.1	9.1	9.1
	Dewatering boreholes	1	9.1	9.1	18.2
	Surface and underground sources and boreholes installed for the purpose	3	27.3	27.3	45.5
	Wells	1	9.1	9.1	54.5
	Recirculating water from treatment plant	1	9.1	9.1	63.6
	From saline ECCA boreholes	1	9.1	9.1	72.7
	Still to be determined	1	9.1	9.1	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

21. How many MW of electricity will the mining project require on an annual basis? How will this electricity be supplied?

How many MW of electricity will the Diamond mining project require on an annual basis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	72.7	72.7	72.7
	11 MW	1	9.1	9.1	81.8
	20 MW	1	9.1	9.1	90.9
	Other	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

How many MW of electricity will the Coal mining project require on an annual basis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	72.7	72.7	72.7
	34 MW	1	9.1	9.1	81.8
	80 MW	1	9.1	9.1	90.9
	360 MW	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

How many MW of electricity will the Copper and Silver mining project require on an annual basis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	13 – 17 MW	1	9.1	9.1	90.9
	15 – MW	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

How many MW of electricity will the Coalbed Methane mining project require on an annual basis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	81.8	81.8	81.8
	120 MW	1	9.1	9.1	90.9
	No electricity needed	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

How many MW of electricity will the Uranium mining project require on an annual basis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		10	90.9	90.9	90.9
	Still to be determined	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

How will this electricity be supplied?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	National grid	1	9.1	9.1	27.3
	Potential to install large power station on site	1	9.1	9.1	36.4
	Self-generated	2	18.2	18.2	54.5
	Diesel power to a hopefully renewable source	1	9.1	9.1	63.6

How will this electricity be supplied?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	National grid	1	9.1	9.1	27.3
	Potential to install large power station on site	1	9.1	9.1	36.4
	Botswana Power Corporation	1	9.1	9.1	72.7
	Other	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

22. How do you intend to transport your product to the port of export? Does your project or its subsequent development depend upon the construction of a railway to either Walvis Bay or to Techobanine (Mozambique)?

Does your project depend upon the construction of a railway?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Yes	5	45.5	45.5	54.5
	No	4	36.4	36.4	90.9
	Not really	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Is Walvis Bay in Namibia your preferred port of export?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Yes	6	54.5	54.5	63.6
	Not applicable	4	36.4	36.4	100.0
	Total	11	100.0	100.0	

Is Techobanine in Mozambique your preferred port of export?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Yes	6	54.5	54.5	63.6
	Not Applicable	4	36.4	36.4	100.0
	Total	11	100.0	100.0	

Section G Other

23. What in your view are the top five factors that attracted you to choose Botswana as your destination for mineral exploration?

What is the factor that attracted you to choose Botswana as your destination for mineral exploration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Political stability	7	63.6	63.6	72.7
	Skilled workforce	1	9.1	9.1	81.8
	Predictable laws	1	9.1	9.1	90.9
	Coal is a strategic national asset	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What is the factor that attracted you to choose Botswana as your destination for mineral exploration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Lack of corruption	3	27.3	27.3	36.4
	Stable government	1	9.1	9.1	45.5
	Assurance of commodity exploitation once discovered	1	9.1	9.1	54.5
	Fiscal regime	1	9.1	9.1	63.6
	Mining tradition	2	18.2	18.2	81.8
	Botswana is centrally located in SADC region	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

What is the factor that attracted you to choose Botswana as your destination for mineral exploration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	27.3	27.3	27.3
	Transparency of Act	1	9.1	9.1	36.4
	Favourable Act	1	9.1	9.1	45.5
	Attractive money transfers	1	9.1	9.1	54.5
	Government transparency	1	9.1	9.1	63.6
	Reputation of favourable mining jurisdiction	1	9.1	9.1	72.7
	Recognised economic growth	1	9.1	9.1	81.8
	Security of tenure of mineral rights	1	9.1	9.1	90.9
	Resource	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What is the factor that attracted you to choose Botswana as your destination for mineral exploration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Prospectivity (good geology)	1	9.1	9.1	18.2
	Mineral resources	4	36.4	36.4	54.5
	Still unexploited mineral commodities	1	9.1	9.1	63.6
	Diversification of Botswana economy	1	9.1	9.1	72.7
	Geological prospectivity	2	18.2	18.2	90.9
	High level of skills in Diamond industry	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What is the factor that attracted you to choose Botswana as your destination for mineral exploration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	18.2	18.2	18.2
	Personal security	1	9.1	9.1	27.3
	Ease of doing business	2	18.2	18.2	45.5
	Relatively good infrastructure	1	9.1	9.1	54.5
	Relatively low costs	1	9.1	9.1	63.6
	Credit rating	1	9.1	9.1	72.7
	Reputation of good corporate governance	2	18.2	18.2	90.9
	Energy deficiency in economic market	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

24. What in your view are the top five concerns that you would want to see addressed to improve your ability to carry out your mineral activities in Botswana?

What concerns do you want to be addressed to improve your ability to carry out mineral activity in Botswana?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	9.1	9.1	9.1
	Resolution of problems associated with coal and uranium overlap as related to PLs	1	9.1	9.1	18.2
	Administration of prospecting licences	1	9.1	9.1	27.3
	Government must force companies with licences to work as per commitment	2	18.2	18.2	45.5
	Speedy process of work permits	1	9.1	9.1	54.5
	Clarity in prospecting licence compliance and renewal	1	9.1	9.1	63.6
	The rail link to markets	1	9.1	9.1	72.7
	Much better engagement and recognition of high-risk direct foreign investment	1	9.1	9.1	81.8
	Continued access to attractive acreage opportunities through the tenure process	1	9.1	9.1	90.9
	Streamlining the surface rights process and aligning it to the mining lease process and title deed registration	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What concerns do you want to be addressed to improve your ability to carry out mineral activity in Botswana?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	27.3	27.3	27.3
	Explicit government support for export infrastructure	2	18.2	18.2	45.5
	10	1	9.1	9.1	54.5
	Lack of efficient service delivery from both public and private sectors	1	9.1	9.1	63.6
	Revision of the ACT as it applied to the Debswana regime	1	9.1	9.1	72.7
	National strategy on Coal	1	9.1	9.1	81.8
	Certainty over development of key infrastructure	1	9.1	9.1	90.9
	Recognition of Coal Seam Gas in the requisite mining Acts	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What concerns do you want to be addressed to improve your ability to carry out mineral activity in Botswana?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	27.3	27.3	27.3
	Integration of needs between departments to fast track projects	2	18.2	18.2	45.5
	Botswana is too dependent on SA for essentials like fuel	1	9.1	9.1	54.5
	Renewal of statutory timeframes and quality PLs datasets maintained free from errors	1	9.1	9.1	63.6
	Clarity in retention license and allowance in continued prospecting	1	9.1	9.1	72.7
	Interaction of needs between DME and DEA	1	9.1	9.1	81.8
	Assistance in being able to recruit the necessary skill sets from outside Botswana to develop projects	1	9.1	9.1	90.9
	There must be incentives like tax exemption for companies that explore though to mining	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What concerns do you want to be addressed to improve your ability to carry out mineral activity in Botswana?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	27.3	27.3	27.3
	Speed of government transactions	2	18.2	18.2	45.5
	Government must commit to development of infrastructure	2	18.2	18.2	63.6
	Improved and cheaper communication skills	1	9.1	9.1	72.7
	Economic integration in SADC	1	9.1	9.1	81.8
	Concession issued on rail	1	9.1	9.1	90.9
	Streamlining the import/export of equipment services required for exploration and development	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

What concerns do you want to be addressed to improve your ability to carry out mineral activity in Botswana?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	27.3	27.3	27.3
	General attitude of workforce can hinder production	1	9.1	9.1	36.4
	Labour ministry should arrange exemption of skilled foreign labour and tax exemption for localising management	1	9.1	9.1	45.5
	Skills development in tertiary institutions	1	9.1	9.1	54.5
	Cheaper and available power supply	2	18.2	18.2	72.7
	Clarity in mining licence and allowance for continued prospecting	1	9.1	9.1	81.8
	Efficiency of Geological Services Department	1	9.1	9.1	90.9
	Security of tenure of mineral rights	1	9.1	9.1	100.0
	Total	11	100.0	10 0.0	

Appendix 8: Data templates

Mine plan

The production plan to include:

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr…	Yr15
Annual waste tonnes stripped										
Annual ore tonnes treated										
Head feed grade										
Plant recovery/Recovered grade										

Revenues

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr…	Yr15
Product prices (average $/carat or LME price)										
Net prices to the mine – Net Smelter Return basis or other purchase arrangement e.g. RV/SSV.										
Total revenues in USD										
Exchange rate										
Total revenues in local currency										

Operating costs

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr…	Yr15
Variable Costs										
a. Mining										
b. Treatment										
Fixed Costs										
a. Mining										
b. Treatment										
Administration and General Costs										
a. On mine general and administrative costs (mine overhead costs)										
b. Off mine g&a costs (transportation, smelting and refining charges, and insurance charges)										
c. Environmental closure cost provision										

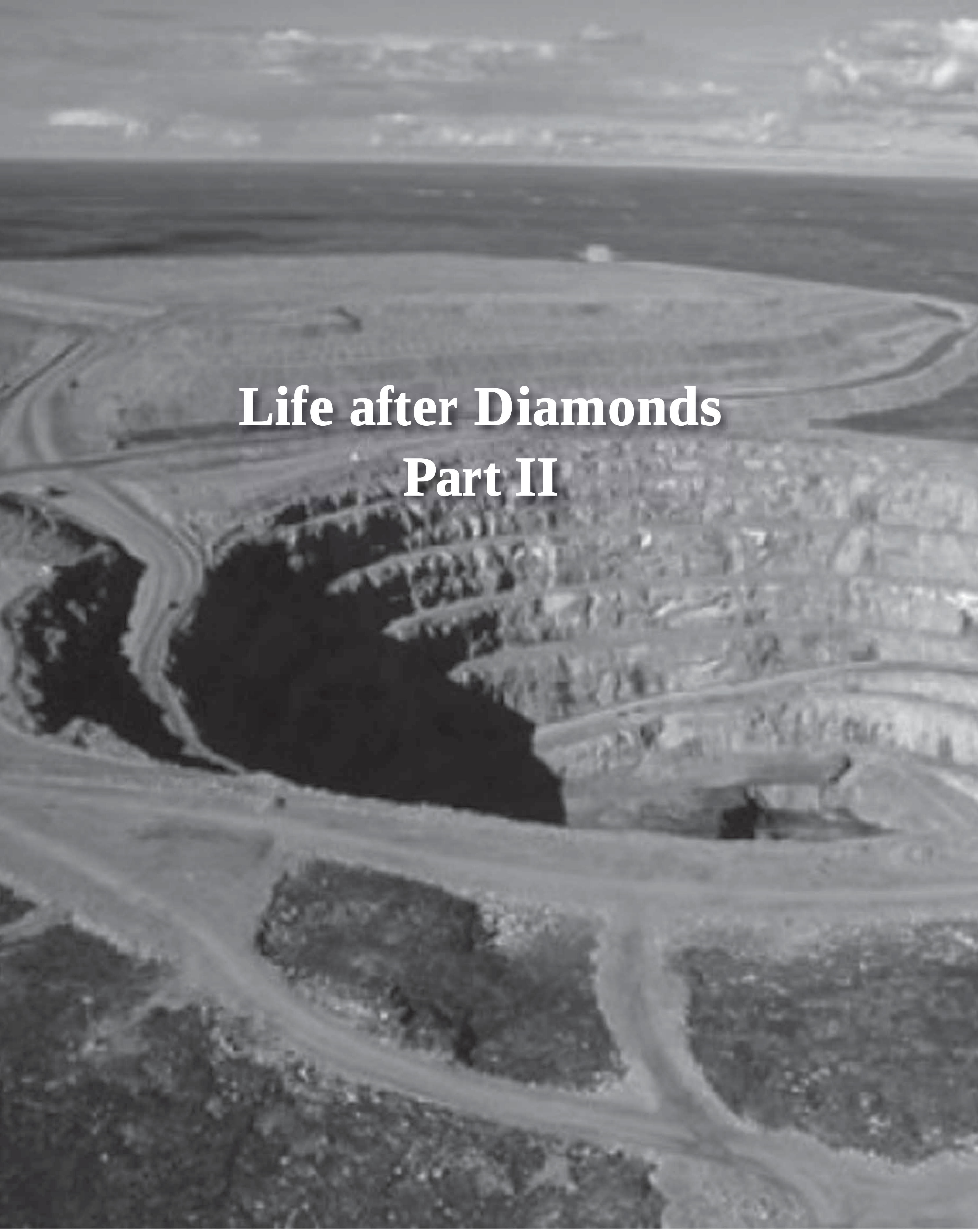
Capital costs

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr…	Yr15
Project/Expansion Capital										
1. Mine development (overburden pre-stripping, shaft sinking, stope development, etc)										
2. Mining equipment										
3. Treatment plant										
4. Infrastructure (water, power, access, housing)										
5. Other										
Stay in Business Capital										
1. Mining equipment										
2. Treatment plant										
3. Infrastructure (water, power, access, housing)										
4. Other										

Fiscal regime

Fiscal Regime
a. Will the standard mining tax regime VRIT apply to the project?
b. Is there a shareholders' agreement that governs profit sharing? If so what are the terms?
c. List the applicable royalty rates for the project

Life after Diamonds
Part II



Life after Diamonds:

The Economy-wide Consequences of Declining Diamond Production in Botswana

Part II

Rob Davies
Dirk van Seventer

September 2014

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LIST OF ACRONYMS

ARCH	Autoregressive Conditional Heteroskedasticity
BIDPA	Botswana Institute for Development and Policy Analysis
BoP	Balance of Payments
BURS	Botswana Unified Revenue Service
CAB	Current Account Balance
CCFS	Ministry of Finance's Cash Flow Statements
CGE	Computable General Equilibrium
CSO	Central Statistics Office
ECT	Error Correction Term
GDP	Gross Domestic Product
GNDI	Gross National Disposable Income
GNI	Gross National Income
HIES	Household Income and Expenditure
IMF	International Monetary Fund
KP	Kimberley Process (certification scheme)
LM	Lagrange Multiplier (test)
OLS	Ordinary Least Squares
SACU	Southern African Customs Union
SAM	Social Accounting Matrix
SUT	Supply and Use Table
TFPG	Total Factor Productivity Growth

APPENDICES

The Economy-wide Consequences of Declining Diamond Production in Botswana

Executive Summary

The central purpose of this report is to explore the consequences for Botswana's economy of a rapid, significant and permanent decline in diamond production.

We assume that the decline takes place between 2025 and 2027, although the lessons we draw do not depend on this precise timing. We explore the economy-wide consequences of such a decline using a computable general equilibrium model of the Botswana economy. Although such models are solved numerically, it is the underlying story behind the numbers that matter. This is particularly true in this case, since data limitations in Botswana require a number of assumptions to be made.

The report draws lessons for this event by applying the model to three different scenarios. Firstly it analyses the consequences of the 2008–2009 global recession and the (temporary) decline in diamond production and exports. Secondly, it explores the period covered in the projections of a companion study that projects mineral outputs for the period 2012–2026, covering both the Base and the High scenarios in that report. Finally, the report looks explicitly at the impact of a sharp fall in diamond production.

The primary finding of these exercises is that the central mechanism driving the impact of diamond mining decline is what we refer to as the savings channel. Diamond mining generates much higher operating surpluses than most other activities. These surpluses feed into the savings required for investment in Botswana either directly, through high savings in the mining sector, or indirectly through the revenue contribution to the government budget. When diamond mining declines these resources are no longer available.

Thus when diamond GDP in diamond mining falls by 83% in 2025 and 2026, total GDP falls by 20%, relative to the non-depletion path. However, even though mining GDP stabilises thereafter, GDP continues to decline relatively, so that ten years after depletion began, GDP is 47% below the non-depletion path. We do not run the model far enough into the future to establish when this decline ends.

This outcome is influenced by the policies adopted both before and after depletion. We explore two possible post-depletion policies, related to managing the exchange rate and the budget balance. Maintaining a fixed exchange rate reduces the negative impact by running a current account deficit. This is not a sustainable policy, since foreign debt cannot rise indefinitely. It is likely that depletion will reduce Botswana's credit rating, making it harder to borrow. Accumulating a significant sovereign wealth fund prior to depletion might provide some cushion. However, this policy essentially delays the required adjustment to a non-diamond economy and may make the final adjustment harder.

Reducing government spending in line with reduced diamond revenue improves the outcome, largely because it raises government savings.

Policies that might be adopted prior to depletion include slowing down diamond production, raising capacity in other mining sectors and investing in developing replacement industries.

Slowing extraction of diamonds might delay the onset of depletion, but it also reduces the growth of the economy prior to depletion. Estimates of the elasticity of demand for diamonds suggest that the scope for benefiting by using market power is limited.

Expanding other mining sectors can mitigate the effects of depletion, but given the qualitatively different nature of diamond mining, with its higher surpluses and off-take potential, it does not seem feasible that other mining could expand by the extent required to replace diamonds completely.

The report does not suggest what other non-mining activities might fill the gap left by depletion. However, it notes that, as with other mining, it is unlikely that activities that generate such high surpluses can be developed on sufficient scale to replace diamonds.

The conclusion is that depletion inevitably involves adjustment to lower income levels and a slower growth path. It will be important to manage expectations around this. The impacts of depletion will not be felt equally across the population. The data underlying the model do not permit proper analysis of the distributional consequences. However, it is possible that depletion will spark off distributional conflicts as various groups attempt to maintain their incomes. The model itself does not incorporate such political economy feedbacks. The report speculates that the likelihood of such conflicts is greater the more sudden depletion is.

Introduction

1

The remarkable performance of the Botswana economy over the past four decades has been driven by exploitation of mineral resources in general and diamonds in particular. These are non-renewable resources with finite lives. While new resources will likely be discovered, some thought has to be given to a future in which the resources provide a less vigorous engine of growth than they have in the past.

The Government of Botswana has already begun implementing policies aimed at a post-diamond future. The policy of encouraging diamond based activities – sales, sorting, cutting and polishing – is not aimed solely at beneficiation of an existing resource but also at developing a global capability that will survive as a stand-alone industry as its domestic supply base dries up. There are other possibilities that need to be explored.

This study's main purpose is to examine the consequences for the Botswana economy of a large and permanent decline in diamond production. This decline is anticipated to happen some time in the late 2020s, but it is instructive to begin by asking how we would intuitively assess the likely economy-wide impact of a sharp and permanent decline in diamond production now.

There are three obvious immediate impacts:

1. Reduced GDP: Diamond mining contributed about 12% to Botswana's GDP in 2013. The end of diamond mining would directly contract GDP by this amount.
2. Reduced exports: Diamonds constitute about 80% of Botswana's exports by value. This would be lost.
3. Reduced government revenue: Diamond mining contributes about 30% of government revenue, through taxation and royalties. These would be lost.

The reduction in exports and revenues would have multiplier effects that would exacerbate the 12% direct GDP loss. We do not have export and government expenditure multipliers for Botswana, so cannot easily say how much this additional effect would be. While these effects cannot be avoided, they can be influenced by policy responses to them. In particular management of the budget balance and of the current account balance / exchange rate will be crucial.

Would government respond to the immediate loss of revenue by reducing expenditure? Or would it attempt to maintain it and resort either to deficit financing or raising the revenues from other sources? Cutting expenditure will compound the immediate decline in the economy. Running a deficit might delay the decline but will not be sustainable in the longer run.

Similarly, the impact of the reduced export earnings would also depend in part upon the policy response. Broadly speaking, the authorities could try to keep the exchange rate fixed or allow it to float. The former would allow import levels to remain roughly where they are, but would increase the current account deficit, running down foreign reserves or increasing foreign debt. In this case the impact of the loss of exports on income is somewhat ameliorated, but essentially by reducing wealth. Under a market-determined exchange rate it is likely the Pula would depreciate, raising the cost of imports. If imports are reduced by the same amount as exports, there would be severe shortages in the economy, not only of consumer goods but of intermediate inputs into production. While this could stimulate local production, Botswana's current import dependence and lack of manufacturing suggest the scope for significant import replacement is highly limited, especially in the short run.

These are the direct effects we might expect. In addition there will be indirect effects, which we would expect to be large, given the magnitude of the shock to the economy.

An important indirect impact is through the impact on savings. Diamond mining is a source of savings in the economy, either directly or because the revenues it generates for government allow government to run a budget surplus. It thus creates the basis for investment across the economy, not simply in diamond mining. Depletion will reduce savings and therefore investment and long-run growth. However, there are aspects of this that have contradictory consequences. On the one hand, mining enterprises appear to be net savers: they use fewer resources in investment than they save out of current production. This means that they generate savings that permit investment elsewhere in the economy. At the same time, because of diamonds, Botswana has run a current account surplus until recently. This means that Botswana as a nation is a net saver; it is a net exporter of capital.

Depending on how the current account and exchange rates are managed, reduced diamond exports could turn Botswana into a net importer of capital. Thus the opposing effects: lower savings from mining are counterbalanced by higher foreign savings. The net effect of these two effects is uncertain, but intuitively the reduced savings from the first effect will outweigh the increased savings from the second, since the latter depends on the willingness of foreigners to accumulate Botswanan debt. Obviously this is not sustainable in the long run. Its consequences would show up in the longer run as reduced investment and growth.

The other indirect effects would come from the impact of these effects on other sectors of the economy. The main influence would be the drop in imports. How would this impact on production in other sectors?

To examine these indirect effects we need a model that captures these interactions. We make use of such a model later in this Report. We present the results as deviations from a hypothetical base path that represents what the economy might have done if diamonds were not depleted. This is purely a reference path: it does not imply that this is a realistic alternative path. To avoid any implication that it is a possible path, we refer to it as the Non-Depletion Path, rather than the more commonly used Business as Usual Path.

Our main findings are that:

1. A drop of 83% in diamond GDP over two years leads to total GDP being 20% below what it would otherwise have been;
2. Even though output of diamonds stabilises thereafter, GDP continues to decline so that it is 47% below the reference GDP 10 years after the depletion started.

In other words, the impact persists for a long time after the shock. The high value added, especially gross operating surplus, in diamond mining creates the savings required for other sectors of the economy (including other mining sectors) to be able to invest. When these dry up, investment and growth elsewhere is reduced. If the shock is high enough, the savings generated in the economy are hardly enough to permit replacement of normal consumption of capital through depreciation.

Although we do not know with certainty the size of the shocks, there is no doubt they will be large. If one takes into account population growth, they suggest that income per head could drop more than 30% in the 10 years after the decline, and will continue to decline thereafter. Income per head will be 50% below the hypothetical reference path. In so far as this represents some expectation in the minds of citizens (and government) of what might be (having become used to growth in incomes it is natural to expect it to continue), managing both real welfare declines and the political economy of unfulfilled expectations will be difficult tasks.

Although these analyses are hypothetical, they can be useful in so far as they stimulate explorations of what can be done. This study draws some general lessons.

Although the analysis in this study comes from the use of an economy-wide model, we try to avoid obscuring the real story with technical details by relegating most of the technical matter to appendices. In the main body of the report we present our major findings, without delving too much into the modelling behind them.

Apart from using the model to explore scenarios related to diamond depletion, we run two other scenarios: Scenario I: Global Recession, 2007–2015 and Scenario II: MEERP Replication, 2012–2024. The latter models the period 2012–2024, based on projections undertaken in the companion study to this, Fichani & Freeman (2012). While these scenarios are of interest in themselves, our main concern is to use them as inputs into our primary focus, diamond depletion.

The global recession provided a sharp real-world lesson of how a reduction in diamond production feeds into the economy. Mining value added fell by 46% and total value added by 9%.

Preliminary Matters

2

Before presenting the results of the various modelling exercises, we discuss some preliminary matters. We briefly discuss the use of Computable General Equilibrium models and the scenarios we run. We then use a multiplier analysis to explore the role of diamonds in the economy. We end the section with some general observations on the various channels through which diamond mining influences the economy.

2.1 A Word on Computable General Equilibrium (CGE) Models

We use an economy-wide model of Botswana in the form of a Computable General Equilibrium (CGE) model, to explore various issues. Appendix B has a discussion of the nature, use and limitations of such models. To summarise that discussion, such models provide us with a laboratory for undertaking controlled experiments of the consequences for the economy of an exogenously driven change (a 'shock'). By focussing on a particular change we are able to isolate the impact of interest from the influence of other changes that might be happening simultaneously but independently.

To use the model we set up a reference path, representing how the economy might move over time in the absence of the shock. We then impose the shock and consider the deviation it causes from the reference path. Because the only difference between the reference model and the shocked model is the shock we have introduced, we know that the deviation is a consequence only of the shock.

The reference path is in some sense irrelevant for the analysis: it is introduced only to provide a benchmark. If the shock causes GDP to be 5% below the reference path, our interpretation is that the shock, taken on its own, will cause GDP in the real world to be 5% below where it would otherwise have been.

We emphasise that this is not a forecast. We also emphasise that the reference path is not a possible alternative to the shocked economy. This is particularly important when we discuss the impact of diamond decline. The reference path is based on the assumption that the economy continues to grow at a rate similar to the rate before diamonds declined. Of course that will not be possible; we are not suggesting that Botswana will have a choice of continuing as if diamond production has not declined. It is important to emphasise this, since we will sometimes use the modelling jargon and refer to the reference path as the 'business as usual' path.

2.2 Scenarios Explored

Three scenarios are investigated:

1. Scenario I: Global Recession, 2007–2015
2. Scenario II: MEER Replication, 2012–2024
3. Scenario III: Diamond Decline, 2025–2036

Each of these requires different base paths. For Scenario I, the base path represents what hypothetically might have happened without the crisis. Clearly this is pure conjecture, a speculative counterfactual. However, as we shall see, the merit of this investigation is that it allows us to unpack how a number of different influences interacted during the crisis. In particular, we can learn about the influences of events beyond the control of decision makers in Botswana and the responses to those events, which were, to some extent, more a matter of choice.

For Scenario II we try to replicate the base scenario of MEER. We learn something about this, purely because of the issues discussed above, namely that we have to model the drivers of the path, not simply the outcomes. We can also use this to consider the low and high scenarios in MEER.

Scenario III is the nub of the exercise. It explores what happens after diamonds are depleted and what appropriate policies are both before and after. For this we need a base path that extends beyond 2026 (the end of MEER and the notional date for diamond depletion). Our problem is that we have little to guide us about this period, about either the reference path or the nature and timing of the shock. For the reference path we simply project the MEER period in some balanced way. We then model diamond depletion as a fall in diamond production caused primarily by a fall in capacity utilisation in diamond mining. We will discuss this further in the relevant sections.

While the first two scenarios are interesting in their own right, they also provide some insights that help us understand the issues around diamond depletion more fully.

2.3 Diamonds in the Botswana Economy

The primary database for the modelling is a 2007 Social Accounting Matrix (SAM).[1] Before undertaking the modelling it is useful to consider what that SAM tells us about diamonds and diamond mining in the structure of the economy. To do this, we make use of standard multiplier analysis.

A dominant characteristic of *Diamond Mining* is its weak interindustry linkages to the rest of the economy. Its forward linkages, through supplies to other sectors, are almost non-existent. In recent years the development of the cutting and polishing industry has strengthened these links, but there are no up-to-date data on this. In any event, this forward chain is probably relatively short, having few connections itself with the rest of the economy. The SAM shows that output from *Diamond Mining* is supplied only to *Other Mining*. Its backward linkages, through direct purchases of material inputs, are similarly weak. As Table 22 shows, *Diamond Mining* uses 17 of the 32 product groups identified in the SAM as inputs. Although this is a relatively high number, the value of these inputs is small (Col [1]) and they represent a low proportion of the costs of diamond mining (Col [2]). Moreover, a significant proportion of these inputs is imported (Col [3]); a weighted average suggests that overall 59% of the value of its intermediate inputs is imported. Finally, *Diamond Mining* is not a significant market for all of these products (Col [4]). Sales to diamond mining represent 8.0% of the sales of Electricity and Water in the economy. This is the highest market share of products supplies to the industry. It also buys 7.4% of the petroleum sold, but petroleum is entirely imported.

These characteristics mean that fluctuations in the level of diamond mining are not translated into significant fluctuations in direct demands for inputs supplied by other sectors. From this point of view the direct connections of the sector to the rest of the economy are weak.

Multiplier analysis permits us to go beyond these direct effects to include the indirect linkages, which operate through the purchases of inputs by sectors that supply *Diamond Mining*. The SAM permits us to measure a number of different multipliers, depending on what we assume to be endogenous. For this report we present two, both shown in Table 23. The Supply and Use Table (SUT) multiplier is based purely on the interindustry connections; the SAM multiplier brings in the factor incomes and household demands as well. Hence, we expect SAM multipliers to be larger than the SUT multipliers because the household income and expenditure loop is now included. It is possible to extend the SAM multiplier further, to include government expenditures and revenues. Since provision of revenues for the government is one of the most important linkages of diamond mining to the economy, this extension seems relevant. However, multiplier analysis assumes fixed prices and fixed proportional relationships between variables. While this can be plausibly assumed for technical relationships in production and supply, it is less plausible with household and government income and expenditure. For this reason it is better to use a CGE model, which permits price variations and

[1] See *Appendix A* for a discussion of its compilation.

substitution, to analyse the impact of diamond mining via these channels.

Both multipliers show the direct and indirect impacts of a unit rise in demand for a product on either total activity levels or total commodity supplies. The impact on commodity supplies is higher than on activity levels because some commodity supplies are imported, because of taxes and margins on commodity trade, and because the commodity may be only one of the commodities supplied by the activity. Thus, in Table 23, a rise in the demand for Diamonds by P1.00m will cause the level of all activities in the economy to rise by P0.97m, while the supply of all commodities will rise by P1.08.

These are very small multipliers. An activity multiplier less than one is extraordinarily low and reflects high direct or indirect imports. From Table 22 we see that the inputs with high cost shares in *Diamond Mining* have high import content and, as a result, any stimulus to the activity leaks out of the economy rapidly. Thus, although additional diamond mining requires petroleum inputs, these are entirely imported and thus the expansion in diamond mining has no impact on domestic industry through this channel. Moreover, this will apply to all activities supplying diamond mining that also use petroleum. Finally, intermediate inputs make up a small proportion of the value of gross output in *Diamond Mining*. Expansion of output thus has few spillovers.

In Table 23 the SAM multipliers are much higher. It can be seen that the activity multiplier for *Diamond Mining* rises from 0.97 for the SUT multiplier to 1.15 for the SAM multiplier. This is because both factor incomes and household expenditures are now treated as endogenous. A rise in the demand for Diamonds causes all activities in the economy to expand by 1.15 not only through the interindustry linkages, but also because a higher wage income is generated which increases household demand and has further knock-on effects.

The difference between the two reflects the fact that *Diamond Mining* is linked to the Botswana economy primarily through the incomes it generates. These then feed demands by households and so the multipliers are bigger. Given the importance of diamond revenues for the government, one could expect the multiplier analysis to endogenise government revenues and expenditures. However, as noted above, this assumes proportional relationships between government revenue, spending and the rest of the economy. It is likely that this is not true and that these relationships are affected by changes in relative prices. The multiplier analysis will thus give an inaccurate measure of the impact, probably overstating it. It is better to deal with it in the proposed CGE framework.

2.4 Channels of Influence

Any particular sector can potentially affect the rest of the economy through six different channels:

1. The *interindustry* channel, as a purchaser or supplier of inputs from or to other sectors in the economy;
2. The *absorption* channel, as a provider of consumer, government or capital goods to the domestic economy;
3. The *factor* channel, as a user of labour, capital and land;
4. The *fiscal* channel, as a generator of tax revenue or beneficiary of subsidies or other government expenditure;
5. The *international* channel, as an exporter and importer;
6. The *accumulation* channel, as a saver or investor.

Our multiplier analysis has shown that Botswana's *Diamond Mining* does not have significant interindustry linkages with other sectors in the economy, so its impact through the interindustry channel is not important. The same can be said for both the absorption and factor channels.

It is mainly through the last three channels that it has its impact. The fiscal channel is obvious: diamond mining generates tax revenue and royalties directly. In addition, through its impact on the rest of the economy there are indirect effects, although these will likely be small.

Similarly the international channel is obvious. Diamonds are Botswana's biggest exports. We do not have the data to calculate the net exports (exports less any imported inputs directly or indirectly), but they are probably substantial. Depending on how the exchange rate is managed, the international channel can also have impacts via the exchange rate or the current account balance.

The accumulation channel is less obvious and requires more elaboration. In what follows, we refer to real savings and investment, not to the financial flows that are associated with them.

When we consider a particular sector of the economy in isolation, investment can be regarded as determined independently of investment in other sectors. Firms in the textile sector, for example, assess future outputs and returns and plan their investment accordingly. They take the cost of investment as given. They do not necessarily consider what investment is being undertaken in diamond mining. (Although what is happening in other sectors may feed into the formation of their expectations of the future.)

However, we cannot simply add together each sector's investment derived in this way to get aggregate investment in the economy. In an economy-wide framework there is a savings-investment constraint.[2] National accounting consistency requires that in any given period aggregate savings in the economy must equal aggregate investment.[3]

Savings is measured as the difference between income and final consumption. We can split national savings into private savings, public sector savings and foreign savings, (the negative of the current account balance).[4] Investment comprises gross fixed investment and changes in inventories. For this discussion it is convenient to ignore inventory changes so that we can focus on fixed capital formation.

We can thus write a disaggregated form of savings-investment identity:

	savings-investment balance of non-mining firms
plus	*savings-investment balance of mining firms*
plus	*savings-investment balance of households*
plus	*savings-investment balance of government*
=	*current account surplus*

[2] *Appendix D below discusses these matters in more detail.*

[3] *We refer here to real savings, that is, final goods which are produced but not used up in any period. This should not be confused with various financial forms of savings.*

[4] *An economy can only invest and consume more than it produces if resources flow into the economy from outside. That means it has to import more than it exports. This implies that foreigners are consuming and investing less than they produce. They are saving, and their wealth is increasing in the form of trade debts owed to them.*

The mining sector competes for national resources with the rest of the economy. Were it to invest more than it saves, some other sector(s) would have to save more than they invest. Equally, when the mining sector invests less than it saves, other sectors are able to invest more than they save.

This accumulation channel is important for determining how the economy grows.

A crucial determinant of the behaviour of the economy is how the overall equality between savings and investment is brought about. There are two broad alternatives. Savings might rise to accommodate any increase in investment. There are a number of financial mechanisms that theoretically could bring this about: interest rates, income redistribution, current account readjustments, government budget adjustments.

Alternatively, investment could be constrained by inflexible savings. The government might be unable to raise its savings (i.e. raise a budget surplus or reduce a deficit). The current account deficit might be constrained because of an inability to borrow abroad. Or the private sector – households and firms – might find it difficult or suboptimal to save more. In this case, even if firms wish to invest more, the workings of the economy might prevent total investment rising. There might be some compositional changes, with some firms fulfilling their plans at the expense of others or the public sector crowding out private investment, but total investment remains constant.

We have no evidence which of these alternatives operates in Botswana. The various channels are probably rather complex. Total investment is split roughly half and half between public and private sector investment. The surpluses generated in the mining sector play an important role in determining both of these.

The mining sector is a crucial source of revenue for government, allowing it to run a current budget surplus, that is, to save. Much of these savings are probably offset by public sector investment (mainly in infrastructure). So while it may appear that the budget surplus permits government capital expenditure without significant borrowing, one could also view the process as government acting as a conduit for channelling mining surpluses into public infrastructure.

Our intuition is that the behaviour of private sector investment is dominated by investment in mining. But we have little evidence of what even that might be. It seems likely that the mining houses can *finance* any investment from foreign sources, but we are concerned with the real goods and services used for investment. Access to foreign financing means that the imported component of investment can be supplied. However, any local component has to come from domestic resources. This will not automatically generate foreign savings, so must be matched by domestic savings, whether by the mining sector, other firms or households.

The real question is whether a planned increase in investment in mining automatically generates all of the real savings necessary to permit it to be realised. Although we do not know the proportion of investment imported, we suspect that a large part of mining investment is engineering and construction, which tend to have a high domestic content. We also assume that both private and public domestic savings are relatively independent of investment in any particular year. Mining investment requires resources now in order to increase output some years down the line. It will raise income and savings in the future, but not within the year it takes place. We therefore model investment as savings constrained.

There is a further, purely modelling, reason for making this assumption. If we make total investment the driver of savings, we effectively impose a growth rate on the economy. But we are interested in exploring how diamond depletion affects growth and therefore want to have it endogenously determined. Assuming savings drive investment will give us more insight into the problem at hand.

This discussion should not be taken to imply that savings are fixed. As income rises, so household savings will also rise. If government reduces its budget surplus, savings will fall. Thus the level of savings can change. However, such changes are not induced by the desire to invest more. If, after all shocks have worked themselves through the economy there is a gap between desired investment and actual savings, it is desired investment that will adjust, not savings.

Scenario I: Global Recession, 2007–2015

3

3.1 Background

There have been numerous thorough accounts of the impact of the financial recession on Botswana. The intention of this review is not to provide another authoritative and comprehensive account of the impacts. Rather we wish to identify those impacts and their channels that carry lessons for understanding the potential consequences of the cessation of diamond mining and possible measures to mitigate those effects, now and in the long run.

Botswana was clearly affected by the recession. The recession hit in the second half of 2008. In 2009 Botswana's GDP fell by 7.8%.[5] If we exclude indirect tax revenues net of subsidies, value added, a better measure of output, fell by 9.3%. This was driven by a fall of 46.2% in mining value added; non-mining value added actually grew by 5.3%. Given mining's share in value added (28.3% in 2008), if there had been no change in other sectors, total value added would have fallen by 13.1% in 2009. However, other sectors off-set this by contributing a positive 3.8% to the overall growth rate.

It is clear that the immediate cause of this was the fall in diamond exports following the collapse of the world diamond market. Figure 1 shows global exports by diamond producing countries, highlighting the plunge in the fourth quarter of 2008. Volumes fell by 49%; prices also fell, meaning the global value of exports by diamond producing countries, highlighting the plunge in the fourth quarter of 2008. Volumes fell by 49%; prices also fell, meaning the global value of exports (Figure 2) by these countries fell by 56%.

[5] *(Statistics Botswana, 2013)*

Figure 1: Indices of Values and Volumes of Exports by Diamond Producing Countries
(2004Q1 = 100)

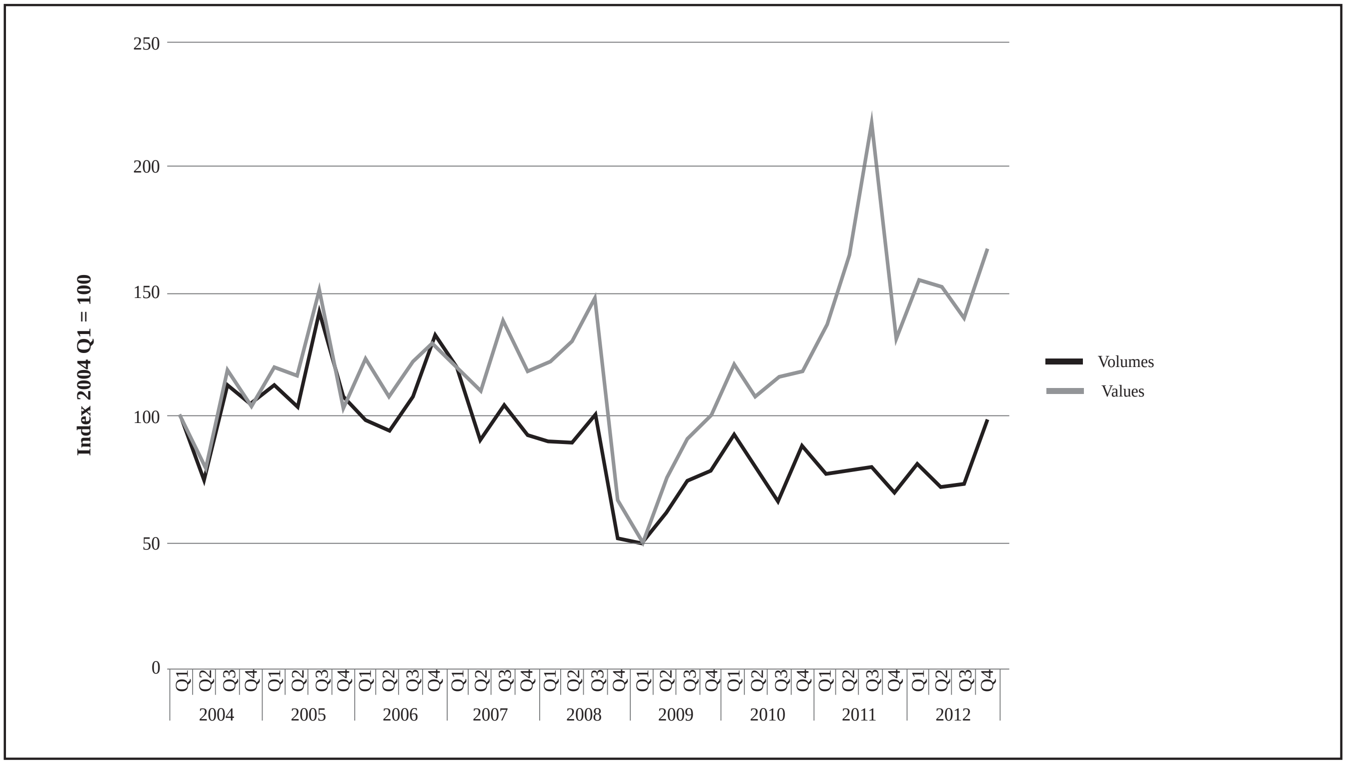
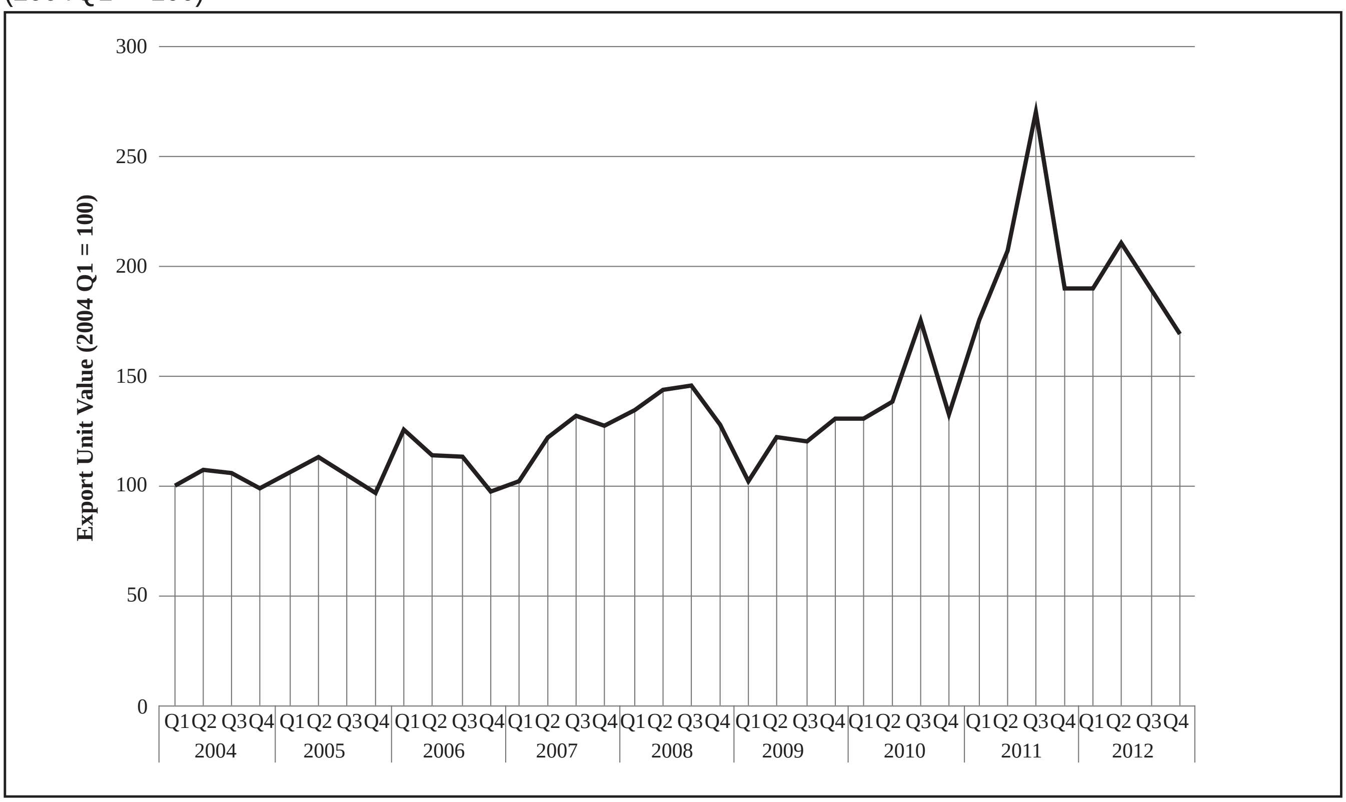


Figure 2: Unit Value Indices for Exports of Diamond Producing Countries
(2004Q1 = 100)



Source: *Kimberley Process, various dates*

However, it is not obvious that the fall in exports necessarily had to translate into a fall in mining production and a major drop in GDP. Had the drop been viewed as temporary – which, with hindsight, would have been a reasonable view – it might have been sensible to maintain production and stockpile output, although Debswana does not have this option. Indeed, this is what some countries did. Table 1 shows that Australia increased its production massively, but reduced its exports marginally. The same pattern is observed for Angola, Russia, Canada and Guinea: although production fell, exports either rose or fell by a greater percentage than output. These countries were able to buffer the potential impact of falling exports on production. This is unlike the countries lower down the table, where the fall in exports was either similar to the fall in production (Botswana, Other) or considerably less than it (Namibia, South Africa, DRC). These countries essentially adjusted to the contracting global market by contracting domestic production.

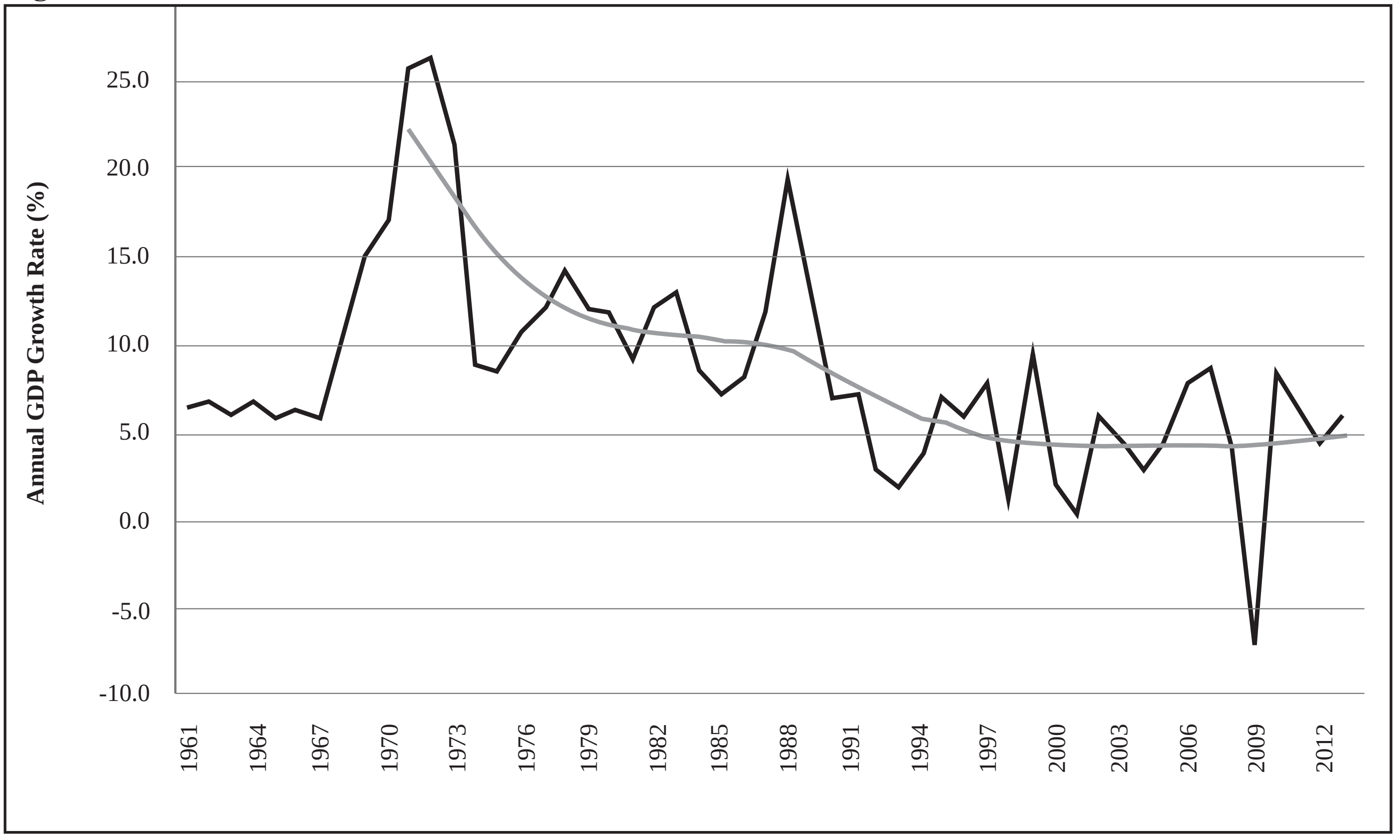
Table 1: Changes in Production and Exports During the Crisis

	% change	
	Production	Exports
Zimbabwe	30.3	196.3
Australia	129.4	-13.8
Angola	-1.6	85.8
Russian Federation	-6.7	-17.4
Canada	-30.8	-47.3
Guinea	-87.5	-93.5
Botswana	-14.5	-15.3
Other	-43.2	-39.5
Namibia	-60.4	-35.7
South Africa	-42.5	-7.8
Democratic Republic of Congo	-49.0	-8.3
Total	-19.7	-23.1

Many factors can explain these different responses: the ability to finance stock piling, the level of domestic demand, the relative influence of state and private companies in such a decision. It is beyond the scope of this study to investigate these. Our interest is whether there are lessons that can be learned from this experience that may help guide policy makers in thinking about an expected similar drop at some point in the future, when diamonds run out.

It is clear from Figure 2 that prices dropped sharply during the crisis but have since recovered to levels that are higher than pre-crisis. Going forward, the price of diamonds is forecast to increase due to the combination of new consumer markets in Asia (India and China mainly) while global production (not only in Botswana) is declining.

Figure 3: Annual GDP Growth Rates, Botswana, 1961–2013



Source: *World Bank (2014)*

This recovery in the global diamond market allowed Botswana's GDP growth rate to bounce back quickly, as shown in Figure 3; the 8.6% achieved in 2010 was the same as in 2007 and the highest since 1999. The rates in 2011–2013 were of the same order as those prior to the recession. We have fitted a trend line to the data (estimated omitting 2009), which shows that since diamonds were fully produced in 1971, the economy's growth rate has progressively declined (from an exceptional high rate), roughly stablising around 1997. If one omits 2009, the average smoothed growth rate was 5.3% pa between 2007 and 2013, compared to 4.6% in the ten years prior to the global recession. Even including 2009, the average rate for 2007–2013 was 4.5% pa. From the perspective of growth performance, it seems that the global recession caused a temporary downturn, from which recovery was complete by 2012.

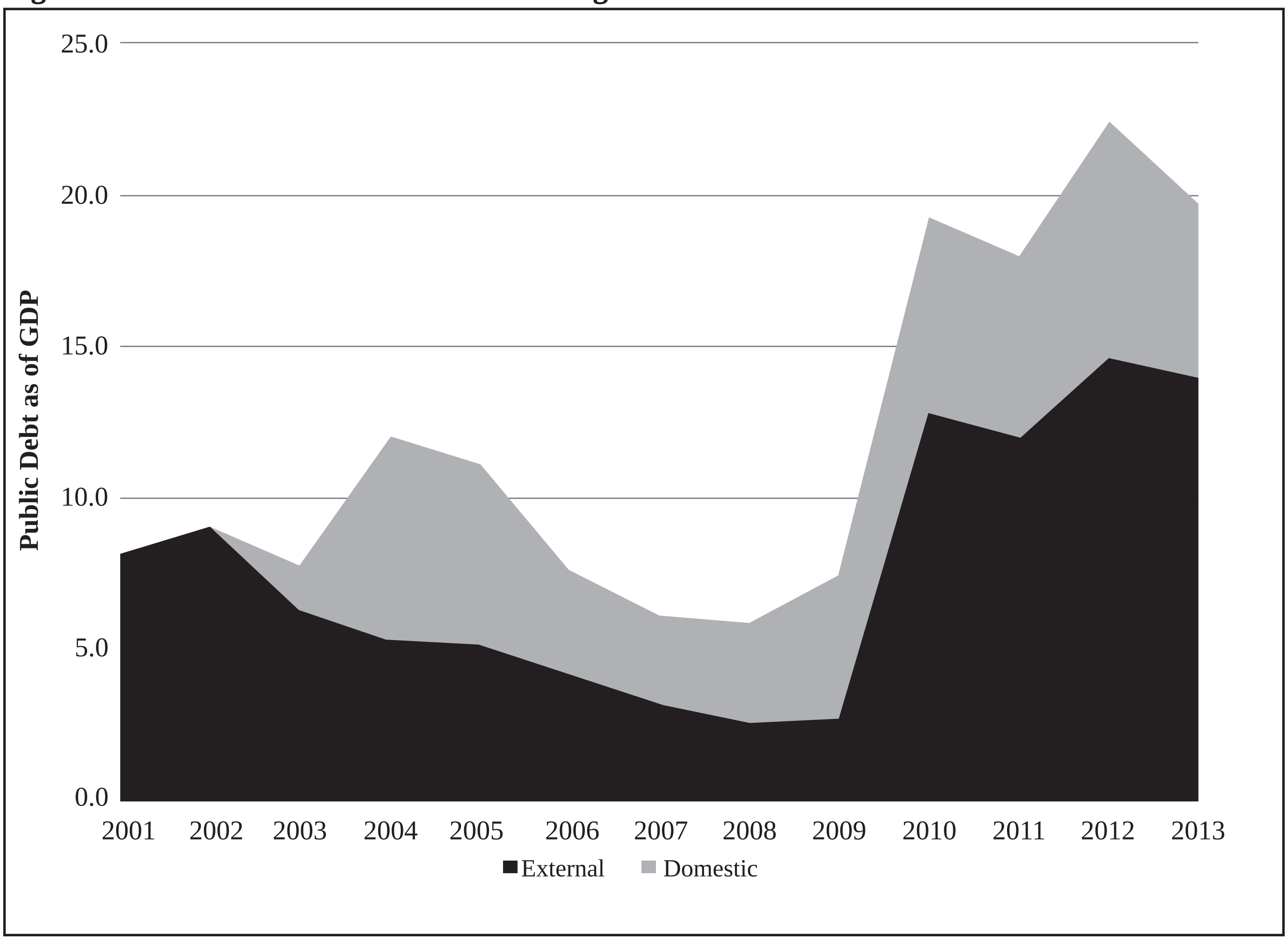
The foregoing refers solely to growth performance. The global recession had some impacts that had longer lasting effects on the economy. The impacts on the current account balance and the budget balance both provide relevant lessons for policy management in the face of depleted diamonds.

The current account balance was typically in surplus before 2007. In 2008 there was a small deficit which worsened in 2009 and remained in deficit until 2012. In 2013 it returned to the traditional surplus (see Figure 25).

Figure 26 shows the various components of the BoP over the period. The primary reason for the deficit and its continuation was that when exports slowed down, imports did not follow suit. In the five years prior to the recession (2003–2007) exports expanded by P3.4bn per year[6], while imports grew by P2.8bn. In 2008, export earnings went up by P1.1bn, while imports grew by P10.7bn. Although both fell in 2009, the main year the recession hit, exports fell by P8.9bn while imports declined by only P2.0bn. Between 2008 and 2012 P14.1bn were added to merchandise exports, while P36.0bn were added to merchandise imports. (The graphs in Figure 27 show the same data as percentages of GDP at market prices, to get round the problem of reporting in current prices. They tell the same story.)

The global recession also affected the government budget balance and its financing. Figure 28 provides three views, all telling the same story. Recurrent expenditure remained on an upward trend through the main years of the recession, only dipping in real terms in 2010.[7] Revenue had much the same trend in nominal terms, but in constant 2006 prices had started to decline in 2006/07. The recession seems not to have accelerated this downward trend, although the dip in 2010 also occurs. Over the period the development expenditures (roughly government investment) pretty much matched the surplus of revenue over recurrent expenditure, although in any particular year the two were often out of sync. Development expenditure followed recurrent expenditure and revenue taking a downturn in real terms in 2010. However, unlike the other two, this downturn has continued up to the latest data point.

Figure 4: Government Public Debt Outstanding as % of GDP



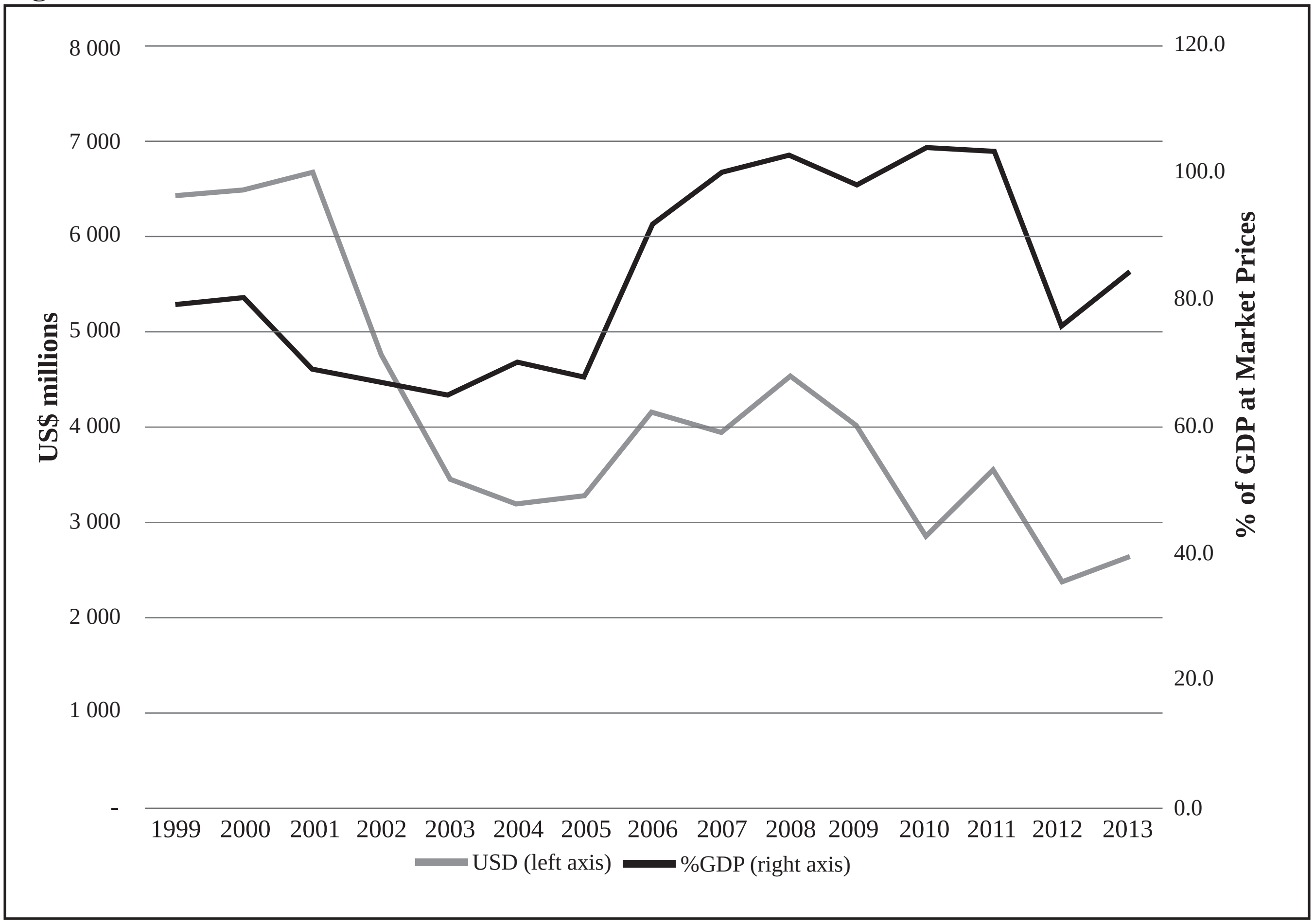
Source: *Bank of Botswana, various dates, Botswana Financial Statistics, Table 7.5*

[6] *These and the following figures in this paragraph are in current prices.*

[7] *The fiscal year runs from April to March, so that most of the action in FY 2010/11 was in calendar year 2010.*

One interpretation of these trends is that recurrent expenditure did not adjust to the recession. Although real revenue was flat in 2009/10, recurrent expenditure grew. The recurrent budget did not go into deficit, but the surplus was reduced sharply. In part the response was a decline in investment. But there was also a large rise in public debt, as shown in Figure 4. We see a sharp rise in external public debt in 2010. Figure 5 shows that although there was no drawing down on the Pula Fund (another potential source of financing the current account and budget deficits), its expansion slowed down during the recession and has not really picked up again.

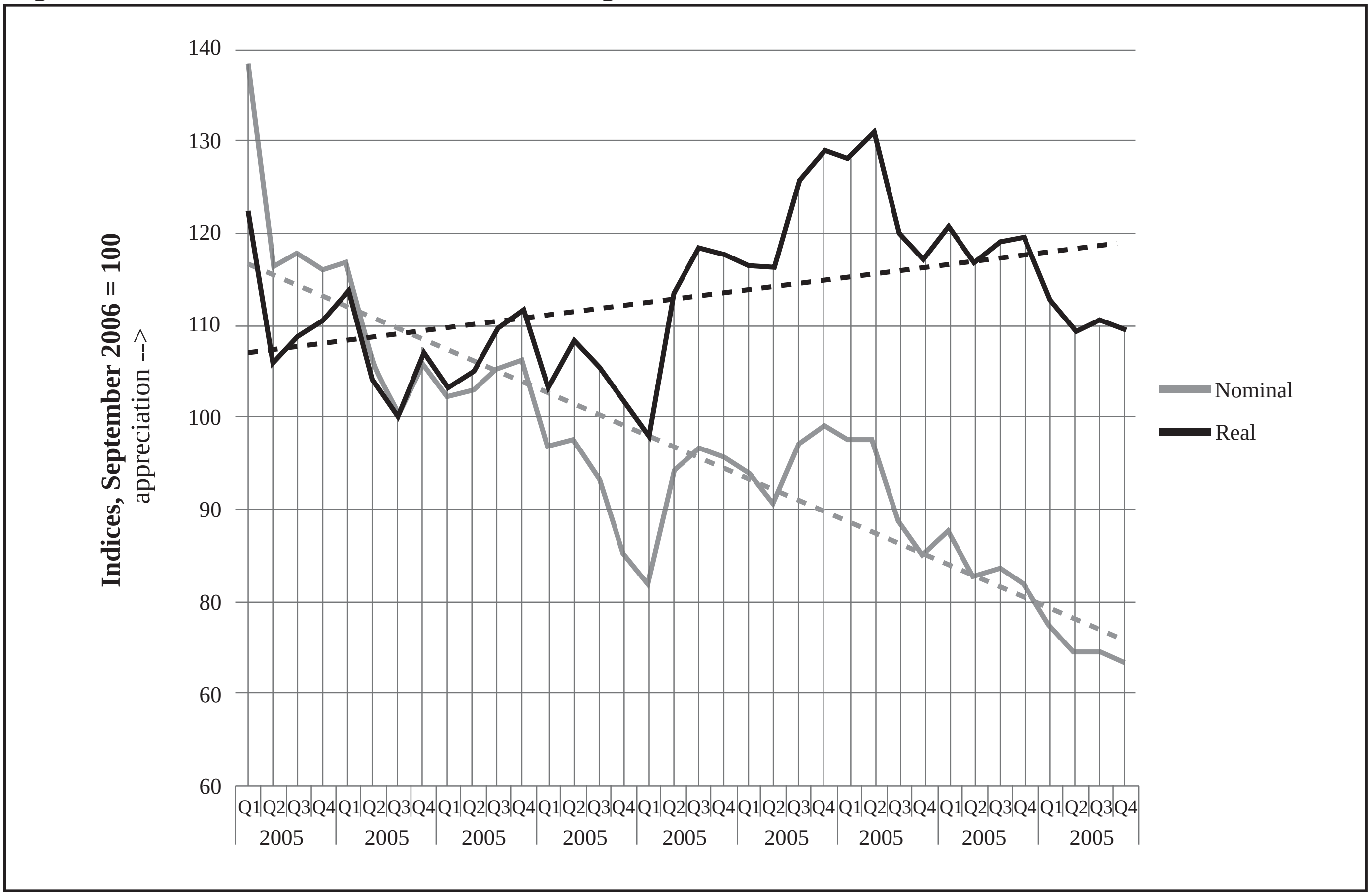
Figure 5: The Pula Fund, 1999–2013



Source: *Bank of Botswana, various dates, Annual Reports*

Finally, to complete this descriptive account, Figure 6 shows indices for the nominal and real exchange rates for the Pula against the US dollar. The exchange rate is managed under a crawling band regime, largely predicated on an inflation target. At the start of the recession both the nominal and the real exchange rates depreciated, but by the end of the first quarter of 2009 they both appreciated. The nominal rate remained high until Q2 of 2011, while the real rate only started to depreciate at the end of 2012. Given the way the exchange rate is managed, these movements were mostly driven by cross movements in other exchange rates, rather than internal factors. Given the impact of the recession was largely through a fall in exports, recovery might have been aided by a more sustained real depreciation. The continued high level of imports despite the recession was probably encouraged by the appreciated exchange rate.

Figure 6: Indices of US Dollar/Pula Exchange Rates



We can draw some lessons from this experience for the diamond depletion story. When there is a downturn in the economy most economies are slow to adjust the demand side to be consistent. The Pula did not depreciate significantly in real terms. This might be an appropriate response to a temporary negative shock. We consider this further when discussing the modelling below. However it is not a sustainable option when the negative shock is permanent.

3.2 Modelling the Financial Crisis

The recession requires a base path that shows how the economy might have performed in the absence of the recession. We have no guide as to what this hypothetical path might have been. We therefore adjust the model so that GDP grows at roughly the same rate as it did for the years before the recession.

The recession's immediate consequence was a fall in the world price of diamonds. Botswana responded by reducing its production and exports. There was also a pause in investment. We use our model to explore these three effects, using a combination of three shocks: a fall in the global export price of diamonds, a reduction in capacity utilisation and a reduction in investment in diamond mining. We modelled each of these separately and then together, allowing us to unpack the contribution of each to the overall impact.

Firstly the global export price of diamonds falls. We use the Kimberley Process Certification Scheme (KP) data to measure the unit value of exports of diamond producing countries as a proxy for the world price of diamonds. This price fell by 14% in 2009. However, as seen in Table 2, there was a wide variation across the diamond producers. Botswana was close to the global average. Since these are nominal values, we model a fall of 12%.

Although the recession was felt in late 2008 into 2009, some of the price changes in subsequent years might be attributable to the recession. Global prices rose relatively fast in 2010 and 2011, probably as a bounce back from the recession. However, as noted earlier, some producers stockpiled during the recession. The subsequent release of these stocks would presumably have influenced global prices; was the fall in 2012 a result of this? Russia's exports increased by 174% in 2010; would the price rise in that year have been greater without this? We do not know the answer to these questions. We therefore assume that the price of Botswana's diamond exports rose in 2010 and again in 2011, bringing the price trend to where it would have been without the initial fall.

The unit value of Botswana's diamond exports fell in 2009 by 15% in nominal terms. This translates into 16.8% in real terms using the OECD Expenditure deflator as a proxy for global prices. Although this is a significant drop, it would not be expected to reduce

Table 2: Change in Export Unit Values of Selected Diamond Producing Countries

% year on year

2005	2006	2007	2008	2009	2010	2011	2012	
ANGOLA	20	-20	7	2	-40	41	17	-7
AUSTRALIA	23	15	25	3	-3	9	16	1
BOTSWANA	11	-1	-7	21	-15	30	79	-21
CANADA	-4	-5	-10	51	-12	54	21	-19
DRC	14	-17	-4	16	-45	27	3	-25
GUINEA	56	-14	-46	-57	170	-11	141	37
NAMIBIA	12	-1	-11	21	-14	35	23	2
RUSSIAN FEDERATION	13	10	40	-6	27	-18	71	11
SOUTH AFRICA	-15	16	10	9	-27	77	9	-18
ZIMBABWE	-22	-25	-58	70	-74	77	43	-9
TOTAL	2	6	8	16	-14	19	48	-11

Source: *Kimberley Process Certification Scheme*

Botswana's GDP by as much as occurred. Furthermore, it was more than compensated for by the subsequent recovery in prices. To help understand the impact of the price fall, we consider a one-off decline of 15.9% in 2009 and a subsequent recovery by means of an increase of 21.1% in 2010.

However, as we noted, it is possible that the level of production need not have fallen. We therefore reduce capacity utilisation in 2008 and 2009 followed by a recovery in the subsequent years while also allowing the reported disinvestment by means of a reduction in investment. The latter is modelled as negative growth in all mining capital stock in 2009 and 2010 of 1% and a recovery of 8.6% in 2011 to bring the sector back to a baseline growth of 2.1%.

3.3 Scenario I: Results and Discussion

The following simulations are considered for Scenario I

Sim1	World diamond price falls 15.9% below trend in 2009, and resumes trend growth in 2010
Sim2	Sim1 plus increase in the world diamond price in 2010 to restore the price to what it would have been without the 2009 decline (+21.1%)
Sim3	Sim2 **plus** reduction in investment in mining (-10% in 2009 and 2010) followed by rise to pre-crash level in 2011

Scenario I is designed to tell the story of the recession and recovery and covers the period 2007–2015 of the modelled economy. The last couple years of this period take their capacity utilisation drivers (using the productivity of capital as a proxy) from the first year of the MEER projections, while the earlier years use what we think we know has happened to the world price of diamonds, the capacity utilisation of the diamond mining sector and the investment (growth in capital stock) in this sector.

In order to better understand the impact of the various drivers, a number of simulations are devised. They are captured in the following table.

Table 3: Simulations for Modelling the Recession and Recovery Years (Scenario I), % change

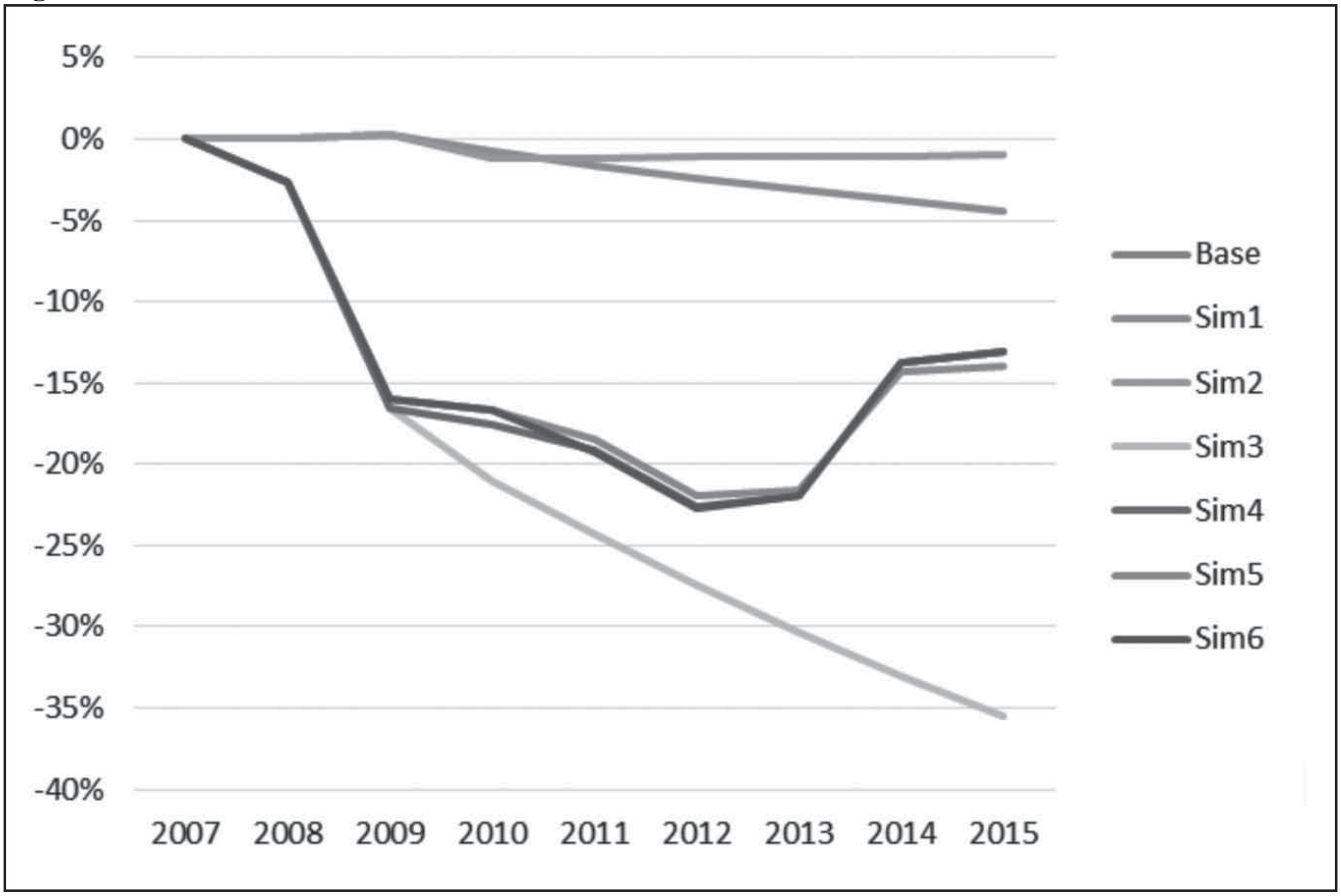
Shock parameter	Simulation	2008	2009	2010	2011	2012	2013	2014	2015
World price of diamonds	sim1		-15.9						
	sim2 & subsequent		-15.9	21.1					
Productivity of fixed capital in diamond mining (capacity utilisation)	sim3	-8.1	-45.2						
	sim4 & subsequent	-8.1	-45.2	22.3	3.9	-7.0	17.0	43.6	0.0
Investment (growth in capital stock) in mining (baseline: 2.1%)	sim5		-1.0	-1.0					
	sim6		-1.0	-1.0	8.6				

In simulations 1-2 we change the world price of diamonds only with a recovery in 2010 (simulation 2) and maintain this change for the subsequent simulations 3-6. Productivity in fixed capital in the diamond mining sector is changed as a proxy for a drop in capacity utilisation in simulations 3-4 with a recovery in simulation 4. This recovery is based on the actual output trajectory of recent years as discussed earlier which then blends into the MEER projections for 2013–2015 discussed below as part of Scenario II. This is maintained in the subsequent simulations 5-6. The additional disinvestment part of Scenario I is explored in simulations 5-6 with a recovery to the baseline growth of 2.1% modelled to take place in 2011.

The impact of these simulations on total GDP is shown in the next figure as deviations from the baseline with the same principle applying to the two subsequent figures. Note that the baseline itself is therefore not shown but this is represented by the X-axis (0% deviation). The drop in the world price has a small negative impact on total GDP in 2009. If, as is the case in simulation 1, the diamond world price does not recover, the deviation from the base just gets more negative as the years go by. The recovery of the diamond world price in 2010 has a positive impact on total GDP but cannot quite offset the losses.

However, the biggest negative impact on GDP can be attributed to the drop in diamond mining production which is here proxied by a declining capacity utilisation and modelled by a negative shock to capital productivity. As was discussed above, Botswana did not follow all diamond mining countries as others choose to maintain their production. In particular, simulation 3 represents the worst-case scenario as the negative shock is not followed yet by a recovery in diamond mining output as is the case in simulation 4. Thus, simulation 3 brings about the permanent negative trajectory for GDP while the recovery in the diamond mining production attenuates the negative impact. Towards the end of the period a recovery in GDP is engineered based on the MEER projections of mining production, although not nearly all lost GDP is recovered and a permanent gap of about 13% compared to the base remains. The reduction in capital stock growth of simulations 5 and subsequent recovery in simulation 6 have a small impact on GDP with virtually no difference between simulations 4 and 6 from 2011 onwards.

Figure 7: Total GDP, Deviations from the Base

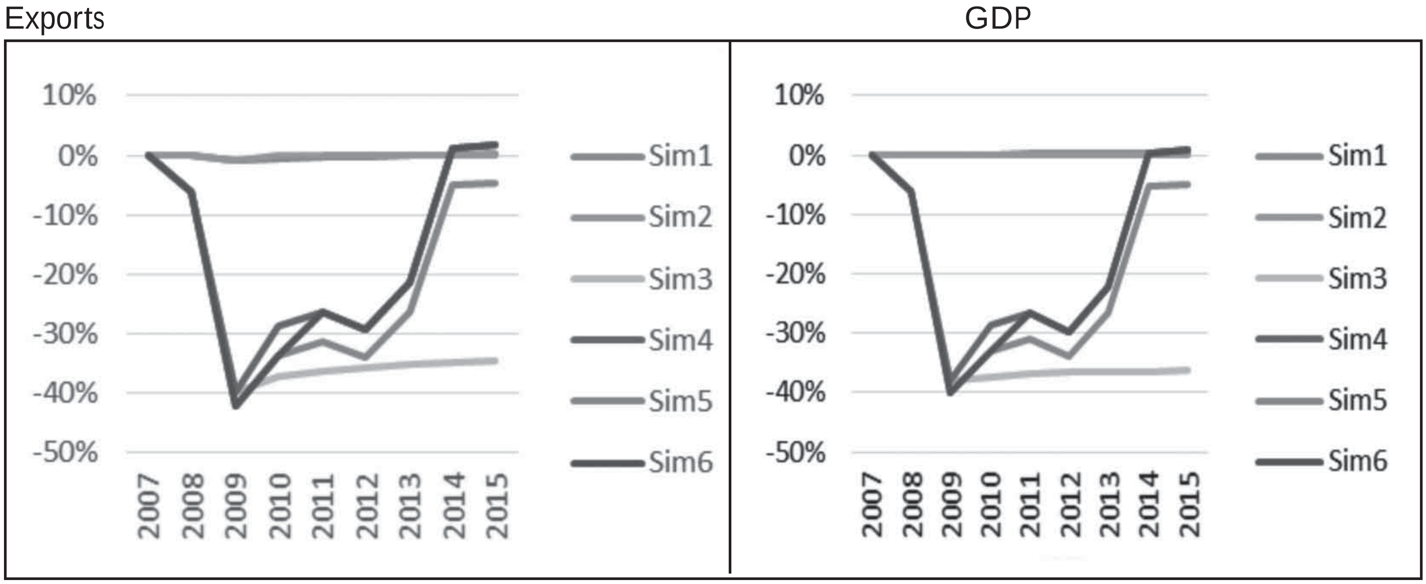


Source: *Own calculations*

The overall story sketched above is predominantly shaped by what happened in mining, as can be seen in Figure 7. The decline and subsequent recovery in the diamond world price has virtually no impact on mining GDP (dominated by diamond mining) but the drop in mining output leaves a permanent negative hole if there is no recovery. With the actual recovery in diamond mining modelled as best as we could in simulation 4 we are, however, unable to plug this whole until the MEER projections kick into action from 2013 onwards. The last two simulations (5-6) offer a slight variation with incomplete recovery if the negative capital stock growth is not reversed in simulation 5.

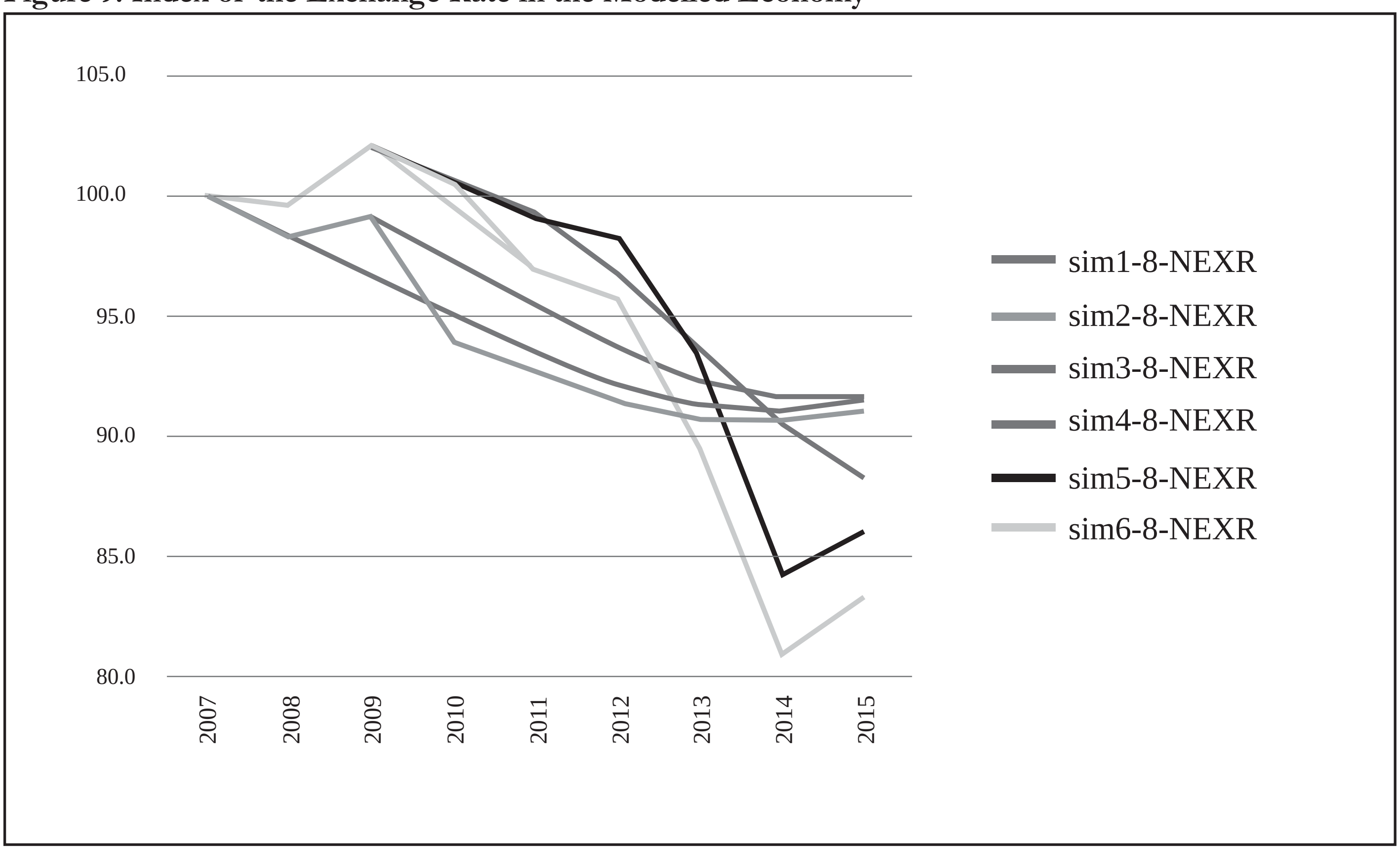
The picture for non-mining from our CGE is different to what has been experienced in recent years. The model shows a slight increase in non-mining GDP in the 2009 year of the main negative shocks, albeit somewhat less for when only the decline in the diamond world price is modelled (simulations 1-2). However, in the subsequent years GDP is consistently lower for all simulations, in particular if the negative impact of mining production and investment kicks in. In reality the non-mining industry has performed much better than in the modelled economy. This of course may be because of changes in factors other than the recession.

Figure 8: Mining Exports and Mining GDP, % Deviations from the Base Path



Source: *Own calculations*

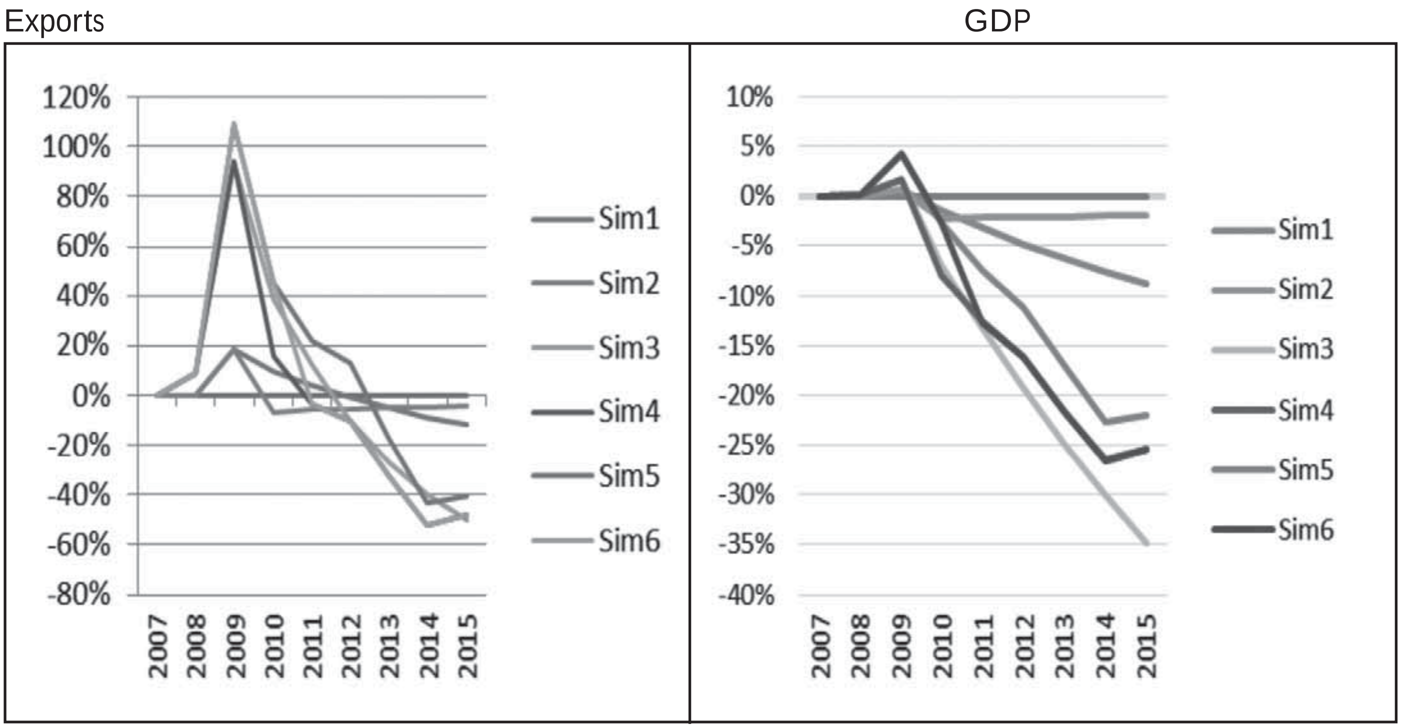
Figure 9: Index of the Exchange Rate in the Modelled Economy



Source: *Own calculations*

As was mentioned during our multiplier analysis, there is not much linkage between the diamond mining sector and the rest of the economy. The reason then must be that factors outside the control of the model have allowed for non-mining to perform better. One such factor is the exchange rate. The model allows for the nominal exchange rate to adjust to fixed foreign savings which brings about a slight devaluation during the recession years and a consistent appreciation in the subsequent years. But in reality the exchange rate seems to have been managed down on a steady path of depreciation thereby allowing for the accumulation of foreign savings while supporting the non-mining sectors. The modelled trajectory of the exchange rate for all simulation, including the base, is shown in the next figure to be on a downward trend which indicates an appreciation as less local currency is required to buy a unit of foreign currency.

Figure 10: Non-Mining Exports and GDP, Deviations from the Base



Source: *Own calculations*

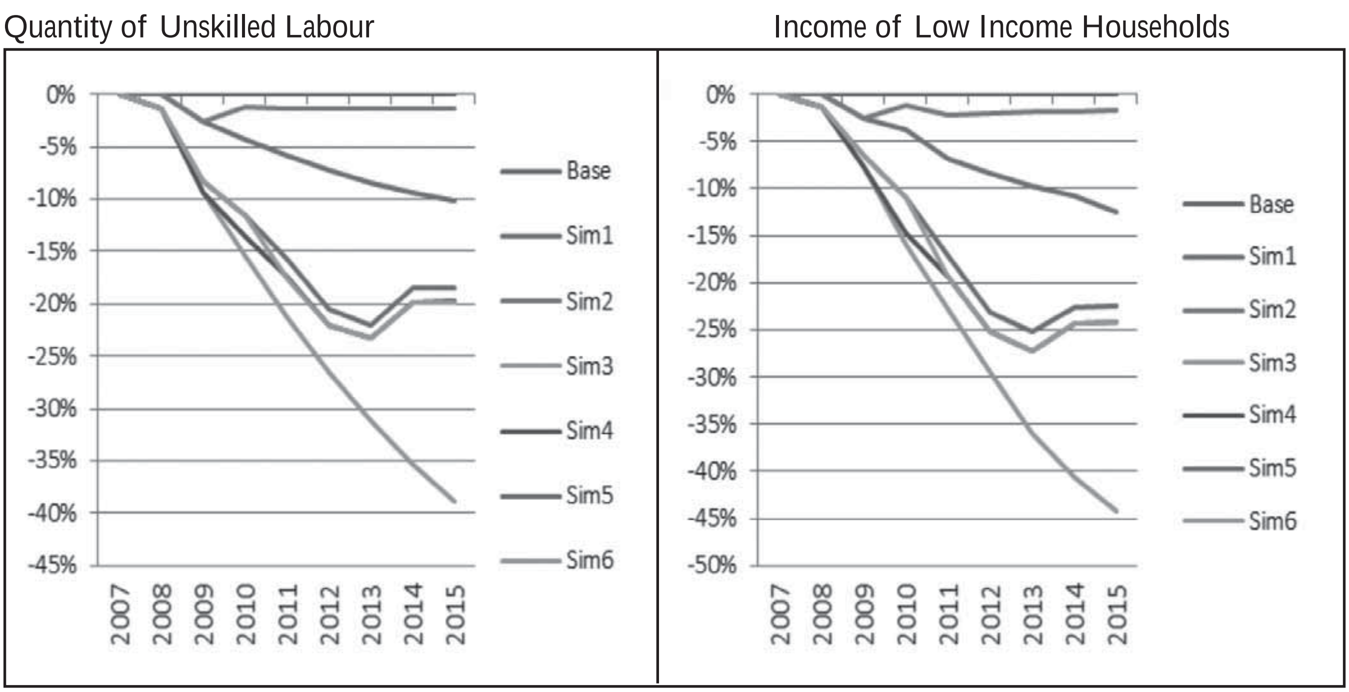
Another factor may be that during the modelled recovery of production and investment of the diamond mining industry, the non-mining sectors may have been squeezed for investment and thereby growth which in reality may not have happened if foreign savings were allowed to accumulate with the steady depreciation. In addition, other external factors, such as the recovery of tourism and possibly other sectors due to exogenous pick-up in world demand could have contributed to positive growth in non-mining sectors. We did not try to model these intricacies as it would mask the challenges that would have been faced by the non-mining sectors.

An important consideration for policy makers is what, in the modelled economy, the impact of the selected shocks is on government revenue. Figure 11 shows the impact on government revenue from mining royalties and total revenues and suggests significant reductions.

Figure 11: Government Revenues from the Mining Sector and Total, Deviations from the Base

Source: *Own calculations*

Figure 12: Quantity of Unskilled Labour and Income of Low Income Households, Deviations from the Base



Source: *Own calculations*

The impact of the modelled recession on unskilled labour is similar to that of GDP, and suggests significant downward adjustment for low income households as can be seen in Figure 12.

Scenario II: Minerals and Energy Exports Revenue

4

4.1 Background

In the introduction we provided an intuitive account of how the economy might be affected if diamond production ended abruptly now. Any of the intuitive lessons one can learn from such a thought experiment will apply in principle whenever diamonds are depleted. However, there are a number of ways in which the impact depletion at some time in the future will differ from the impact of immediate cessation now.

The most significant difference arises from the possibility of a change in the structure of the economy between now and depletion. Although these changes will occur because of a multitude of intertwined influences, it is useful to think of them as emanating from two broad types of sources: economic evolution and policy.

Between now and depletion, there will be a process of economic evolution in response to a wide range of influences: global prices, technology, skill levels and so on. It is tempting to regard this process as 'natural' although it can clearly be influenced in a variety of directions by choices and interventions. The outcomes are not inevitable. They are also in some sense unknowable: forecasting what Botswana's economy and its global context will look like even ten years from now is perilous. The further into the future diamond depletion occurs, the more uncertain we are about what the nature of the economy will be when it does occur.

Such evolution will be intimately related to policies pursued between now and then. Although all policies will influence the path the economy takes, for this study it is useful to distinguish policies motivated by the expectation of depletion from other policies. Again we emphasise that the CGE approach is not aimed at forecasting, but rather at understanding the effects of depletion, taken in isolation. From a modelling point of view, for both types of influence, we want to distinguish exogenous from endogenous changes.

Although we cannot forecast how the economy will look when depletion starts, we lay down a reference path for the period. To do this we draw on the projections of mineral output carried out in the companion report to this study, *Minerals and Energy Exports Revenue Projections* by Fichani and Freeman (Fichani & Freeman, 2012), hereafter referred to as MEER. Although there are other projections that could be used, they generally look only a few years ahead; MEER runs up to around the expected depletion date, 2026.

MEER projects mining GDP for the period 2012–2026. It assumes that the rest of the economy grows at 6.2% pa. This allows a projection of overall GDP over the period. Taking the non-mining growth as fixed assumes there is no interdependence between mining and other sectors of the economy. This is a reasonable working assumption for MEER since its focus is solely on the mining sector. It is likely that the impact of non-mining on mining is small and therefore can be ignored if one is concerned only with mining sector issues. However, the present study is concerned with the entire economy. Developments in the mining sector definitely have significant impacts on the rest of the economy. We thus allow non-mining growth to be driven from inside our model. This is one of the main reasons for complimenting MEER with a CGE-based analysis.

To do this we align the base path with the Base Scenario in MEER. Since that Report was not concerned with the same issues as this study, there is insufficient information to allow us to construct a model that replicates it fully. We adjust a mix of mining investment growth rates, total factor productivity growth (in all sectors) and capacity utilisation in mining so that the mining growth rate generated by the model replicates the projected Mining GDP growth rates in MEER. Since the SAM on which the model is based is for 2007, we splice the projected growth rates with actual growth rates from the National Accounts for 2007–2012. We discuss this more fully in the next section.

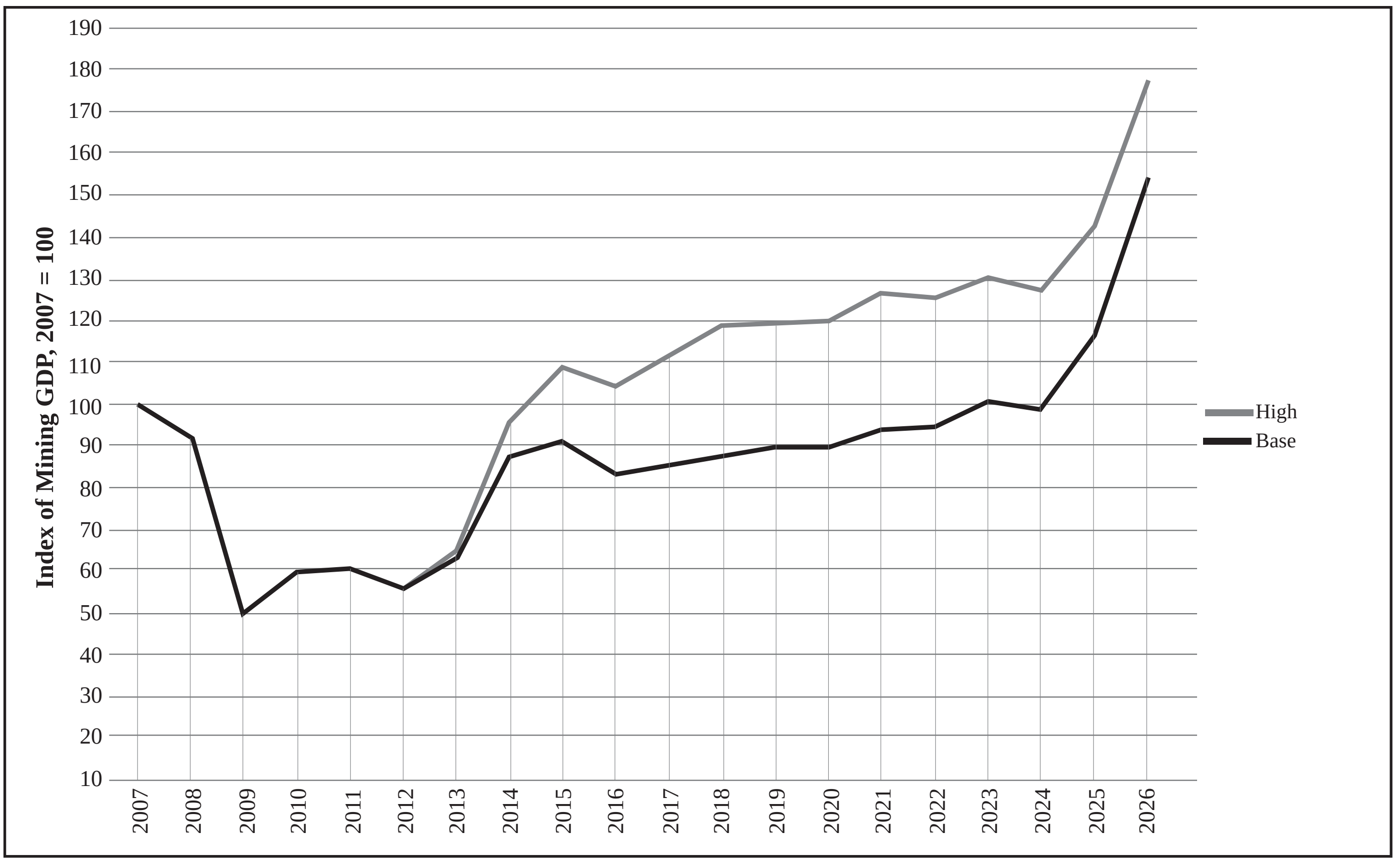
4.2 Constructing the Reference Path – Base and High Scenarios

MEER reports not only a Base Scenario but also a High Scenario, in which projected new mining projects (outside Diamonds) come on line. Since this affects the base from which diamond depletion occurs, we calibrate the model to both paths.

Before explaining the process by which this was done, it is useful to look at the MEER projections. Since the base year for the model is 2007, we constructed a Mining GDP Series for 2000–2026, using the actual growth rates for 2000–2012 with the MEER projected growth rates for 2013 to 2026. This provides two paths that diverge in 2012. depending on whether the Base or the High Scenario is followed. These paths are shown for 2007–2012 in Figure 13.

Figure 13: Indices of Mining GDP, 2007–2026

2007 = 100



Source: *Own calculations from data in National Accounts and MEER projections*

The growth in the MEER projections is largely concentrated at the beginning and the end of the period. For both paths, the growth rate between 2015 and 2024 is modest. Table 4 shows the compound annual growth rates for three periods in the projections. Although the rate for the whole projection is high, we see that in the middle nine years it is less than two per cent per year.

The growth spurt at the end of the period creates some problems for our replication. The evidence suggests that depletion starts around 2026. We understand that the spurt is related both to a rise in the quality of diamonds mined at the end of Cut 8 and to projects related to re-working of past dumps. We have no information as to whether this spurt is related to a rise in investment. Rather than model a massive increase in investment at the end of the period (which seems unlikely just prior to depletion) we rather base our modelling on the period up to 2024. We then consider the implications of the end of period rise in growth rates separately.

Table 4: Period Growth Rates in MEER Scenarios, % per annum

	Base	High
2012-15	18.0	25.4
2015-24	0.9	1.7
2024-26	25.0	18.2
2012-26	7.6	8.7

In modelling each of these two scenarios we adopt the following procedures. Our primary target is for Mining GDP to follow the path set out in the base (high) scenario in MEER. Given the economic environment (world price trends and so on), there are potentially three immediate drivers of changes in output:

a) changes in the capacity of the mines;
b) changes in the productivity of that capacity; and
c) changes in its utilisation.

As indicated above, we constructed an output (GDP) series for mining from 2000 to 2026. 2000 through 2012 is derived from the National Accounts, representing actual historical trends. 2013–2016 uses the growth rates from the projected output in MEER. We merged the two series and scaled them to fit the model (so that the value of the merged series for 2007 is the same as the model value). This scaling is necessary since the Statistics Botswana figures are in constant 2006 prices, the model is in 2007 prices, and the MEER projections are in constant 2012 prices.

Since we have only this mining output path to guide us, we have to consider how each of the three drivers might have contributed to the paths.

We assume that capacity of the mines, which we relate to investment, changes steadily over period. We therefore fit a 'peak-to-peak' trend to the output series, a well-known shortcut method to estimate potential output. The peaks we identify are 2000, 2007, 2015 and 2023. We calculate the growth rates that would have moved mining GDP smoothly from 2000 to 2007 (3.9%), from 2007 to 2015 (-1.2%) and from 2015 to 2023 (1.6%). We interpret the series thus generated as measuring full capacity or potential output, and we assume that it is driven by investment.

The difference between this investment-driven series and actual output must then be driven by a combination of changes in productivity and capacity utilisation. To distinguish these we consider 2000–2013 and 2014–2026 separately.

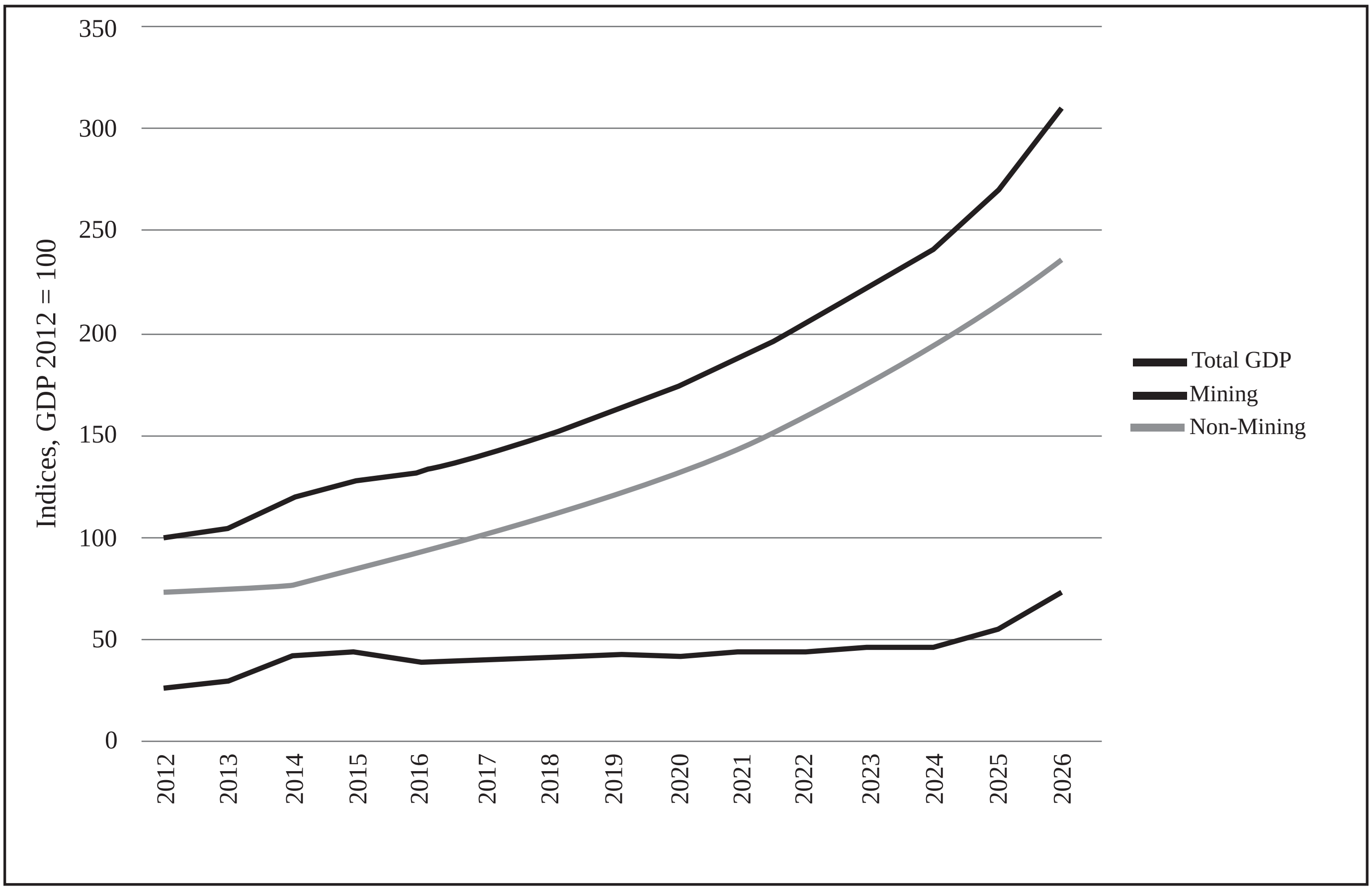
a) 2000–2013: in this period we are dealing with actual output. We assume, as is fairly standard in the literature, that there was a constant growth in productivity, and that this contributed 2% p.a. to mining output growth. By applying this to the potential output series based on investment, we calculated the path that output would have taken if driven solely by capacity and productivity growth. We then assumed that the difference between this series and actual output was accounted for by changes in capacity utilisation.
b) 2014–2024: here we are dealing with the projected output figures from the MEER. We assume that these projections are full-capacity projections; they show what output will potentially do as the projects surveyed come on line. We thus attribute differences between projected output and our investment-driven series to productivity changes.

The procedure for the High Scenario was the same although the details differ. In this series we identified more peaks and thus more sub-periods in which growth differed. Until 2007 the results are the same. However, they diverge because the 2015 peak is higher. Thus between 2007 and 2015 potential output in the Base scenario declines by -1.2% per year; in the High scenario it rises by 1.1%. Thereafter we identify more peaks in the High scenario, and so have slightly more adjustments to the growth of potential output (2015–2018, 3.0%; 2018–21, 2.0% and 2021–23, 1.5%). Over the 2015–2023 period potential output grows at 2.3% per year in the High scenario compared to 1.3% in the Base scenario.

To replicate the MEER scenarios completely, we would have to have targeted not only mining GDP growth but also overall GDP and non-mining GDP growth. However, as pointed out above, MEER generates its GDP growth by assuming a fixed rate of growth for non-mining sectors. Since we are concerned with capturing the interaction between mining and the rest of the economy, we want the non-mining growth to be endogenously determined. We therefore target only the mining growth rates allowing the total GDP and the Non-mining GDP growth rates to be generated by the model.

Figure 14: Total, Mining and Non-Mining GDP, Base Scenario

Indices, GDP 2012=100



Source: *Own calculations from data in National Accounts and MEER projections*

The model does this by the following process. Mining GDP is exogenously determined, following the process described above. This determines the amount of investment that is needed in mining. Given our assumption that aggregate investment is savings driven, the investment available for non-mining investment is determined as a residual. This is allocated amongst non-mining sectors based on a balance between the existing sectoral structure of capital and the relative sectoral rates of return to capital. Given relative rates of return, the more capital a sector has, the more investment it is allocated. Given its share in capital, it is allocated a higher share of investment the higher its relative rate of return is. This allocation, coupled with assumed total factor productivity growth, determines the growth rates of the non-mining sectors and overall GDP.

Since these growth rates are based on a series of essentially hypothetical assumptions, we do not focus on the actual numbers but rather deviations from the reference paths generated by any shock. Figure 13 shows the base path generated by this process for the whole period 2007–2026.

4.3 Scenario II: Results and Discussion

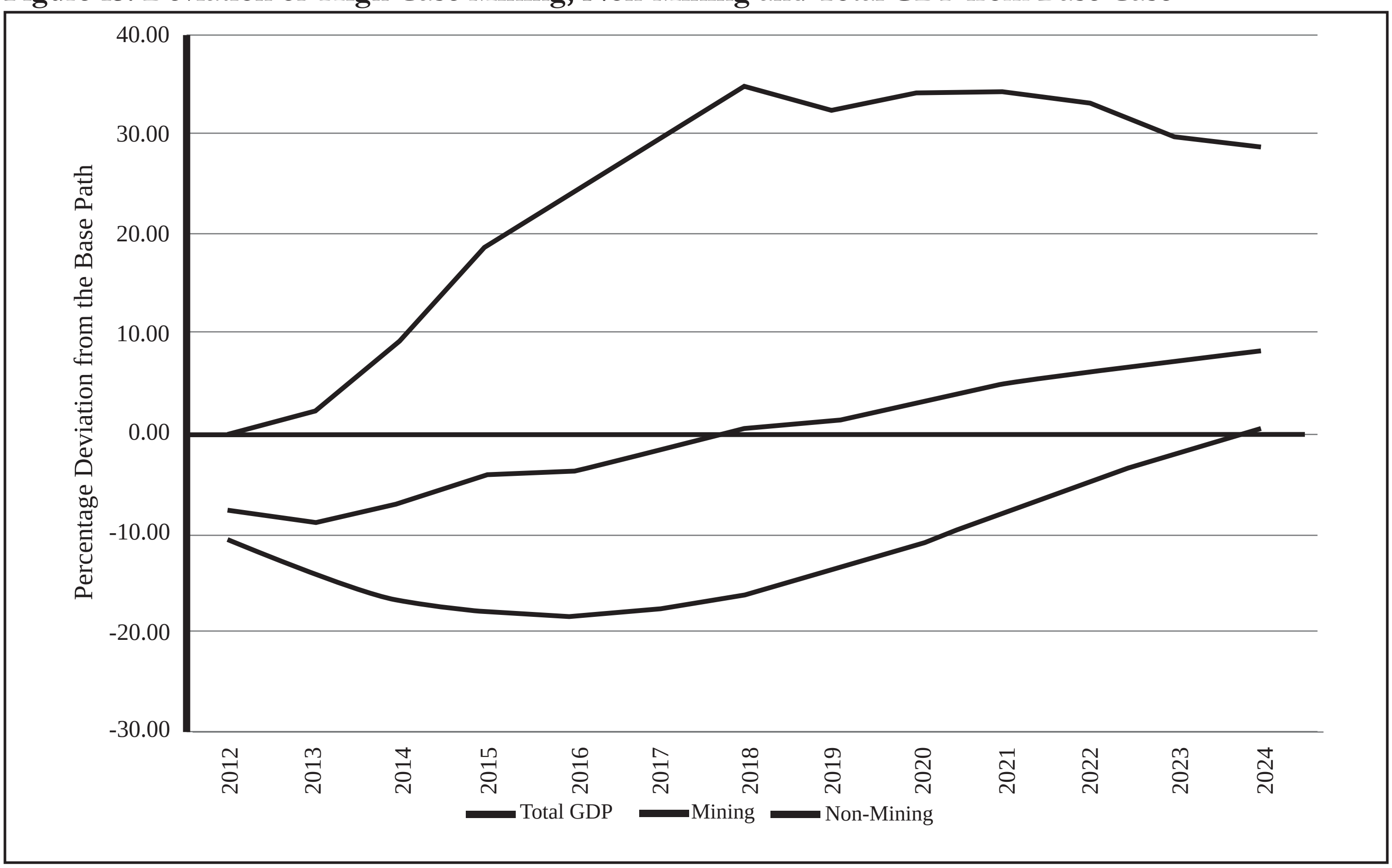
As indicated above, the primary reason for using the model to replicate the projections of mining GDP in MEER is because it provides the base from which the consequences of depletion after 2026 can be examined. It will thus be used as the start of Scenario III.

However, a secondary reason is that we can throw some light on the interactions between mining, non-mining and overall GDP. As indicated above, the MEER assumes that non-mining GDP grows at a fixed rate, while in the model it is influenced by what happens in mining.

The discussion above should make it abundantly clear that the model is based on a number of assumptions, necessarily so given the paucity of data. This means that the interactions between mining and non-mining – and therefore between mining and overall GDP – are not of particular interest. For example, we have assumed that total factor productivity in all non-mining sectors grows at 1% per year. The growth of these sectors could be made higher or lower simply by assuming a different TFPG. We therefore cannot draw much insight by these numbers.

However, we have modelled not only the base reference path based on the MEER Base Scenario, but also the path of the High Scenario. The difference between these two is caused solely by the difference in the modelling of the mining sector. TFPG in non-mining is the same along both paths. By comparing the two we can gain some insight into how the mining sector affects the rest of the economy.

Figure 15: Deviation of High Case Mining, Non-Mining and Total GDP from Base Case



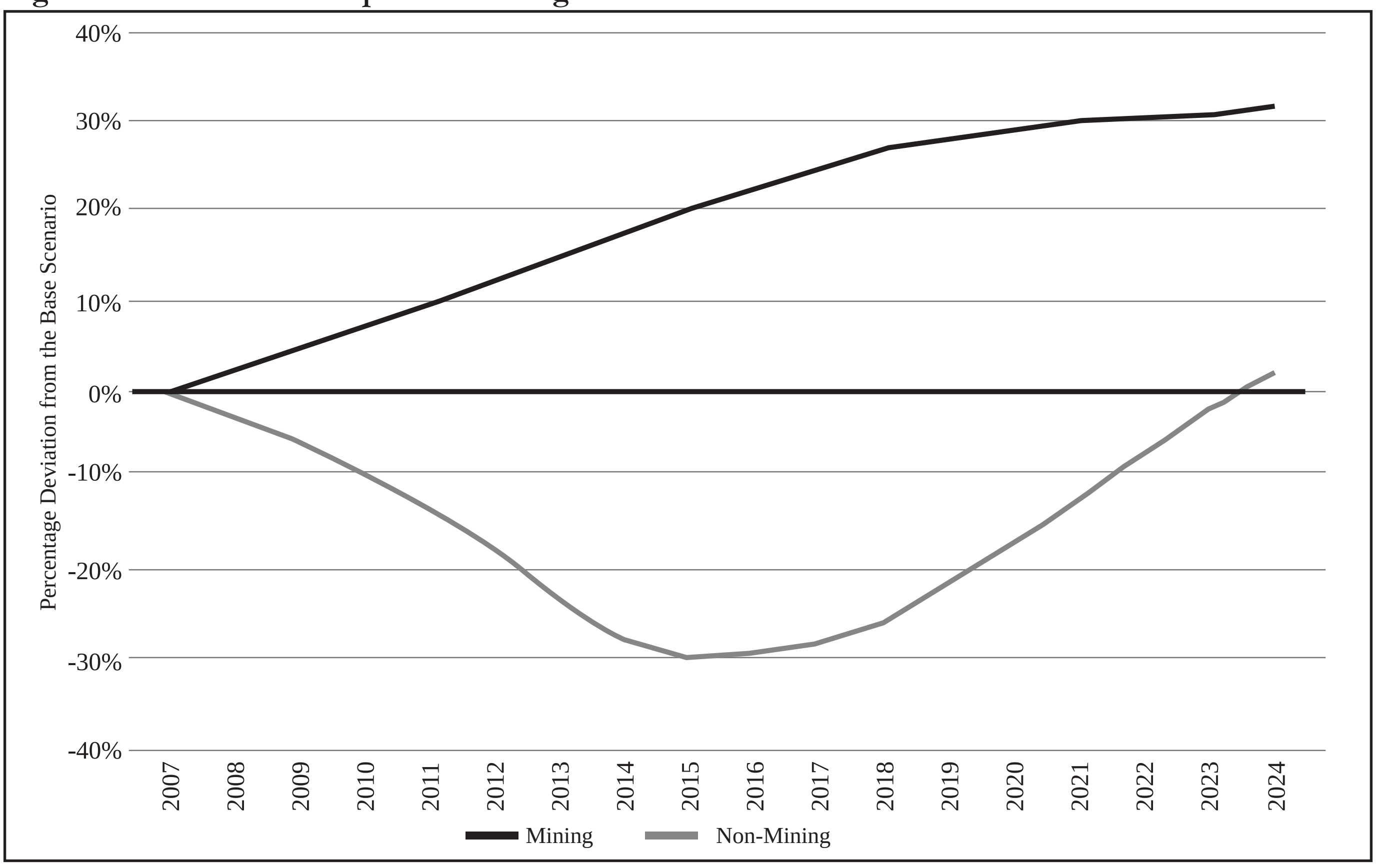
Source: *Own calculations from model results*

In Figure 15 we show how mining GDP, non-mining GDP and total GDP in the modelled High Scenario deviate from their values in the modelled Base Scenario. Obviously mining GDP is higher: we have modelled it to be so. However, initially both non-mining and total GDP are below their Base-case values. What can we draw from this?

Growth of total GDP is simply a weighted average of the growth rates in mining and non-mining, so the question boils down to explaining the deviation of non-mining from the Base Scenario. There are a number of reasons. We discussed above the ways in which the mining sector might impact on the rest of the economy, identifying six potential channels. Our multiplier analysis has suggested that the inter-industry linkages between mining, diamond mining in particular, and the rest of the Botswana economy are weak. Were they stronger we would expect the higher mining growth to induce higher growth in other sectors. Similarly, what we have labelled the absorption and the factor channels play little role. Rather it is the last three channels – the fiscal, international and accumulation channels – that drive this result. What is more their influence changes over the period.

Firstly, investment in mining is higher in the High Scenario than the Base Scenario. Given the savings constraint on total investment, this crowds out non-mining investment. Although mining capital in the HS is higher than the BS, non-mining capital is lower. Figure 16 shows the paths they take. Mining capital rises relative to the Base Scenario, although the rate of increase slows down towards the end of the period. On the other hand, non-mining capital declines relative to the Base Scenario until around 2015, when the deviation starts to lessen. By 2024 it is slightly above the BS.

Figure 16: Deviation of Capital in the High Scenario from the Base Scenario



Source: *Own calculations from model results*

The upturn is partly a result of a different channel becoming dominant. As the mining sector expands faster than in the BS it begins to generate more savings. By 2015 savings by mining enterprises is greater than in the BS. At the same time, the increased revenue government receives from mining permits an increase in government savings. Both of these savings effects mean that the crowding out effect of mining investment on non-mining investment is off set by increased savings, so that non-mining begins to expand.

Finally, there is the international channel. We have assumed an exogenous current account balance and floating exchange rate. Mining exports rise faster than in the BS. In effect imports have to rise faster as well, so the exchange rate appreciates sharply compared to the BS at the start of the period. By 2015 it has risen 12% above its BS level. Clearly that hurts tradable non-mining activities. But it then depreciates, so that by 2024 it is close to its BS level. This also contributes to the expansion of the non-mining sector.

Maintaining a fixed exchange rate has significant expansionary effects on output.

4.4 Lessons

This Scenario was run largely to provide the basis for Scenario III. However, by comparing the difference between the Base Scenario and the High Scenario we can draw some lessons that might be relevant for depletion. Unlike depletion we here model a rise in mining output. Nonetheless it throws some light on the relationship between mining expansion and the rest of the economy.

The main story is that initially the additional investment in mining crowds out investment in non-mining and reduces its output. However, as the mining sector expands, it generates more savings both directly and through the revenues it generates for government. This counteracts the initial contractionary effects and the non-mining sector begins to expand.

Whether the exchange rate will be adjusting or not during this period remains to be seen. If it is managed downwards on a less declining path there will be more foreign savings which are ultimately available for investment in the non-mining sector since mining investment is given by the MEER projections. The lesser depreciation will not support non-mining as much as it does in the above.

On the other hand, and in anticipation of the final scenario, it may well be judicious to continue building foreign reserves that can be used to run the inevitable current account deficit in the face of a sudden decline in the mining sector. This will be discussed in the next section.

Scenario III: Diamond Depletion, 2024–2036

5

5.1 Background

This overall project is concerned with how Botswana can manage its economy when 'diamonds run out', as they inevitably must do. As we have indicated above, we have very little to help us model this, the most important, scenario. In addition to problems related to current data and the lack thereof, the precise timing and nature of depletion is unknown. Nonetheless it is useful to think through likely consequences and policy options ahead of depletion. A CGE model is ideal for such an exercise, since it allows us to undertake various experiments representing different paths.

It seems likely that depletion will be a process rather than an event. Differences in the date of final depletion of different mines combined with options to prolong the lives of mines (for example by slowing production or by reworking tailings) mean that ultimate depletion will be the cumulation of a staggered series of closures rather than a sudden stop. Nonetheless, we model the process as occurring relatively rapidly. Any modelling of it is necessarily hypothetical, designed to help us understand issues rather than providing specific magnitudes and dates. We therefore begin with an intuitive discussion of the interpretation of the issue that underlies our modelling strategy.

There is a vast body of literature in economics and political economy on problems facing countries that discover large deposits of non-renewable natural resources and the experiences they have managing them. Often the analysis is framed in terms of 'the natural resource curse', 'Dutch disease' and other approaches that emphasise the potential negative consequences of such bounties of nature. (In this literature, Botswana is generally held up as an example of how to manage a resource boom well.) As far as we are aware there is much less literature on the opposite problem: what happens when a resource-rich country becomes resource-poor?

Asking this question highlights a central uneasiness many feel about the resource curse/Dutch disease literature. If resources place a curse on the economy, surely their depletion should remove it? If the booming sector has detrimental consequences for other sectors, surely its collapse should be welcomed? But although we know that resources can be politically and economically mismanaged, we nonetheless recognise that in principle discovery of resources is beneficial. Canadian economists developed a theory of development based on natural resources – the staples thesis – long before economists encountered Dutch disease. In principle the question of whether resources are beneficial or harmful for long-run development hinges on whether or not the large surpluses generated in the resource boom period are used to build up dynamic and productive non-resource-based industries.

How should we interpret the process of diamond depletion? While it might happen with more or with less speed, we understand that the form it will take is that producing diamonds will become increasingly expensive (relative to diamond prices), in terms of both investment and operation costs. The escalation in costs of the sequence of cuts at Jwaneng is evidence of the increasing investment required to retrieve diamonds. The investigation of the economics of continuing 'super pit' mining or going underground suggests that there is a trade-off between investment and operational costs.

Presumably, at some point, these costs outweigh the returns and production will fall while diamonds remain in the ground. We interpret depletion as being primarily driven by the escalating relative costs of recovery, rather than a physical ending of the resource. Although rising costs can be seen as a smooth process, the lumpiness of mining investment means that it could happen suddenly. The size and relative concentration of diamond mines means that each expansion of diamond mining takes place in discrete steps: Cut 9 follows Cut 8, Cut 10 follows Cut 9, and so on. If the number of mines was greater, differences in timing of investment might mean that the aggregate process is fairly smooth. With the industry in Botswana dominated by two mines this is not the case. Cut 8 takes some eight years to develop, before Cut 9 begins. At some point, the next massive investment is found not to be worth it, and capacity development drops suddenly. Investment creates step-wise rather than incremental increases in capacity.

Given the role of diamonds in the economy of Botswana, large-scale depletion necessarily has a substantial negative effect. This impact might be reduced or exacerbated by policy responses, both prior to and after depletion. But it cannot be avoided. Policy debates must therefore be centred on how to manage a substantial drop in income per head. It is perhaps useful to borrow from the climate change literature and distinguish adaptation and mitigation policies. However, given the inevitability of depletion, regardless of actions that might be taken, adaptation policies are the only sensible long-run policies. Mitigation policies might help smooth a transition, but are unlikely to be sustainable in the longer run. One might say that the extent to which the country is forced to adopt mitigation policies will be a sign of failure to initiate appropriate and timely adaptation polices.

This is well understood in policy-making circles in Botswana (as it is in all resource-based economies) and it is unlikely that any hypothetical technical modelling exercise adds significantly to that understanding. However, what it might contribute is a systematic framework in which the consequences of alternative potential policies can be evaluated.

5.2 Basic Design

To set up the base path for this simulation we project the MEER Base and High Scenarios as explained under Scenario II through to 2036. We assume that from 2025 mining output continues to grow at the average growth rate in the MEER scenarios between 2015 and 2024 (0.9% pa for the BS and 1.7% pa for the HS). This growth is generated by appropriate capital and TFP growth.

We assume that depletion occurs over the three years 2025–2027. Investment is reduced by 6% in each year; TFP falls by 30% p.a. in 2025 and 2026, and capacity utilisation falls by 60% in 2025 and 2026, and by 15% in 2027. We simulate diamond depletion by imposing three shocks simultaneously to both BS and HS paths.

1. We reduce total factor productivity in diamond mining between 2025 and 2027 and thereafter have it constant. This means that these sectors need more factor inputs to produce the same output. This assumes that mining becomes more costly.
2. We simultaneously:
    a. raise investment in diamond and copper mining; and
    b. reduce the productivity of capital in these sectors by an amount that keeps output constant.

This combination is designed to simulate investment becoming more costly in real terms: the sectors increase their capital without increasing their output.

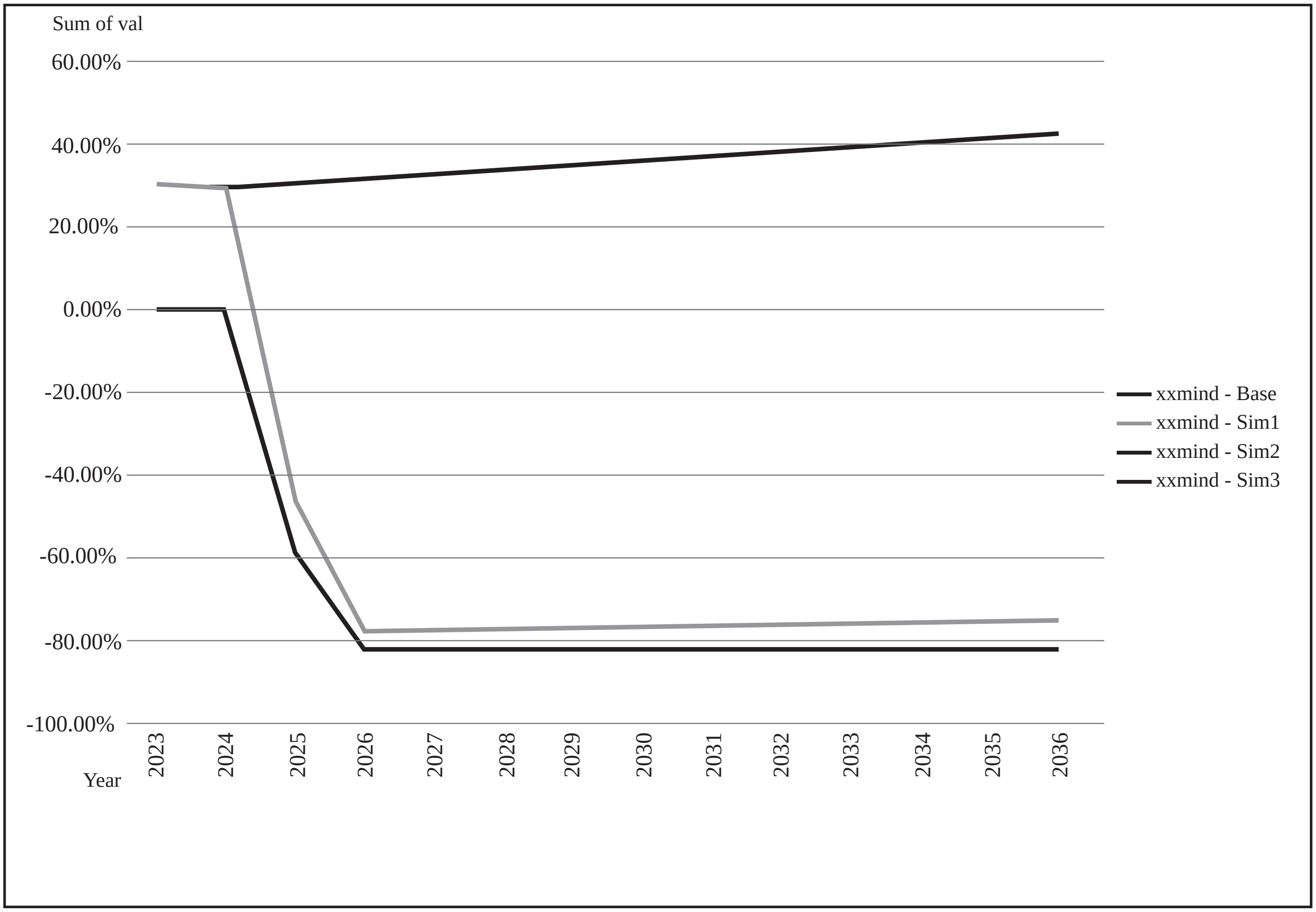
We impose these shocks solely on Diamond Mining. Its GDP falls as shown in Figure 17.[8] In this figure, we show the impacts relative to the growth path projected from the BS. Thus the two HS simulations (Sim 3 and Sim 5) start some 30% above the reference path, since this is where the sector had grown to by 2024. In both cases

[8] *All results are reported as deviations from the 'business as usual' base path, unless otherwise stated. Since mining in the BAU economy continues to grow at roughly 2.5% pa, the deviation is larger than the fall in output we impose.*

the simulated shock reduces diamond GDP below their respective reference paths by the same percentages (to 59% in 2025 and 83% in 2027). However, the fall in the HS case is slightly less relative to the lower BS reference: the diamond mining GDP will be slightly higher if depletion comes off a higher starting point. In both cases we assume that the Diamond Mining GDP remains stable thereafter.

Figure 17: Depletion of Diamonds in Base and High Scenarios

% Deviation from Base Scenario



Source: *Own calculations from model results*

Base = BS Reference path; Sim1 = HS path; Sim 2= Depletion in BS; Sim3 = Depletion in HS

We have emphasised throughout this report that we have little real information to guide us on the size and form that the depletion will work itself out. We have chosen to simulate a large and fairly rapid shock. In a presentation 'Botswana Diamonds, 2020 and Beyond' delivered in Amsterdam in 2011, the then Minister of Minerals, Energy and Water Resources, Dr P. H. K. Kedikilwe, presented a chart giving projections of diamond production in Botswana for 2005–2030.[9] This suggests that the number of carats produced annually will fall by 68% between 2023 and 2027. It then rises so that by 2030 it is 58% below the 2023 level. Our simulated shock reduces diamond output both by more than and faster than this.

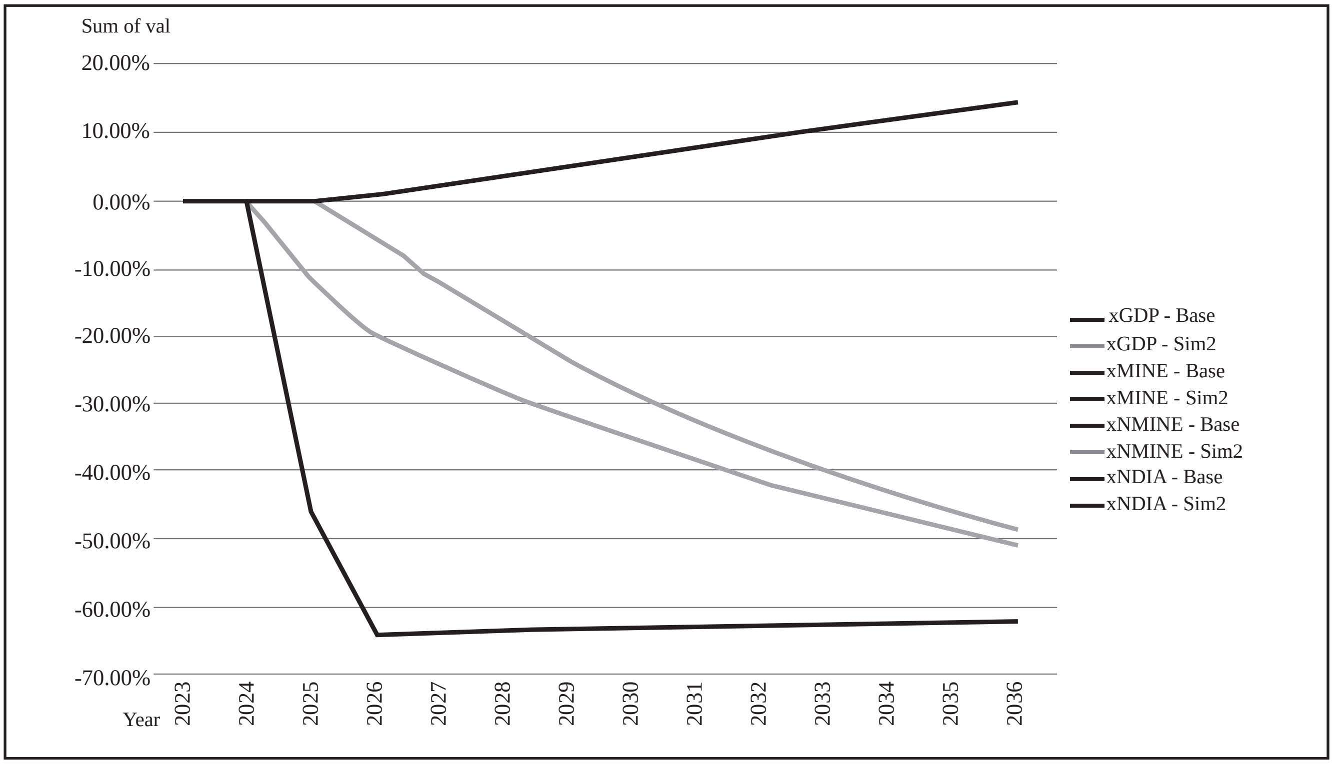
[9] *The charts are generated in MS Excel using PivotCharts. Because PivotCharts do not show blank charts, none of the reference paths (Sim2) appear on the chart; they coincide with the horizontal axis.*

We have presented the shocks to both the BS and HS in Figure 17 so that they can be compared. However it is somewhat difficult to continue to present them together, so we shall report the BS results and then consider what difference the HS makes to them. We will also consider what difference it makes if the shock unrolls itself more slowly.

Figure 18 shows the impact of depletion on Total GDP and on Non-Mining GDP. The simulated shock is targeted solely at diamond mining. As shown in the diagram, other (non-diamond) mining rises above the reference path. However, since mining is dominated by diamonds, it falls significantly as a whole. Non-mining GDP, after a slight rise in the initial year of the shock (2025), begins a steady downward trajectory, which is maintained throughout the period. Obviously GDP as a whole also falls, by 20% during the depletion period but then is dragged down further, so that by 2036 it is more than 50% below what it would have been.

Figure 18: Movements in Total and Sectoral GDP, Base Scenario Depletion

Percent deviation from Reference Path



Source: *Own calculations from model results*

Base = BS Reference path; Sim 2 = Depletion in BS; xGDP = Total GDP; xMINE = All Mining; xNDIA = Non-diamond Mining; xNMIN = Non-Mining

We have discussed the forces behind these trends at several points earlier in this report. In Scenario II we saw that the additional mining investment required to shift from the BS to the HS initially crowded out investment elsewhere, but that the higher savings and revenue generated by the expanded sector subsequently permitted investment to grow. Here there is a reverse of one of those influences, the whole process being dominated by the loss of mining savings and revenue. Savings by mining enterprises fall by 86% below the reference path in the first year of depletion. They rise slightly thereafter as the fall in savings generated by diamond mining is offset slightly by the rise in those generated by other mining. Savings by the enterprises as a whole fall by 44% in 2025 and are 58% below the BS reference path by 2036. Government savings fall less sharply initially, but the accumulated change is 94% below the reference path by 2036.

This result reconfirms one of the main findings of this report: while depletion has a immediate deleterious effect on the economy, the more significant effect is the longer-run negative impact through lost savings and reduced investment.

We have also pointed out earlier that these results depend on how the exchange rate and the current account balance are managed. In the short run the negative effects can technically be mitigated by off-setting falling domestic savings with rising foreign savings. In principle, the options are to allow the exchange rate to float, maintaining a fixed current account balance, or to fix the exchange rate and allow the current account balance to go where it will.

The results presented above are those under a flexible exchange rate. The exchange rate adjusts to keep the current account balance (negative of foreign savings) constant. Since depletion leads to a sharp fall in exports, imports have to fall as well.[10] This is brought about by exchange rate depreciation. These changes have some marginal resource allocative effects on the economy: import-dependent producers face input constraints, import competing producers face less competition, exporters are stimulated slightly by the exchange rate depreciation. However, these effects are swamped by the savings effects we have referred to above. Domestic savings fall, but, with a fixed current account balance, there is no compensating rise in foreign savings.

When the exchange rate is kept fixed, the fall in exports is not accompanied by a fall in imports. The current account moves into deficit and foreign savings rise. It is difficult to provide the data in an intuitive way, since foreign savings switch from being negative to positive. Percentage changes thus make no sense. We therefore look at the ratio of foreign savings to GDP. For all scenarios this ratio is -6% in 2024. In the BS reference path it steadily becomes a smaller negative number after 2025 since GDP rises continuously, but it remains negative. With depletion it rises with a floating exchange rate, as GDP falls. However, when the exchange rate is kept fixed, the ratio of foreign savings to GDP switches from -6% to +13% in 2025 and +19% in 2026.

This rise in foreign savings does compensate for the fall in domestic savings caused by depletion. The economy seemingly performs better, as can be seen in Figure 19. Non-mining, which declined steadily under fixed exchange rates, now actually has a period of growth before turning down. This translates into a levelling out of GDP after its initial decline, even though it remains roughly 10% below the reference path. However, the growth of non-diamond mining is slowed down compared to the floating exchange rate.

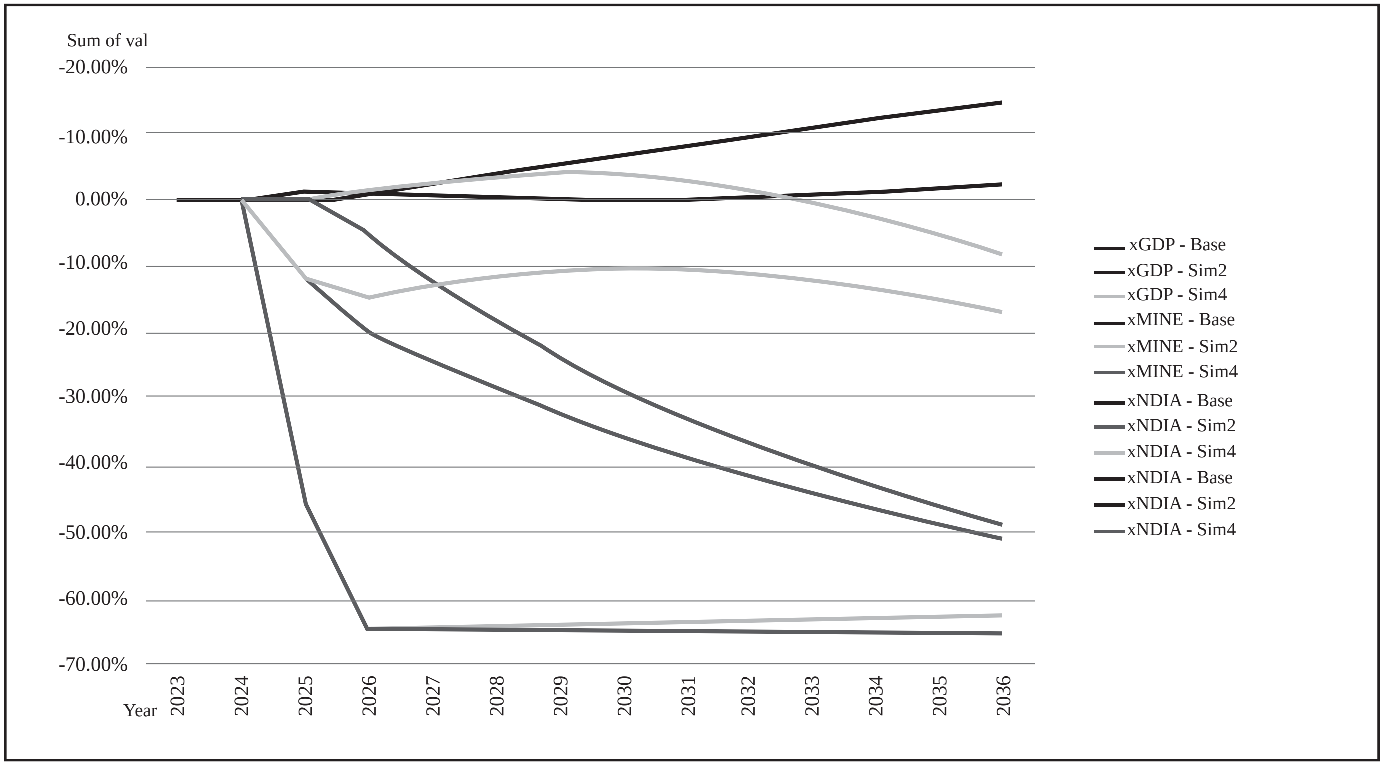
This improved performance comes about because of the rising current account deficit (rising foreign savings). It is clear that the counterpart to this is a rise in foreign debt. Recall that this is what happened during the global recession (see Figure 4). The difference in this case is that, unlike the recession, diamond depletion is not a temporary phenomenon that can be expected to be reversed.

Increasing foreign savings – allowing a current account deficit to grow – depends on the ability to run up foreign debt. Sensible debt management policies, combined with international lender sentiments, mean foreign debt cannot rise indefinitely.

[10] *There are other components of the current account but they are small relative to the trade in goods and services.*

Figure 19: Total and Sectoral GDP with Floating and Fixed Exchange Rates

Percent deviations from BS Reference Path



Source: *Own calculations from model results*

Base: BS Reference path; Sim 2: Depletion in BS floating ER; Sim4: depletion in BS with fixed ER;

xGDP = Total GDP; xMINE = All Mining; xNDIA = Non-diamond Mining; xNMIN =Non-Mining

In addition, it is likely that the diamond depletion will reduce Botswana's credit ratings so that foreign borrowing will become more difficult.

This is the standard overvalued exchange rate story. Although the short-run outcome is better, it is not a sustainable path. A current account deficit of 19% of GDP will rapidly run into problems of rising foreign debt. As suggested above, it is likely that the exhaustion of natural resources reduces the credit rating of the country, making it even more difficult to borrow. Maintaining a fixed exchange rate is thus not an option.

The bottom line from these two basic scenarios is that the diamond depletion causes a drop in GDP. This is similar to what was seen during the recession, as analysed in Scenario I. However, that was clearly a cyclical downturn, with some prospect of recovery. The drop accompanying the ending of diamonds is permanent. Rather than dropping below the trend path before returning to it, there is a drop onto a lower trend path. This means that some permanent adjustments have to be made to the economy, unlike during the recession when temporary measures could be taken to ease the path through it.

We have concentrated on the overall economic consequences of depletion. It is clear that the burden of adjusting the economy downwards need not be distributed equally amongst the citizens of Botswana; indeed, it is unlikely that this will be the case. The modelling exercise should permit some limited observations. The basic SAM on which the exercise is based identifies a number of different types of households (see Table 21). The different impacts are very slight. Household incomes by 2036 are on average 48% below the reference path. The income of low-income urban households is 51% below what it would have been, while that of high-income urban households is slightly below 48% down. These differences are within the margin of error, and so do not tell us much. However, a limitation of these kinds of models is that they do not include what might be called political behavioural responses. The impacts are mediated through markets, and do not capture the possibility that the drop in income stimulates distributional struggles as different actors in the economy seek to maintain their income. Such struggles have occurred in other countries facing significant economic downturns. A typical outcome is inflation. We are not able to investigate this kind of scenario in Botswana and it is indeed beyond the terms of reference for the study. However, it is important to flag the possibility.

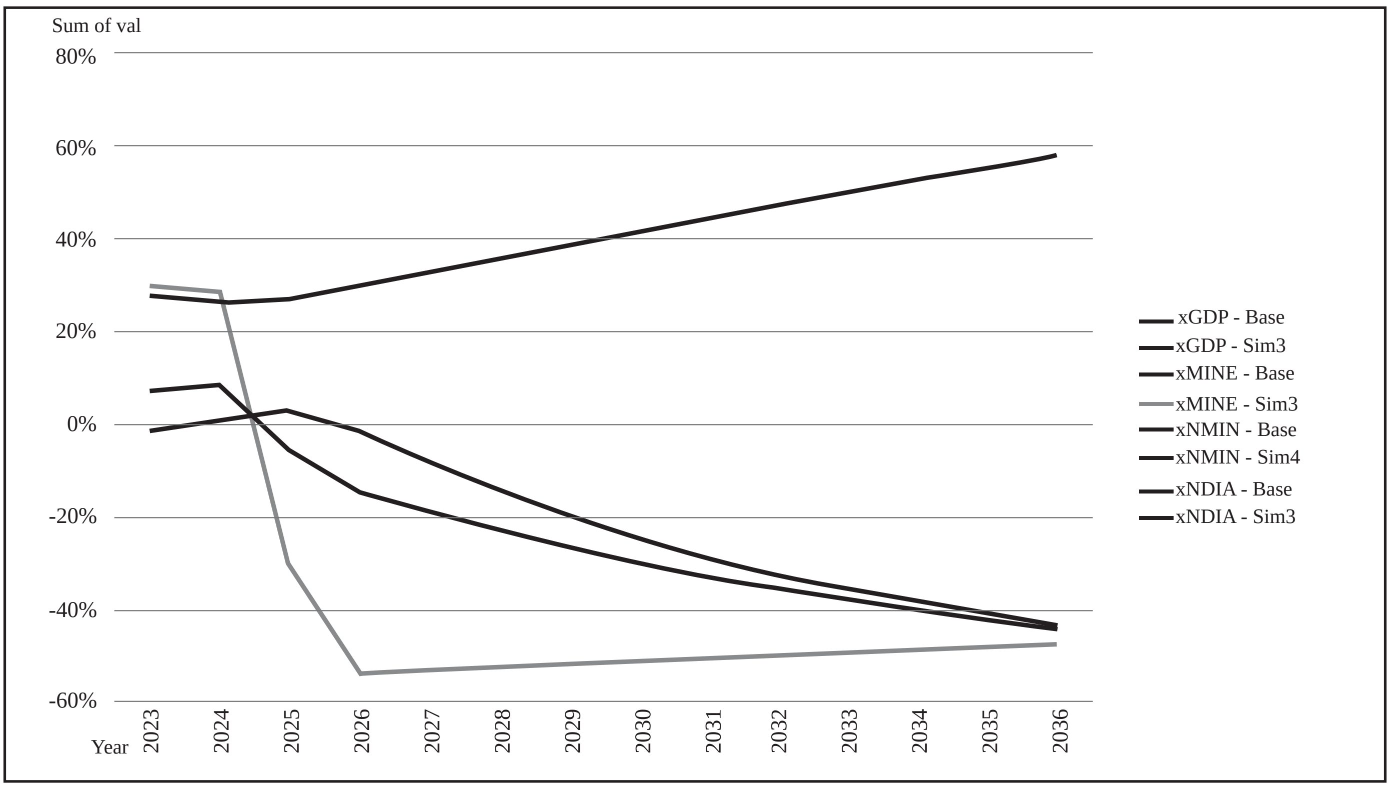
5.3 Offsetting Factors and Policies

The foregoing basic scenario is rather bleak and it is natural to consider how inevitable the scenario depicted is. Depletion is inevitable: diamonds are a finite resource and will run out. The only circumstances in which it will not lead to the large and sharp drop we have depicted will be if depletion is a long slow process during which some high-income-generating activities are developed to take diamonds' place.

We do not have either the information or expertise to assess whether the first of these conditions is likely. The former Minister's speech referred to above on page 34, does suggest a steep decline, and our understanding of the nature of diamond mining also suggests that when it occurs it will be rapid. But all we are able to do in our modelling is to run a scenario, as we have done, that indicates what the consequences might be if it is sudden. We ran a scenario (not reported) in which the same drop is spread over a number of years. As expected, its impact is simply to spread the same effects on GDP over a longer period, not to reduce the size of the eventual impact.

Figure 20: Diamond Depletion off the MEER High Scenario

Deviations from Base Scenario Reference Path



Source: *Own calculations from model results*

Base: BS Reference path; Sim 3: Depletion in HS

xGDP = Total GDP; xMINE = All Mining; xNDIA = Non-diamond Mining; xNMIN =Non-Mining

We are equally unable to make pronouncements on the second condition set out above – the development of alternative income-generating activities that might provide substitute sources of savings. Our model works with the nature of current existing activities; it cannot endogenously generate new, previously unknown of activities. We are able to run scenarios in which the scope and nature of particular activities is changed dramatically.

For example, we could shock a particular industry with a massive productivity increase, coupled with large increases in global prices and demand. But doing so would not provide much insight. The question is not what the consequences would be of finding an activity that has the ideal characteristics to substitute for diamonds, but whether postulating the existence of such alternatives is plausible. It is beyond our model to answer such questions, but there are some speculations that might be made.

Given the dominance of diamonds in the economy over the past four decades, it is not clear that there are likely contenders to replace them. No other sector has the high valued added, high levels of exports or high savings that diamonds have. The MEER projects growth in other minerals, particularly coal and copper. However, an examination of the relevant characteristics of these makes it doubtful that they can plausibly compensate for the loss of diamonds. Based on the 2007 SAM we see that diamonds contribute 33% of value added in Botswana. For copper the share is 9%. That looks as though the gross value of copper would have to be 3.7 times the gross value of diamonds. However, value added is a much greater share of gross output in diamonds than it is in copper. Taking this into account, copper would have to be 5.5 times bigger than diamonds to generate the same amount of GDP. In 2007 prices this would mean copper output would have to be P130bn. This seems implausible, particularly if one converts it to tonnes.

Table 5: Characteristics of Diamond, Copper and Coal Mining in Botswana, 2007

	Diamond	Copper	Coal
Value added share in gross output %	99	66	49
Share of gross operating surplus in value added	96	76	38
Contribution to value added	33	9	<0.1%
Export share	57	19	0

Source: *2007 SAM*

The fundamental problems lie with the characteristics of diamond mining, and particularly the high operating surplus it generates. It is this that permits the high savings and the government revenue. Other activities typically do not have the same surpluses, at least not at the same scale. Tourism, call centres and other service exports simply do not generate returns that permit the same level of 'off-take' that diamond mining does.

We therefore treat the depletion scenario we have painted as inevitable and consider not whether these consequences can be avoided but whether they can be mitigated. The basic scenarios have not taken into account pro-active policies that might be adopted to reduce the impact of the ending of diamonds. They are 'minimalist' scenarios, in the sense that policy responses are the minimum to live with the new economy. We need to consider the consequences of measures that might be taken to reduce the negative impact.

5.3.1 Mining Growth Before Depletion

One factor we can consider is how the higher mining output path projected in the MEER High Scenario might change the post-depletion outcomes. Figure 20 reports the results relative to the BS reference path. In 2024 the mining output in the HS is some 30% higher than in the BS. One question that needs to be answered is whether depletion off this higher path takes diamond production down to the same absolute level as it does in the BS, or whether the drop in both scenarios is the same in relative terms. Obviously the former would imply a much larger fall than the latter. We simply modelled it as the same relative drop. The impact is somewhat mitigated compared to the BS. GDP in 2026 is 15% below the BS reference path, compared to 20% when depletion occurred off the Base-case 2024 level. However, the same story applies: while the immediate shock is severe, the longer term decline operating through the reduction in savings, investment and growth is more significant and persists throughout our period.

5.3.2 Reducing Diamond Production Now

Perhaps a policy option is to attempt to delay the onset of depletion by slowing down the rate of extraction of diamonds. It is difficult to model this, since we do not have information on how feasible it is, given the lumpiness of investments. However, we presume that it would be possible to reduce production in the period up to 2024. This has two broad consequences. Firstly it slows down growth in that period; in this regard it has a similar effect to depletion, reducing savings, investment and growth. The policy thus trades off high growth for a shorter period against lower growth for a longer period. There are theorems in economics that suggest this is in principle not a sensible trade-off. However, if there are constraints to developing alternatives which require time to mature, there may be merit in doing so.

Given Botswana's pre-eminence as a global diamond producer, the second impact of such a policy would be to push up world diamond prices. This would counter the first effect. To examine the effects of this we need to know something about the elasticity of demand for diamonds.

Using quarterly data compiled by the Botswana Institute for Development and Policy Analysis (BIDPA) from the Botswana Central Statistics Office (CSO), Bank of Botswana, the Kimberley Process and World Bank, and additional data from the Federal Reserve Bank of St Louis website, several specifications of global demand functions were estimated. After testing for unit roots and for the properties of the data, we obtained the following estimation results:

Table 6: Regression Results for Demand Function Estimation

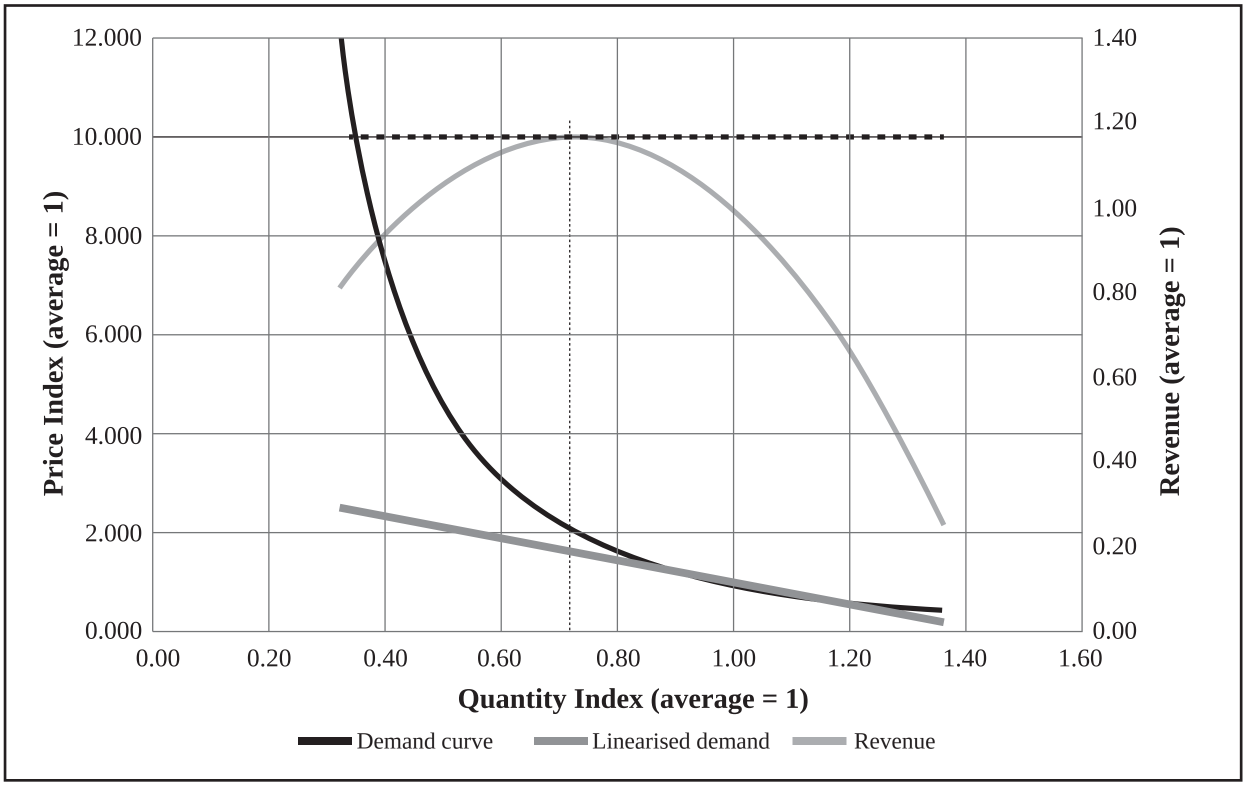
Dependent variable: Log of Quantity of Diamonds Traded		
Explanatory Variables	Coefficients	Standard Errors
Log of Price of diamonds	-0.4501**	0.1977
Log of Expected price of diamonds	0.0424	0.1474
Log of Income	0.2843	0.8205
Log of Expected income	13.6601***	3.5611
Log of Real price of gold (-1)	-0.8500***	0.1439
Log of Real price of silver (-1)	0.5157**	0.2020
Log of Real price of platinum (-1)	0.390789**	0.1358
R^2	0.7551	
Prob>F	0.0000	
d Statistic	2.3218	
No. of observations	38	

The elasticity of demand is -0.45. As expected, it is inelastic, suggesting that total sales revenue could be raised by reducing total quantity sold. Were the elasticity to remain constant regardless of the price, then revenue would be increased consistently as the quantity supplied was reduced – the maximum revenue would be when 1 carat was sold! However, although the demand function estimated has a constant elasticity along its length, the domain over which it is relevant is restricted. It represents the elasticity at the average price and quantity for the period over which it is estimated.

If we assume that the demand curve at other prices and quantities is a linear function equal to the tangent of the estimated demand curve, we can derive Figure 21. This shows the demand curve (assuming an elasticity at the average price and quantity of -0.45) and the associated revenue curve. Modelling this suggests that the revenue maximising sales of diamonds globally is about 73% of the average annual sales of the period. With this supply, the price would be about 60% higher than the period average and revenue would be 17% higher.

There is thus some scope for raising revenue by restricting supply. However, this is an estimate for the world market as a whole. It assumes that the global suppliers operate as a monopoly, that is, as a cohesive cartel. That is unlikely in practice, since many small producers would have an incentive to cheat on the cartel. Any cooperation amongst major producers could thus restrict supply by less than this amount and thus raise revenue by less. Furthermore, it seems that for legal reasons Botswana could only restrict supply by reducing production (as opposed to stockpiling). This means that costs will vary. Once one takes costs into account, the optimum quantity is not the revenue maximising but rather the profit maximising amount (see Annex F for calculation).

Figure 21: Schematic Representation of Relationship between Price, Quantity and Revenue of Global Diamond Demand



Although there are parallels between this proposal and OPEC, it should be borne in mind that the nature of diamond production is very different from oil production. For the latter, once a well has been established, output can be varied relatively easily. That is not the case for diamonds.

It would seem that there is limited scope for Botswana deliberately to raise the returns to diamond mining by curtailing output prior to depletion.

5.3.3 Sovereign Wealth Fund

It is common these days for resource-rich economies to establish sovereign wealth funds, investing part of their resource rents in foreign assets. The accumulated funds are intended to generate income to offset reduced incomes when the resource runs out. The Pula Fund established by Botswana is a sovereign wealth fund. However, as shown in Figure 5, during the Global Financial Crisis the growth in the Fund slowed down. It has been falling relative to GDP since 2000 and is now about 40% of GDP. The question then is whether, between now and when diamonds run out it can be built up sufficiently to provide the capital that will generate an income that can replace what is lost by diamond depletion.

We do not have details of the Fund and therefore cannot properly assess whether this is a possibility. The magnitude of the GDP decline suggests that it would be a mammoth task. If 30% of GDP is lost, then roughly speaking the necessary size of the fund will be 30% divided by a real rate of return times GDP. If the real rate of return is 5%, the fund would have to be 6 times GDP (in 2024). This suggests higher rates of savings than Botswana currently manages.

While sovereign funds are a sensible way of managing resource depletion (essentially converting resource capital into financial capital rather than consumption), they do have some drawbacks. There is a high temptation for governments to draw on the funds to buy political support in hard times. Depending on how they are managed, it is also possible that the accumulation of sovereign funds helps maintain a high exchange rate, exacerbating any Dutch disease effects and thus retarding the development of the non-diamond industries that will form the foundation for a post-depletion economy.

Conclusions

6

Depletion of diamonds removes what has been the central engine for growth in Botswana over the past four decades. Our report suggests that incomes will inevitably decline and will certainly be considerably lower than what citizens will expect them to be based on past performance. The immediate decline will be significant, but its impact on the economy is limited because of the limited interconnections between diamond mining and the rest of the economy. However, because diamond mining has directly and indirectly been the driver of savings and investment in the economy, the slow-down in the economy will continue for a number of years after depletion.

There are limited options for policy-makers to ameliorate this decline. Some apparent policy options – drawing down sovereign wealth funds, running up foreign debt, maintaining government transfers and expenditure – might appeal in the short run but are not sustainable in the long run. They should only be used if it is clear that structural transformation will take place, otherwise they could exacerbate the negative impact.

The report has not explored the political economy consequences of the decline. The burden of decline will not be borne equally across the various groups in society. In other countries income declines of this size have sparked off distributional conflicts, as agents attempt to use the means at their disposal to maintain the incomes they have become accustomed to. It is important that such conflicts be managed. Sharp unanticipated negative shocks can be more disruptive than expected ones. It is therefore important that all agents in Botswana are educated into understanding the inevitability of depletion.

Appendices

Appendix A: Constructing a 2007 SAM for Botswana
In order to analyse the impact of new and existing mining and energy projects on the Botswana economy we propose to make use of a CGE modelling framework. The underlying data base for a CGE is a SAM. Below we describe briefly how a SAM for Botswana was constructed for the year 2007. While the base year may seem out of date as it is prior to the 2008 Financial Crisis, we argued in the previous section that the structure of that has not significantly been altered. Moreover, the core data for the SAM uses data from a SAM for the year 1996/97 and any further updating may introduce more noise than useful information for the purpose of our proposed analysis.

The 2007 SAM that we use is an update of the official 1996/7 SAM (CSO) and a preliminary 2002/3 SAM by Thurlow (2007).

A range of data sources have become available since these two SAMs. They include data for the public sector, household income and expenditure, GDP data for aggregate and disaggregate industries, the national accounts, trade data and balance of payment data. We discuss the preparation of the various components of a preliminary 2007 SAM for Botswana below starting with a Macro SAM before discussing the compilation of a Micro SAM.

1. National Accounts for a Macro SAM for 2007

National Accounts data for 2007 report GDP from the expenditure side for household expenditure, government expenditure, investment demand, change in stock and trade. On the income side we use unpublished value added data from CSO at basic prices for a range of industries which are augmented with import duties and other taxes (less subsidies) on goods and services to arrive at GDP at market prices. Intermediate inputs and gross value of production (shares) are available from further unpublished CSO data for the financial year 2006/7.

Macro data for foreign primary income and current transfer flows (revenue as well as payment) are available from the Balance of Payment. An adjustment has been made to avoid double counting of SACU transfers in the calculation of GDP.

For more detail on government income and expenditure in the Botswana SAM we use a combination of data from Ministry of Finance's Cash Flow Statements (CCFS) and Botswana Unified Revenue Service (BURS) in order to establish a breakdown of direct taxes in corporate and household. Income from royalties and dividends is available from the CCFS and we allocate this to government income from enterprises so that it is recorded separately from corporate tax income. While total government expenditure is available from the national accounts we extract government transfers to enterprises and households from CCFS. In order to balance the public sector Macro SAM account, we calculate government savings as the residual.

In order to complete the 2007 macro SAM for Botswana we had to negotiate various inconsistencies in the underlying data sources by selecting appropriate balancing items and making some assumptions. For our purposes these are:

1. domestic commodity supply: derived from the activity's production costs;
2. dividend payouts to households, assuming corporate taxes and government ownership (as discussed above) and an assumed corporate savings rate of 50%;
3. household savings;
4. government savings; and
5. foreign savings.

A final 2007 Macro SAM for Botswana is shown in the next table.

Table 7: A 2007 Macro SAM for Botswana, P billion current prices

	mact	mcom	mlab	mmix	mcap	ment	mhhd	mgov	matx	mdtx	metx	mftx	mmtx	mstx	ms-i	mstk	mrow	mtot
mact		107,706																107,706
mcom	38,382						26,096	14,726							18,161	7,537	36,612	141,513
mlab	19,080																75	19,155
mmix	1,123																	1,123
mcap	49,122																2,615	51,737
ment					45,059			1,939										46,998
mhhd			18,612	1,123		8,788		744									590	29,857
mgov						10,933				6,475			4,018	2,634			3,791	27,851
matx																		
mdtx						3,778	2,698											6,475
metx																		
mftx																		
mmtx		4,018																4,018
mstx		2,634																2,634
ms-i						23,499	1,002	9,956									-8,758	25,699
mstk															7,537			7,537
mrow		27,155	543		6,678		62	487										34,925
mtot	107, 706	141,513	19,155	1,123	51,737	46,998	29,857	27,851		6,475			4,018	2,634	25,699	7.537	34925	

In which:

mact	=	activities
mcom	=	commodities
mlab	=	wage earnings
mmix	=	mixed income
mcap	=	gross operating surplus
ment	=	enterprises
mhhd	=	households
mgov	=	public administration
matx	=	activity tax
mdtx	=	direct tax
metx	=	export tax
mftx	=	factor tax
mmtx	=	import tax
mstx	=	sales tax
ms-i	=	accumulation
mstk	=	change in stocks
mrow	=	rest of the world

2. A 2007 Micro SAM for Botswana

Given the above Macro SAM for Botswana, we proceed with disaggregation of various accounts. We first explore the expenditure components, followed by trade, value added by activity, taxes on products and margins and finally the Supply and Use matrix. This is followed by a discussion on how a Micro SAM for Botswana was balanced.

Government expenditure

Our aim is to disaggregate government expenditure into goods and services. Along the lines of previous SAMs, we identify three relevant categories, i.e. government services (as this will be produced by a dedicated production activity of the same name), health and education. For the latter two we use the 2006/7 and 2007/8 expenditure data by functional classification and we then calculate government services as the residual.

Investment expenditure and changes in stocks

We use unpublished CSO investment demand data as shown in the following table. Shares of activities' change in stocks are also available from the unpublished CSO source but in the final instance these will be co-determined by means of ad-hoc adjustment so that they can serve as a residual between demand and supply of goods and services for selected commodities (see discussion below).

Household expenditure

We use the 2002/3 Household Income and Expenditure Survey (HIES) data indirectly, available from a 2002/3 SAM for Botswana (Thurlow, 2007). This SAM is an update and expansion of the 1996/7 SAM with HIES data for a wide range of households and labour categories. We only use the household expenditure part of this SAM. A number of ad-hoc adjustments were made.

Trade

Trade data in the SAM consists of data for trade in commodities and trade in services. Both are discussed separately in turn below:

Commodities Trade

We use external trade statistics from Botswana's CSO (2010) for exports and imports of commodities at the 2-digit level of Harmonised System classification. These product groups have been allocated to the SAM commodities. A number of ad-hoc adjustments had to be made to satisfy balancing conditions typical for the CGE model that we aim to operate with the new 2007 Botswana SAM. Re-exports are not modelled in the CGE framework and consequently we have to make sure that exports of any commodity or service are smaller than domestic supply. This is not the case for textiles, clothing and footwear. Although local production has been identified in the value added statistics and was revised upwards, exports are still much higher than local supply. We do not know the extent of re-exports and we decided to adjust exports down accordingly.

Services Trade

There is considerably less data available on services trade than there is on commodity trade. We rely on a combination of data from the Balance of Payment (BoP for trade in transport, travel and other services), World Development Indicators (disaggregating 'other services' into 'financial services' and 'other services') and the 1996/7 SAM for disaggregation of services trade. Along similar lines as discussed above with regard to textiles, clothing and footwear, we scale trade in accommodation down both on the import and export side, in order to ensure that domestic supply is not larger than exports of accommodation as reported by the BoP.

Activity Value Added

We use Value Added from unpublished CSO records for 32 activities. The same source also offers intermediate inputs as well as gross output for a similar number of activities spanning the financial year 2006/07. Although not quite the same period, we assume shares to have remained constant and we apply them to our 2007 reference year.

Value added and gross output for textiles, clothing and footwear remains problematic. The reason is that trade data suggests that more is exported than is produced locally. While a re-estimation of GDP was taking place at the time of the SAM construction preliminary estimates were made available for our purposes; the latest estimates show GDP of the textiles, clothing and footwear activity to be twice as high as initial estimates. Although this does not solve the inconsistency with the trade data discussed above, we took these new estimates into account by proportionally scaling GDP of the other manufacturing sectors back. In this way we maintain overall consistency with manufacturing's total value added. Note that a further adjustment to our 2007 estimates may be necessary in order to reflect more recent updates.

Product Taxes

Treatment of aggregate SACU transfers and import duties was discussed above. The Ministry of Finance's fiscal accounts reports totals for import duties and sales tax respectively while the 1996/7 SAM shows the sum of both as product tax but there it is broken down by commodity. There is no product tax on services in the 1996/7 SAM. Since there is no other information currently available we apply the 1996/7 SAM product tax rates to 2007 imports plus domestic supply values while forcing consistency with the aggregate totals for import duties and sales tax as discussed earlier by means of proportional scaling.

Supply and Use

The Supply and Use matrix coefficients are initially taken from the 1996/7 Botswana SAM and applied to the gross output estimates described above. Negative numbers for losses reported in the 1996/97 SAM were changed into zeroes.

Margins

Trade margins are derived from the 1996/7 SAM and applied to the absorption data described above. No distinction is made at this stage between margins on domestic trade, exports and imports. The last two represent margins to move goods to and from the border. Further disaggregation of margins into those associated with domestic trade, imports and exports will be discussed below.

3. Balancing the SAM

Given all the above, we can now line the supply and demand for commodities up and check for overall consistency in the goods market. For each commodity identified in the SAM, total domestic supply plus imports, taxes on goods and services and margins must equal the sum of intermediate and final demands. The latter consists of household and government expenditures on goods and services, demand for investment goods, changes in stocks and exports.

Our initial adjustment for any inconsistencies between demand and supply is to make ad-hoc modification to changes in inventories. An additional check is to make sure that domestic supply remains larger than exports (as discussed earlier). We make additional adjustments to domestic supply, in particular where no changes in inventories are technically possible.

Full consistency of commodity demand and supply is then achieved by making intermediate demand the final residual. Since we have made adjustments to domestic supply and given the existing Supply Matrix, gross value of production by activity will now have changed. Then, while keeping activity value added constant, intermediate inputs by activities must now change and together with changes to intermediate demand by commodity, biproportional scaling of the Use Matrix is applied to achieve final consistency of the SAM.

4. Further Disaggregation of Labour, Households and Income Distribution

So far, we have prepared data inputs to create a balanced 2007 SAM for Botswana which only identifies a single type of labour, a single type of household and aggregate trading margins. Disaggregation of these variables is conducted in a subsequent phase in which we make use of the 2002/3 SAM. The latter is based on the Household Income and Expenditure Survey (HIES) for 2002/3.

Similar to the 1996/7 SAM, the main disaggregation of household income and expenditure is along geographic lines of towns and cities (labelled as urban areas in the 2002/3 SAM, see Thurlow, 2007) and rural with a further disaggregation into income classes for households in urban areas. The income classes are based on those used in the HIES but are presented in our SAM in terms of 2002/3 income bands as Low (bottom 2 deciles), Medium Low (deciles 2-5), Medium High (deciles 6-8) and High (top decile). Household expenditure, savings and direct taxes is initially distributed across these income classes according to the 2002/3 SAM (described by Thurlow, 2007) which is based on unit record data from the HIES.

Labour income is disaggregated into five skill/occupation categories. As is the case in the 2002/3 SAM, we identify professionals, admin and managers, clerical, skilled manual workers and unskilled workers. Initial attempts to use the Labour Force Survey for the year 2005/6 were abandoned due to lack of sufficient detail in the available publications at the time of this SAM's construction. In particular, a cross tabulation of wage earnings and employment between industries and occupation groups will be a useful update of the current data used.

The shares of labour income from the Rest of the World across skill/occupation groups is based on average labour income shares while the shares of household payments and receipts to and from the rest of the world is based on average household expenditures and income respectively. Other shares such as household income received from the enterprises and the government and direct taxes and savings are based on 2002/3 SAM proportions.

A final round of biproportional scaling is required to line wage earnings by occupation up to wage earnings by household category. The starting point here is the 2002/3 SAM shares.

Trade and transport margins are disaggregated into those on domestic trade, exports and imports using the values of trade (less taxes) for the respective components.

5. The Economic Structure of the Botswana Economy through the Lens of a 2007 Micro SAM

We examine the economic structure of the Botswana economy through the lens of the newly estimated 2007 Micro SAM by compiling the following set of tables.

Table 8: Macro Structure of a 2007 SAM for Botswana

	Value	% Share of GDP
HH Expenditure	26.096	34.3
Gross Dom Fixed Inv	18.162	23.9
Change in Inventories	7.537	9.9
Govt Expenditure	14.726	19.4
Exports	36.612	48.2
Imports	-27.155	-35.7
GDP @ Mrk Pr	75.977	100.0
Net Ind Taxes	6.652	8.8
GDP @ Bas Pr	69.325	91.2

Table 8 reports macro variables of the 2007 SAM for Botswana. GDP is estimated to be P76 billion. Note that changes in inventories has been used as a residual in the GDP calculations and represents about 10% of total GDP. The stand-out feature of the table is that exports are 25% higher than imports. Government expenditure on goods and services is about 20% and fixed investment about 24% of GDP.

The distribution of the components of value added at basic prices across industries is shown in the table below.

Table 9: Value Added Shares by Industry in a 2007 SAM for Botswana

	Professionals	Managers	Clerical	Skilled Manual	Unskilled	Mixed Income	Capital	Total
Aaliv	0.3	0.3	0.3	0.3	0.3	66.9	0.1	1.2
Aacrp	0.3	0.3	0.4	0.3	0.4	2.9	0.0	0.1
Aaoth						8.4	0.9	0.8
Amind	4.2	4.2	4.3	4.2	4.3		46.5	34.1
Amcop	7.8	7.8	7.9	7.8	7.9		9.4	8.8
Amcoa	0.1	0.1	0.1	0.1	0.1		0.0	0.0
Amins	0.3	0.3	0.3	0.3	0.3		0.2	0.2
Amino	1.1	1.1	1.1	1.1	1.1		0.8	0.9
Ameat	0.5	0.5	0.5	0.5	0.5		0.2	0.3
Abevs	0.7	0.7	0.7	0.7	0.7		0.5	0.5
Atext	0.5	0.5	0.5	0.5	0.5		0.4	0.4
Aleat	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Aothm	3.8	3.8	3.9	3.8	3.9	10.4	2.0	2.7
Awate	1.4	1.4	1.6	1.4	1.6		0.5	0.8
Aelec	2.5	2.5	2.7	2.5	2.7		2.2	2.2
Acnst	6.7	6.7	6.1	6.7	6.1		3.9	4.6
Atrde	7.6	7.6	7.2	7.6	7.2		8.2	7.9
Aacco	3.0	3.0	2.9	3.0	2.9		4.4	3.9
Aroad	1.7	1.7	1.4	1.7	1.4		0.9	1.1
Arail	0.5	0.5	0.4	0.5	0.4		0.1	0.2
Aairt	0.8	0.8	0.7	0.8	0.7		0.7	0.7
Acomm	1.7	1.7	1.4	1.7	1.4		1.4	1.4
Aotrp	0.4	0.4	0.3	0.4	0.3		0.6	0.5
Afini	1.3	1.3	1.2	1.3	1.2		1.3	1.3
Abuss	3.3	3.3	2.9	3.3	2.9		3.7	3.5
Apros	0.6	0.6	0.6	0.6	0.6		0.0	0.2
Adwel							1.8	1.3
Acgvt	34.6	34.6	40.1	34.6	40.1		6.4	14.3
Algvt	4.6	4.6	5.3	4.6	5.3		1.1	2.0
Adoms	1.7	1.7	0.9	1.7	0.9	11.5		0.6
Oaths	1.2	1.2	0.7	1.2	0.7		1.1	1.1
Apnpi	6.9	6.9	3.8	6.9	3.8		0.5	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The first six columns of Table 9 refer to professionals, managers and administrators, clerical workers, skilled manual workers and unskilled workers respectively. Note with 34% the dominant contribution to GDP by diamond mining, followed by copper mining with 9%, the rest of the goods producing activities only contribute about 7% to GDP. Government accounts for about 16% of GDP.

Almost two thirds of highly skilled labour is employed (in terms of wage earnings) by the public sector. Other occupations also show greater dependence on the public sector in terms of wage earnings than the total contribution to GDP. The reason is that the mining industry is more capital intensive than other industries as can be seen in the 4th and 5th entry of the second-last column which makes other activities relatively less important. Construction, trade and hospitality require relatively high inputs from managers. Trade accounts for the high share of clerical workers' earnings.

Table 10 reports on the distribution of activities' costs between primary and intermediate inputs. Note the relatively low share of intermediates in diamond mining. Other mining activities appear to be somewhat more closely connected to the domestic economy and this is even more so for manufacturing activities.

Table 10: Primary and Intermediate Input Shares by Industry in a 2007 SAM for Botswana

	QVASHR	QINTSHR
aaliv	77.7	22.3
aacrp	15.5	84.5
aaoth	87.9	12.1
amind	93.9	6.1
amcop	65.7	34.3
amcoa	48.7	51.3
amins	40.8	59.2
amino	78.7	21.3
ameat	20.2	79.8
abevs	27.5	72.5
atext	17.8	82.2
aleat	19.1	80.9
aothm	22.2	77.8
awate	67.7	32.3
aelec	71.8	28.2
acnst	28.0	72.0
atrde	67.9	32.1
aacco	69.7	30.3
aroad	43.4	56.6
arail	49.3	50.7
aairt	43.4	56.6
acomm	73.6	26.4
aotrp	43.3	56.7
afini	42.1	57.9
abuss	75.0	25.0
apros	46.9	53.1
adwel	100.0	
acgvt	75.5	24.5
algvt	88.6	11.4
adoms	100.0	
aoths	64.3	35.7
apnpi	52.1	47.9
total	64.4	35.6

Moving on to household income, the next table reports its sources. Relatively high shares of transfers by government are reported for low-income urban households and rural households. From the first column it would appear that professional occupations are not only highly represented amongst high-income urban households but also households in urban villages and rural areas.

Table 11: Sources of Household Income in a 2007 SAM for Botswana

	Professionals	Managers	Clerical	Skilled Manual	Unskilled	Mixed Income	Enterprises	Government	Rest of the World	Total
hlow	3.7	4.4	10.0	38.4	20.7	4.6	8.7	7.91	1.73	100
hmel	2.4	14.1	6.4	22.8	11.9	3.5	35.2	1.99	1.76	100
hmeh	8.4	17.4	5.7	16.7	6.8	3.6	39.5	0.24	1.77	100
hhih	12.3	32.3	2.9	8.7	2.1	3.1	36.7	0.03	1.79	100
hurv	20.8	8.9	7.8	24.7	9.6	5.0	18.5	2.92	1.76	100
hrur	13.1	13.6	5.7	26.1	16.2	4.3	5.2	14.22	1.76	100
total	13.0	21.3	5.0	16.4	6.7	3.8	29.5	2.5	1.77	100

As expected, incomes earned by managers play less of a role in urban villages and rural households. In urban areas, income from enterprises represents a large share of household income for all except low-income households and current transfer income from outside the country shows a similar bias.

Conclusions

An attempt has been made to update a SAM for Botswana. The reference year is 2007. The update process uses new data for household income, national accounts, trade and government finance. However, the structure of the economy in terms of supply and use is still largely based on estimates from the mid-1990s.

As a way forward it would seem to make most sense to invest in the construction of a new Supply and Use Table (SUT) for a more recent year than 1996/7. This could then be combined with other data sources to create a more robust SAM for Botswana. However, for purposes of short-term CGE modelling application, new SUT data may not be available. A further temporary update to a more recent reference year using data sources that have been released between the construction of the preliminary 2007 SAM (October 2011) is technically possible but the robustness of the results may be compromised. Such data sources would need to include the national accounts and detailed production statistics, public sector statistics, trade data, household income and expenditure surveys, and labour force surveys. We have not yet explored the availability of such data and require feedback and assistance in this regard.

Appendix B: The Use and Limitations of CGE Models

A computable general equilibrium (CGE) model is a model of the complete economy. It captures the various aspects of the circular flow of income and the interactions between them. For our application we identity 31 activities and 31 commodities. There are 6 types of labour and 2 types of capital (mining and non-mining). There are 6 representative households. We identify two enterprise types (mining and non-mining), general government, accumulation and the rest of the world. In addition, there are several types of taxes and trade and transport margins. The full set of accounts is listed in Table 21.

The model is a stylised picture of the interactions among these various accounts during the base year, 2007. When we solve the model we find a set of prices, outputs, expenditures, savings and various other variables that are consistent with each other, with the parameters of the model and with other variables that are exogenous to the model. We use a recursive dynamic version of the model. This takes the solution for one period of the model, allocates investment to the various sectors, updates other variables according to external information on their likely trends and then solves the model for the next period.

Although it is possible to use CGE models for forecasting, this is not their primary nor their best use. A forecast is a prediction of the value of a variable at some point in the future. To make an accurate forecast one needs forecasts of all the factors that influence the variable of interest (unless one simply extrapolates past trends). CGE models are more commonly used as laboratories to do controlled thought experiments to examine the consequences of particular changes.

Since it is important to be clear about this, an example might help. Say our variable of interest is the world price of diamonds in 2025. We could extrapolate recent trends in this price, but it is unlikely that would give us an accurate forecast. A more accurate forecast would require some understanding of what determines the price of diamonds – incomes, costs of production, tastes and so on – and forecasts of what will happen to these influences by 2025.

In a CGE framework, rather than asking 'What will be the price of diamonds in 2025?' we ask: 'If the price of diamonds in 2025 is $x, what will be the consequences for the Botswana economy?' To answer this question we want to isolate the impacts due to the price increase from the multitude of other influences that will simultaneously be impacting on the economy between now and 2025. We want to capture the direct and indirect consequences of the price rise, but not, say, those of a drought. Although it is highly likely that there will be a drought in Botswana before 2025, and it is definite that a drought will have an impact on the economy, we do not think that the drought is a consequence of the rise in the price of diamonds and therefore it should be excluded when trying to understand what those consequences are.

This does not mean that we do not allow for exogenous changes. We can update labour supplies to allow for population growth, or world prices to follow some path that we think is likely, and so on.

To implement the model we first construct a hypothetical base path, which we can think of as a 'business as usual' path, showing how the economy might have performed without the change in which we are interested.[11] We then make the change and see how the path changes. In the jargon of modelling, we shock the model and run a simulation which gives a new path which we can compare with the benchmark base path. Since the only change to the model is the shock simulated, we know we can attribute any differences to the shock.

Results are reported as deviations from the base path. In this sense, the precise base path does not really matter. If the simulation shows that GDP is 2% below the base path, we are suggesting that whatever the actual GDP

[11] *Although we speak of 'the' path, we should remember that this path comprises changes in all the endogenous variables. They all evolve along the path.*

would be without the shock, the change will cause it to be 2% lower.

This process allows us to isolate the consequences of the shock in which we are interested. It provides us with a better understanding of the consequences of the specific shock. We might run a series of simulations in which we add different shocks together. To take our previous example, having examined the consequences of a rise in the price of diamonds, we might add a drought shock. Preferably we will run three experiments: a diamond price shock, a drought shock and a diamond price shock with a drought shock. This allows us to disentangle the effects of several changes happening together.

Appendix C: Minerals and Energy Export and Revenue Projections

For this study we were asked to draw on data in the Final Report for the Study on Minerals and Energy Export and Revenue Projections, hereafter MEER (Fichani & Freeman, 2012). That Report provides four appendices with tables that are relevant for us. These are:

- Appendix 1: Forecast nominal government mineral revenues
- Appendix 2: Forecast nominal mineral export revenues
- Appendix 3: Projected employment levels from existing and future mining projects
- Appendix 4: Projected gross value of mineral production

For each of the appendices there are projections over the period 2012–2026 for a base case and for a Low and a High Scenario. We want the CGE model to track the base case.

Although these appendices give some indication of what we aim at to set our baseline, it is nonetheless difficult to implement. The MEER Report presents outcomes of processes that are not spelled out. For example, Appendix 4 presents projections of mining, non-mining and total GDP. In the CGE model these are endogenous outcomes of a process involving investment, technical change, employment growth, etc. MEER offers no guidance as to what is happening to these determining factors. This is reasonable in terms of the focus of MEER; it was not its intention to do anything other than an accounting addition of various mining projects planned over the period of investigation. But it means that calibration of the CGE requires some second guessing of what could be behind the growth. Although MEER talks about new projects which add to mineral GDP in the High Scenario, it does not indicate what investments underlie those projects.

We could follow a similar strategy and simply impose output growth. However, that would undermine the purpose of CGE modelling. As we explain later, an economy-wide perspective forces us to work within a resource envelope that constrains what can happen. While this constraint means that output growth in one sector is not independent of that in another, it is not interesting to impose the constraint at that level. The competition amongst sectors is over productive resources – labour, intermediate goods, imports and, in the longer run, resources for accumulation. We therefore need to model the drivers of production and growth, not the outcomes of those processes.

We have therefore had to make some assumptions in this regard. These will be spelled out later as they become relevant.

Appendix D: Savings and Investment Channels

National income accounting consistency requires that aggregate savings in a given period must equal aggregate investment. Savings is the difference between income and final consumption. We can split national savings into private savings, public sector savings and, in an open economy, foreign savings. Foreign savings are the negative of the current account balance. Investment comprises gross fixed investment and changes in inventories. For this discussion it is convenient to ignore inventory changes so that we can focus on fixed capital formation.

A crucial determinant of the behaviour of an economy is how this equality between savings and investment is brought about. There are two broad alternatives. It is possible that savings rise to accommodate any planned increase in investment. There are a number of financial mechanisms that theoretically could bring this about: interest rates, income redistribution, current account readjustments.

Alternatively, investment could be constrained by inflexible savings. The government might be unable to reduce a budget deficit, foreign borrowing might be difficult and the private sector might find it difficult to save more. In this case, even if firms wish to invest more, the workings of the economy might prevent total investment rising. There might be some compositional changes, with some firms being able to fulfil their plans at the expense of others, but total investment remains constant.

Which of these alternatives operates in Botswana? There is little evidence we can bring to bear on this question. However, since the savings channel is such an important mechanism for the analysis in the report, this appendix spells out in tedious detail the nature of the savings-investment constraint and brings some evidence to bear, albeit in an informal way.

We begin with the standard national income accounting identity

(1) $GDP \equiv C_P + C_G + I + E{-}M$

where C_P is private consumption, C_G is government consumption, I is investment (gross fixed capital formation plus increase in inventories by both the private and the public sector) and E and M are exports and imports of goods and services.

This is an identity which states that, by definition, the total expenditure on goods and services is by definition equal to the total value of goods and services supplied by either domestic production (GDP) or imports.

Savings is defined as any income not consumed. To capture savings properly, we expand the notion of income to include net factor incomes from abroad (NFA = wages and property income generated by Motswana outside Botswana less wages and property income generated in Botswana by non-residents), giving Gross National Income (GNI):

(2) $GNI \equiv GDP + NFA$

Finally we include net transfers from abroad (NTR), to get Gross National Disposable Income (GNDI):

(3) $GNDI \equiv GDP + NFA + NTR$

By substitution, we get

(4) $GNDI \equiv C_P + C_G + I + E{-}M + NFA + NTR$

We can re-arrange this and note that E - M + NFA + NTR is the current account balance (CAB).

(5) $GNDI \equiv C_P + C_G \equiv I + (E{-}M + NFA + NTR) \equiv I + CAB$

The left-hand side is Gross National Savings, S:

(6) $S \equiv I + CAB$

Noting that the CAB is the negative of foreign savings, we can write

(7) $S_D + S_F \equiv I$

where S_D is domestic savings and S_F is foreign savings.

This is simply a different way of stating the fundamental resource constraint on the economy (augmented by NFA and NTR) that we started with in (1).

We can think of domestic savings as being undertaken by the private sector (enterprises and households), S_P, and the public sector, S_G:

(8) $S_P + S_G + S_F \equiv I$

Government savings will be the current budget surplus. If we now split private savings into savings by the mining sector and savings by the non-mining sector, and simultaneously divide investment expenditures into expenditures by the mining, the non-mining and the government, we can write

(9) $S_m + S_n + S_g + S_f \equiv I_m + I_n + I_g$

Now rearrange this to give

(10)

$$\underbrace{(S_m - I_m)}_{\text{resource balance in mining}} + \underbrace{(S_n - I_n)}_{\text{resource balance in non-mining}} + \underbrace{(S_g - I_g)}_{\text{resource balance in government}} \equiv -S_f$$

Identity (10) shows the net resource balances in the economy when it is disaggregated into these four institutions.

In the report we suggest that mining investment can crowd out non-mining investment. A reviewer of an earlier draft understandably questioned this, stating, 'Mining investment does not crowd out non-mining investment in Botswana because investment all comes from foreign sources. There is simply no domestic savings to mining investment.' Identity (10) provides a framework for examining this.

Firstly, note that the question is not about the financing of the investment but the real resources embodied in it. Mining investment requires inputs of machinery, construction services, fuel, explosives and the like. Identity (10) is based on these resource flows.

The criticism suggests that there is a direct one-to-one relationship between I_m and S_F. If mining investment rises, so too will the current account deficit (or, the current account surplus will fall). If all investment expenditure in mining is spent on imported goods and services, then we might argue that an increase in mining investment leads directly to an equal rise in imports. This would allow mining investment to move independently of any other net resource balance in the rest of the economy.

Our sense is that there should be a strong relationship, but not a perfect one, since there are construction services involved in mining investment and that at least some of these will be locally sourced.

There are not the data necessary to undertake a proper investigation of this since there are no figures for investment in mining. However, using World Development Indicators we constructed a data series that allows an estimation of private and public investment and of foreign and domestic savings. Figure 22 below shows their trends as % of Gross National Disposable income between 1981 and 2012. If private investment is dominated by mining investment, the suggestion that there is no link would imply a strong relationship between foreign savings and private investment. In Figure 23 we show a scatter plot of the two. There is a positive relationship. However, a crude linear regression of the former on the latter gives an R^2 of 0.15.

There are further considerations that need to be taken into account in considering whether the mining resource balance has any impact on others in the economy.

Firstly, the mining sector is not significant only for its own direct savings but also because the resources it transfers to government through taxation and royalties allow government to save and invest. So the government resource balance in Identity 10 is not independent of the mining one. Figure 24 suggests that there may be a negative relationship between the two, although we emphasise that these data are not strong.

Secondly, one also needs to ask what happens when there is a positive net resource balance in mining. Does an excess of savings over investment in mining have any effect on other resource balances, or does it reduce foreign savings?

Figure 22: Public and Private Investment, Foreign and Domestic Fixed Capital Formation

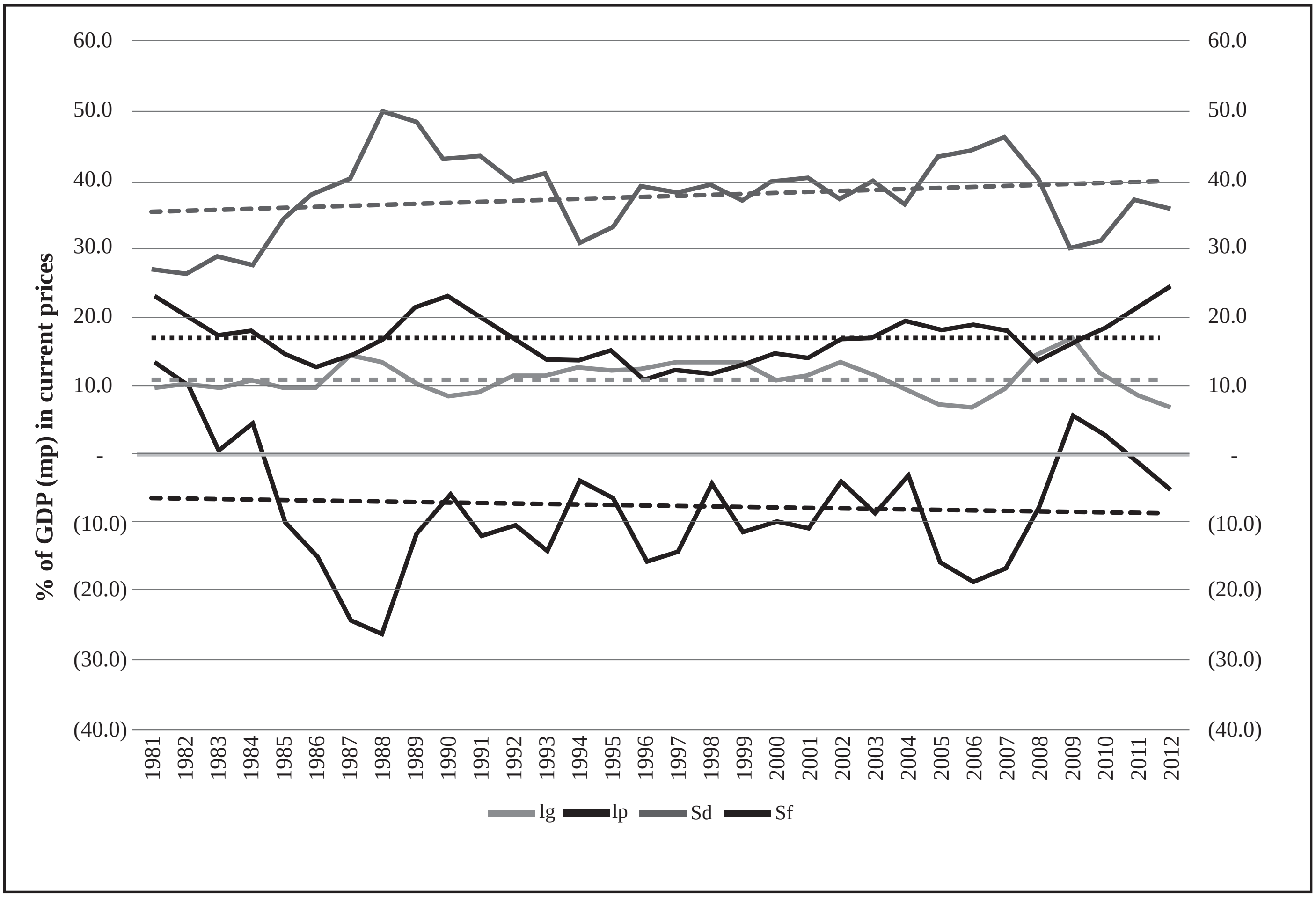


Figure 23: Relationship between Foreign Savings and Private GFCF, 1981-2012

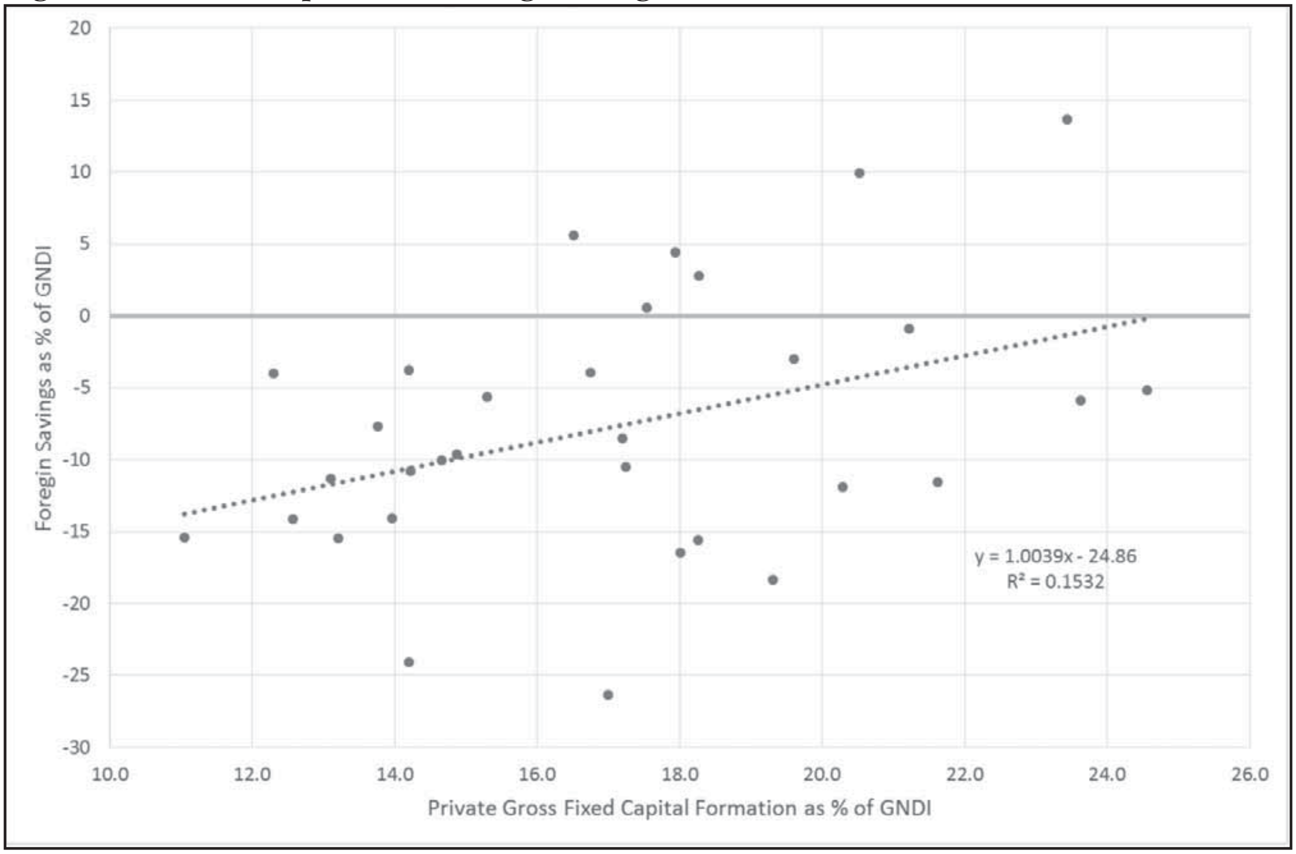


Figure 24: Relationship between Public and Private Resource Gaps, 1981-2012

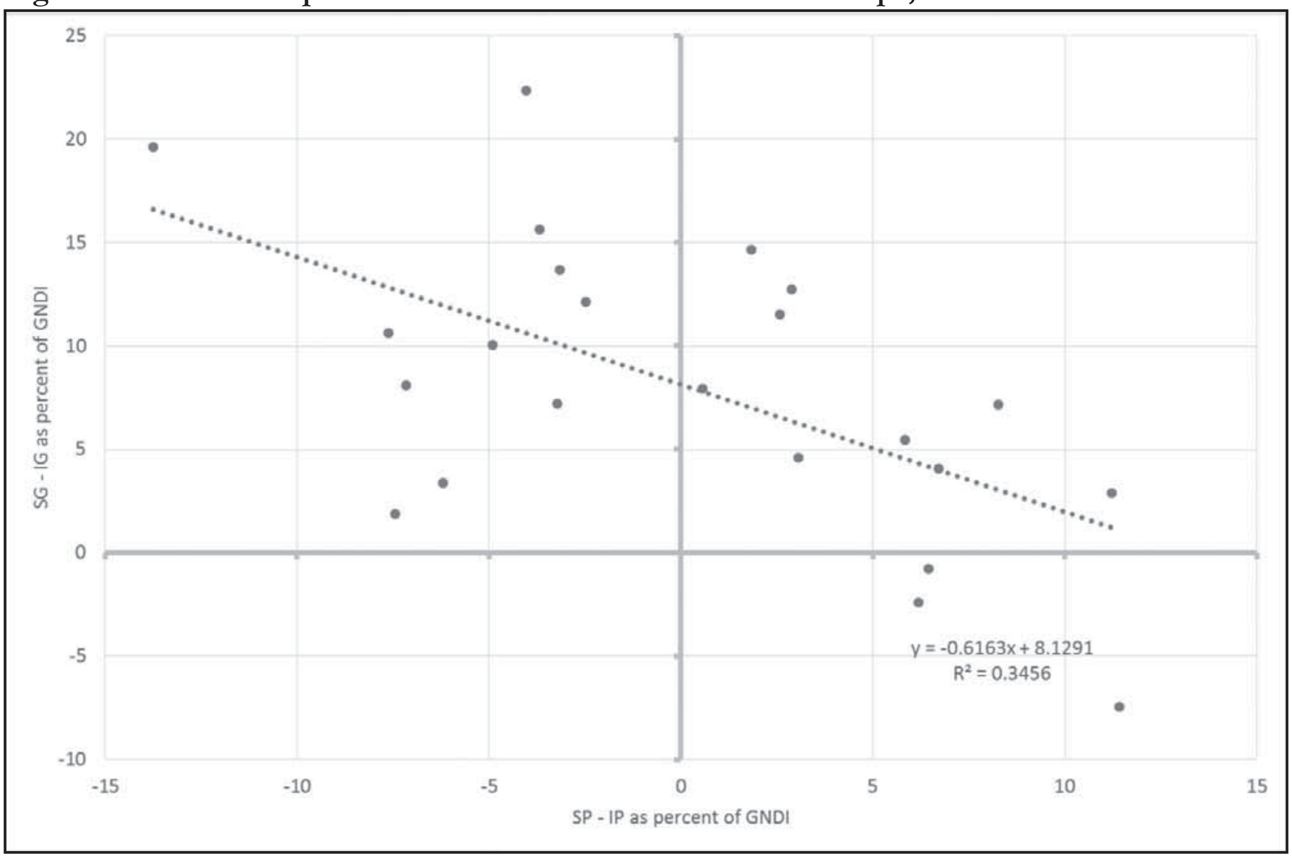


Table 12: Description of Data Used

1	C_P	Household final consumption expenditure, etc.	NE.CON. PETC.CN
2	C_G	General government final consumption expenditure	NE.CON. GOVT. CN
3	I_P	Gross fixed capital formation, private sector	NE.GDI. FPRV.CN
4	I_G	Gross fixed capital formation, public sector	Estimated (a)
5	dstk	Changes in inventories	NE.GDI. STKB.CN
6	I	Gross capital formation	NE.GDI. TOTL.CN
7	E	Exports of goods and services	NE.EXP. GNFS.CN
8	M	Imports of goods and services	NE.IMP. GNFS.CN
9	Y1	GDP	NY.GDP. MKTP.CN
10	S1	Gross domestic savings	NY.GDS. TOTL.CN
11	NFA	Net income from abroad	NY.GSR. NFCY.CN
12	Y2	GNI	NY.GNP. MKTP.CN
13	NTA	Net current transfers from abroad	NY.TRF. NCTR.CN
14	Y3	Gross National Disposable Income	Estimated (b)
15	S2	Gross national savings	Estimated (c)
16	Y_G	Income of government	Compiled (d)
17	S_F	Foreign savings (= -CAB)	Estimated (e)
18	S_D	Domestic savings	Estimated (f)
19	S_G	Public savings	Estimated (g)
20	S_P	Private savings	Estimated (h)

(a) Row 5 = [6] – [5] – [3] (b) Row 14 = [12 + [13] (c) Row 15 = [14] – ([1] + [2]) (d) Row 16: compiled 1990–996 and 2006–2012 from WDI (GC.REV.GOTR.CN + GC.TAX.TOTL.CN); 1997-2005 from IMF 2002 Staff Report for the Article IV Consultations Country Report

(e) Row 17 = -([7] – [8] + [11] + [13]) (f) Row 18 = [15] – [17] (g) Row 19 = [16] – [2] (h) Row 20 = [14] – [16] – [1]

Appendix E: Price Elasticity of Demand for Diamonds and Price Elasticity of Government Revenue from Diamonds in Botswana

1. Introduction

Like nearly all natural resources, diamonds are an exhaustible resource. In recent years, there have been fears that diamonds in Botswana will be either depleted or too costly to mine within the foreseeable future. The International Monetary Fund (IMF), for instance, predicts that diamond resources in Botswana could be depleted by 2029, leading to a sharp fall in fiscal revenue (Basdevant, 2008).[12] This has prompted the government of Botswana to start exploring alternative products that may replace diamonds as sources of revenue for the country. Among others, coal within the mining sector has attracted particular interest, with the authorities claiming that Botswana could be home to over 200 billion tonnes of coal resources (KPMG, 2013). However, given the predominant role of diamonds in the Botswana economy, it is clear that any alternative product would only be a partial replacement. A reduction in revenue from diamonds is, therefore, likely to adversely affect the country's macroeconomic performance.

It is against this background that this study sets out to analyse intervention measures that can be put in place to delay any adverse effects to the Botswana economy arising from diminishing (and eventual depletion of) diamond reserves. To achieve this objective, the study estimates the price elasticity of demand for diamonds and price elasticity of government revenue from diamonds. It is expected that inferences from these estimations will give insights into relevant policies that Botswana can adopt to retain a level of macroeconomic performance that has been achieved since independence.

Using the Two-Step Engle-Granger Procedure and error correction model, the study estimates a long-run and short-run log-log demand function for diamonds with extrapolative or regressive expectations. This is followed by estimation of a log-log government revenue function for diamonds using the two-stage least squares approach. Quarterly frequency data spanning the period 2003:1 to 2012:4 is used for estimating the demand function while annual frequency data for the period 1981 to 2011 is used for estimating the government revenue function for diamonds. Results of the study show that demand for diamonds is price inelastic with the estimated elasticities ranging between 0.37 and 0.48, which suggests that an increase (decrease) in the price of diamonds is likely to cause a less than proportionate decrease (increase) in quantity demanded and an increase (decrease) in total revenue accruing to traders. The study also finds that government revenue derived from diamonds is price inelastic with an estimated elasticity of 0.9. Combined with the previous result, this indicates that an increase (a decrease) in diamond prices causes a less than proportionate decrease (increase) in quantity demanded and an increase (a decrease) in revenue received by traders, consequently increasing (decreasing) government revenue, albeit less than proportionately.

In light of the expected depletion of its diamonds, Botswana has several options. The country, either individually or working in concert with other major producers of the mineral such as Russia, can consider stockpiling diamonds to constrain world supply, which may raise prices and government revenue derived from the mineral. Between them, Botswana and Russia produce nearly half of the world's supply of diamonds. The price elasticities of demand and government revenue from diamonds estimated in this study show that this approach would certainly deliver the expected outcome of keeping diamond prices relatively high and maintaining or increasing the level of government revenue therefrom. For the very long run, however, Botswana needs to exploit economic diversification opportunities that are available. An example is coal mining. Local authorities claim that Botswana could be home to over 200 billion tonnes of coal resources (KPMG, 2013). Botswana can also consider Basdevant's (2008) proposal to adopt a fiscal rule that allows for a certain level of saving each year rather than targeting a balanced budget. In this case, the country would have to save diamond-related fiscal revenue while production is still strong, to help smooth any adjustment in government revenue that may be required in the long term.

The rest of the paper is organised as follows. Section 2 is a brief overview of the diamond industry and the De Beers group. A discussion of the methodology employed in the study follows in Section 3. Section 4 is a presentation of the study results. A summary, conclusion and policy recommendations conclude the paper in Section 5.

[12] *Botswana's diamond resources generate about 60 percent of tax revenue.*

2. The Diamond Industry and De Beers Group

Diamonds are the most important gem stones used in modern industry in the mass production of machine tools and precision instruments (Central Intelligence Agency, 1951). This is particularly due to their hardness, which is greater than that of any other natural or artificial substance. Diamonds are also popular in jewellery. In Botswana, about half of the diamonds are used industrially while the other half is used for jewellery; and the latter accounts for nearly 80% of diamond sales revenue in the country (Basdevant, 2008). Botswana's diamond resources are mostly mined by Debswana, Botswana's (50/50) joint venture with De Beers.

Botswana's main mining partner in diamonds, De Beers, was until recently a cartel that dominated exploration and marketing of diamonds in the world. Established in 1888, De Beers owns mining operations in Botswana, Canada, Namibia and South Africa and employs over 20,000 people (De Beers, 2014). Most of the rough diamonds from mines around the world are sold to De Beers 'at non-negotiable prices'. De Beers, in turn, sorts the rough diamonds and sells them to sightholders (a term for invited clients), who are not allowed to negotiate or resell the rough stones to retailers. Instead, the sightholders cut and polish the stones before selling them to retailers.

The sightholders are under obligation to give De Beers inventory and market information and De Beers retains the right to audit them. In the event that a sightholder does not adhere to the operating rules, De Beers has in the past used its considerable market power to punish them and other diamond market participants. For instance, in the 1970s, De Beers banned Israeli sellers from its markets and allocated 20% less diamonds to the Israeli market as a punishment for hoarding diamonds, creating a shortage and driving the prices up during a period of high inflation (Yu, 2013).

De Beers has been credited for creating a myth that diamonds are rare through its marketing campaign, including the famous advertising line '*a diamond is forever.'* For many years, the organisation has owned over 80% of the world diamond market. Its market share, however, fell in the 1990s from 85% to 65% following the discovery of new mines in Canada, the breaking away from the cartel of Huge Argyle mine in Australia, increasing popularity of synthetic diamonds, and the collapse of the Soviet Union, which weakened the cartel (Yu, 2013). Summarising the current position of De Beers, Zimnisky (2013) states that 'up until recently … De Beers was the diamond industry and the diamond industry was synonymous with De Beers,' which he called a structural flaw in the diamond industry.

3. Methodology, Data and Data Sources

3.1 Demand Function for Diamonds

Price elasticity of demand for diamonds is an important parameter for understanding the relationship among price, quantity demanded and revenue accruing to diamond traders. It provides statistical insights into the sensitivity of quantity demanded of diamonds to a change in its price, controlling for other factors that affect demand. Accordingly, calculating the price elasticity of demand necessitates estimating a demand function for the mineral. We model demand for diamonds in the same way as the demand for other precious minerals (see, for example, Batchelor & Gulley, 1995; Starr & Tran, 2007). In the literature, these demand functions have taken the conventional form, in which demand depends on the price of the commodity and other factors. Thus, the demand function for diamonds can be modelled as:

$$D_t^d = f\{P_t^d, Z_t, e_t\} \qquad (1)$$

where D^d is quantity demanded of diamonds, P^d is the price of diamonds, Z is a vector of other factors that affect demand for diamonds besides its price, e is a random term, and t is a time index. Elements of Z are given by:

$$Z_t = \{Y_t, Y_t^e, P_t^x, P_t^e\} \qquad (2)$$

where Y_t is current income, Y^e_t is expected income, P_t^x are prices of related commodities and P_t^e is the expected price of diamonds. *A priori,* it is expected that price is inversely related to quantity demanded of diamonds; actual and expected income are positively related to demand for diamonds; prices of related commodities are positively or negatively related to quantity demanded of diamonds depending on whether these commodities are diamond substitutes or complements, respectively; and the expected price of diamonds is positively related to the quantity demanded of diamonds. A demand function for diamonds with directly interpretable elasticities takes the log-log form given by:

$$\ln D_t^d = \beta_0 + \beta_1 \ln P_{t-j}^d + \delta_i \sum_{t=1}^{n} \ln Z_{it-k} + e_t \qquad (3)$$

where the coefficients $ß_1$ and δ_i are elasticities; e is a white noise disturbance term; and Z is as defined in equation (2). Due to lack of any theoretical basis, the lag lengths j and k are determined empirically. The quantity demanded of diamonds is proxied by the quantity traded of sorted and unsorted diamonds for exporting countries excluding China and India. The price of diamonds is measured by the real price of sorted and unsorted gem quality diamonds. Real aggregate gross domestic product (GDP) and per capita GDP of the US are used as a measure of income. The choice of the US emanates from the fact that it is the largest importer of diamonds in the world. This variable can also be seen as a proxy of the strength of world economy (see Starr and Tran, 2007).

Real prices of gold, silver and platinum are used to capture the effect of related commodities on demand for diamonds. It is difficult to list precious minerals that are substitutes or complements of industrial diamonds. However, in the jewellery industry, gold, silver and platinum can all be either substitutes or complements of diamonds depending on how they are used. The nature of the relationship between each of these three minerals and diamonds is, therefore, determined empirically.

Expectations are modelled by assuming that consumers are backward-looking with extrapolative or regressive expectations (see Batchelor and Gulley, 1995). In this case, economic agents use past information as a guide in forming expectations. These expectations can be specified for income and diamond prices, respectively as:

$$Y_t^e = Y_t / Y_{t-1} \tag{4}$$

$$P_t^e = P_t^d / P_{t-1}^d \tag{5}$$

A priori, it is expected that the quantity demanded of diamonds is positively correlated with expected income and expected prices. Thus, quantity demanded of diamonds will increase (decrease) if current income or per capita income is increasing faster (slower) compared to past income. Similarly, the quantity demanded of diamonds will increase (decrease) if diamond prices are increasing faster (slower) in the current period relative to the previous period.

3.2 Unit Roots and Cointegration

Prior to estimation of the demand function for diamonds, all variables are tested for stationarity using the Phillips-Perron test. The results reveal that all variables are integrated of order one except for expected diamond prices, expected aggregate income and expected per capita income, which are integrated of order zero (See Table 13 for details). Accordingly, a test for cointegration is carried out to establish the long-run relationship of the variables.

Table 13: Phillips-Perron Test for Unit Roots

Variable	Phillips-Perron Test Statistic (P-Values)	Order of integration	Level of significance
Quantity of diamonds traded	-10.09850 (0.0000)	I(1)	1%
Price of diamonds	-5.242167 (0.0001)	I(1)	1%
Expected price of diamonds	-5.351209 (0.0000)	I(0)	1%
US GDP	-3.202019 (0.0993)	I(1)	10%
Expected US GDP	-1.762011 (0.0742)	I(0)	10%
US per capita GDP	-3.384716 (0.0178)	I(1)	5%
Expected US per capita GDP	-3.304652 (0.0016)	I(0)	1%
Real price of gold	-7.028001 (0.0000)	I(1)	1%
Real price of platinum	-5.759463 (0.0000)	I(1)	1%
Real price of silver	-5.302124 (0.0006)	I(1)	1%

Using the Engle-Granger Two-Step Procedure, it is found that the variables in the demand function are cointegrated, and consequently, an error correction model is estimated.[13] The existence of cointegration suggests that any divergence from the long-run equilibrium path of the variables is bounded. The variables may, in the short run, drift apart from each other but they have the tendency to move towards long-run equilibrium.

3.3 Government Revenue Function for Diamonds

The mining sector in Botswana contributes nearly 40% to the country's GDP, with diamonds contributing an estimated 94% of the mining sector's total exports (Basdevant, 2008). Not surprisingly, diamond resources account for over 60% of the country's tax revenue. Against a background of the expected decline (or in the extreme case a depletion) of diamond resources by 2029 and the need for the Government of Botswana to reposition itself, it is imperative to understand how government revenue from diamonds responds to fluctuating diamond prices and quantity traded.[14] To investigate this relationship, we estimate the price elasticity of government revenue from diamonds in a government revenue function for diamonds.

Government tax revenue from diamonds (G_t^d) depends partly on the price (P_t^d)and partly on the quantity of diamonds traded (Q_t^d). Assuming demand for diamonds is price inelastic, an increase (a decrease) in diamond prices is expected to be associated with higher (lower) revenue accruing to diamond traders and consequently a rise (decline) in government revenue from diamonds (tax revenue, royalties and dividends). It is also expected that the quantity of diamonds traded is another important determinant of government

[13] The Johansen Test followed by a vector error correction model would have been a more appropriate approach. However, the small sample size of 38 observations in a model with seven regressors would considerably compromise the results.

[14] We define government revenue from diamonds as the sum of government tax, royalties and dividends from diamonds.

revenue from diamonds. Everything else remaining the same, government revenue from diamonds will increase (decrease) with increasing (decreasing) quantities of diamonds traded.

In May 2006, the Government of Botswana and De Beers signed an agreement to establish DTC Botswana, a 50/50 partnership between De Beers and the government, which would sort and value Debswana's diamond production and support the development of a local diamond manufacturing industry in the country (De Beers, 2006). There is a possibility that this caused a notable structural change in government revenue from 2006 onwards. To capture this effect, a dummy variable (*Dum*0**6)**, which takes the value 1 for all periods from 2006 onwards and zero otherwise is introduced into the model. The government revenue function for diamonds, therefore, can be specified in log-log form as:

$$\ln G_t^d = f(\ln P^d_{t-l}, \ln Q^d_{t-m}, Dum06 : \varepsilon_t \qquad (6)$$

where ε_t is a disturbance term and $l, m > \mathbf{0}$ are lag lengths (to be determined empirically). Equation (6) is estimated using the Two-Stage Least Squared approach with the lagged values of the regressors (except the dummy variable) used as instruments. In a time series, the pool of lagged values of the variables that have apparent endogeneity problems is a natural source of instruments as these are likely to be correlated with the current values; and they will not be correlated with the error term in the present period, since they were generated at an earlier point in time (Wooldridge, 2008). One lagged value for each regressor is used in instrumenting the explanatory variables in equation (6), which makes the estimated government revenue function for diamonds exactly (just) identified. Accordingly, the issue of over-identification does not arise. Thus, we skip the test for over-identifying restrictions.

3.4 Data and Data Sources

The study uses quarterly data for the period 2003:1 to 2012:4[15] to estimate the demand function for diamonds. Estimation of the government revenue function for diamonds is carried out using annual data for the period 1981 to 2011. Data were compiled by the Botswana Institute for Development and Policy Analysis (BIDPA) from the Botswana Central Statistics Office (CSO), Bank of Botswana, the Kimberley Process and World Bank. Additional data was obtained from the Federal Reserve Bank of St Louis website.

[15] *The study period is in some cases slightly shorter due to unavailability of some observations.*

4. Estimation Results

4.1 Demand Function for Diamonds

Two equations are estimated to demonstrate the long-run relationship between quantity demanded of diamonds and its price (see Table 14). The only difference between them is that the first equation (Equation 1) uses US GDP and expected US GDP while the second equation (Equation 2) employs US GDP per capita and expected US GDP per capita as proxies of income and expected income, in that order. Residuals from each of the two regressions are stationary at 1%, confirming the existence of cointegration. The F-statistic is also statistically significant at 1% in both equations, implying that the variables in the model are jointly significant in the long run.

The standard errors in all the regression results are estimated using the robust estimator of variance. Among others, this approach makes the coefficients valid for statistical inference even in situations where the standard errors are not identically distributed. The basic idea is that the coefficients are not equal to their true values only because the dependent variable has noise added to it. The robust estimator of variance employs the characteristics of the noise to calculate the sampling distribution of the coefficients (StataCorp, 2014), with the implication that the estimated coefficients are different from the actual values simply because of the noise. Thus, the estimated coefficients will converge to their true values if the sample size approaches infinity.

Table 14: Long Run Demand for Diamonds

Dependent Variable: Quantity demanded of diamonds		
Explanatory Variables	**Equation 1**	**Equation 2**
Price of diamonds	-0.450104** [0.1976878] (0.030)	-0.3735151* [0.2111091] (0.087)
Expected price of diamonds	0.0423836 [0.1473948] (0.776)	0.0379002 [0.1599039] (0.814)
Income	0.284309 [0.8204688] (0.731)	
Expected income	13.66028*** [3.5611] (0.001)	
Per capita income		1.33808 [1.718662] (0.442)
Expected per capita income		13.57147*** [3.810567] (0.001)
Real price of gold (-1)	-0.8499294*** [0.1438957] (0.000)	-0.8705398*** [0.2405687] (0.001)
Real price of silver (-1)	0.5157086** [0.2019628] (0.016)	0.5025464* [0.2502008] (0.054)
Real price of platinum (-1)	0.390789** [0.1357982] (0.007)	0.3829929** [0.1708024] (0.032)
R^2	0.7551	0.7396
Prob>F	0.0000	0.0000
d Statistic	2.321791	2.399335
No. of observations	38	38

Standard errors []; p-values (); *** p<0.01; ** p<0.05; * p<0.1

The long-run estimation results of the demand function for diamonds presented in Table 14 reveal that diamonds have price inelastic demand, with estimated elasticities of 0.45 and 0.37 in equations 1 and 2, respectively.[16] The estimated elasticities are statistically significant in both cases (at 5% in equation 1 and 10% in equation 2). This indicates that diamonds are price inelastic, which suggests that an increase (decrease) in the price of diamonds is likely to result in a less than proportionate decrease (increase) in quantity demanded of diamonds and an increase (decrease) in total revenue received by diamond traders. This is not a surprising result, especially considering that diamonds of gem quality do not have readily available substitutes.

Table 14 further reveals that the expected price of diamonds has a statistically insignificant impact on demand for diamonds. Thus, it is not the expected prices that count in influencing the demand for diamonds, but rather actual prices. The table also shows that there is no significant relationship between aggregate income and per capita income on the one hand and demand for diamonds on the other. However, expected income and expected per capita income show a positive correlation with demand for diamonds.

The estimation results also show that platinum and silver are possible substitutes of diamonds while gold appears to be a complement. In the case of the former, silver and platinum prices change in the same direction as the quantity demanded of diamonds. Indeed, substitutes for the precious metals industry include other precious metals such as diamonds, silver and platinum (Investopedia, 2014). Slideshare (2014) also reports that silver rings are (the) most good substitute of diamond ring(s).

In the case of gold, it is observed that gold prices and the demand for diamonds vary in diametrically opposed directions, suggesting that the two may be complements. This finding corroborates the observation by The Diamond Pro (2014) that white gold complements white diamonds. It is worth mentioning at this point that in the foregoing discussion, platinum, silver and gold are expected to substitute or complement diamonds in the jewellery industry. With industrial diamonds, it is difficult to identify realistic substitutes or complements

[16] Since a positive change in price leads to a negative change in quantity demanded in standard demand theory, price elasticity of demand is a negative number. However, it is the magnitude or absolute value that gives an indication of the sensitivity of demand to price changes. It is standard procedure, therefore, to ignore the negative sign (see Parkin et al, 2010).

Table 15: Short Run Demand for Diamonds

Dependent Variable: Quantity demanded of diamonds		
Explanatory Variables	**Equation 1**	**Equation 2**
Price of diamonds	-0.4752511*** [0.1599287] (0.006)	-0.4011608** [0.1447213] (0.010)
Expected price of diamonds (-2)	0.1425476 [0.11476] (0.225)	0.0953181 [0.1214307] (0.439)
Income (-2)	1.405483 [3.17723] (0.662)	
Expected income (-1)	-7.082613** [3.083082] (0.030)	
Per capita income (-2)		0.1411229 [3.003463] (0.963)
Expected per capita income (-1)		-4.394535 [3.255509] (0.188)
Real price of gold (-1)	-0.908089 [0.5599423] (0.116)	-0.8104073 [0.586411] (0.178)
Real price of silver (-1)	0.2946019 [0.2905936] (0.317)	0.332397 [0.2598755] (0.212)
Real price of platinum (-1)	1.022675** [0.4239551] (0.023)	0.867933** [0.3744952] (0.028)
ECT (-1)	-1.361608*** [0.2803554] (0.000)	-1.322093 [0.2673949] (0.000)
R^2	0.5412	0.5628
Prob>F	0.004	0.0004
d Statistic	1.80979	1.771846
No. of observations	36	36

Standard errors []; p-values (); *** p<0.01; ** p<0.05; * p<0.1

Following the establishment of a long-run relationship, an error correction specification is employed to investigate the short-run dynamic relationship of the demand function for diamonds. The model includes differenced values of the I(1) variables and an error correction term (ECT), which serves as an adjustment coefficient to explain short-run deviations from the mean equilibrium path. Table 15 presents estimation results of the short-run dynamic relationships. Since the I(1) variables are differenced, the coefficients are no longer directly interpretable elasticities as in the long-run regressions. Rather, they are now growth rates.[17] Nonetheless, the interpretation is nearly the same and the concept of elasticity can be inferred from both cases (see Wooldridge, 2008).

Estimation results of equations 1 and 2 in Table 15 show that a 1% increase (decrease) in price leads to a 0.48% and 0.40% decrease (increase) in quantity demanded of diamonds, respectively. Both cases reveal that quantity demanded of diamonds is price inelastic, consistent with the long-run regression. The impact of the expected price of diamonds and both measures of income (aggregate GDP and per capita GDP) on the demand for diamonds is insignificant, also in agreement with the long-run results.

While both measures of expected income exhibit a positive and significant relationship with demand for diamonds in the long-run equation, only expected aggregate income is significant in the short-run equation and its relationship with demand for diamonds is inverse. It is also observed that the real prices of gold, silver and diamonds show a positive relationship with the demand for diamonds in the short-run equation but only the real price of platinum is statistically significant.

[17] *A key fact about growth rates is that the growth rate of a variable equals the rate of change of its natural log (Romer, 2012:14).*

4.2 Diagnostic Tests

4.2.1 Serial Autocorrelation

Estimations of the long run and short run demand functions for diamonds are carried out using ordinary least squares (OLS), which is based on a number of stringent assumptions. To verify the validity of the estimation results, some diagnostic tests are conducted. First is the test for first order serial correlation using the Durbin-Watson Test. In the long-run demand function for diamonds with 38 observations and seven explanatory variables, the corresponding d-statistics for equations 1 and 2 are 2.321791 and 2.399335, respectively (see Table 14). At 1% level of significance, these fall within the zone $4 - d_u = 2.265$ and $4 - d_L = 3.087$, which indicates failure to reject the hypotheses that there is no positive (within 0 and $d_L = 0.913$ $d_L = 0.913$) or negative serial autocorrelation (within $4 - d_L = 3.087$ $4 - d_L = 3.087$ and 4). The d-statistics in fact fall in the zone of indecision (within $4 - d_u = 2.265$ and $4 - d_L = 3.087$).

To move away from the indecision and establish the presence or absence of serial correlation, Durbin's Alternative Test is used. This test is a special case of the Breusch-Godfrey Lagrange Multiplier (LM) test and is attractive because it allows for non-stochastic regressors, higher-order autoregressive schemes and simple or higher-order moving averages of white noise error terms (Gujarati, 2004). Results of the test for the long-run demand function for diamonds are presented in Table 16. The figures in the table reveal that the null hypothesis of 'no serial correlation' is rejected, indicating the absence of evidence for serial correlation. We experiment with 2, 8 and 9 lags and we get similar results in all cases.

Table 16: Durbin's Alternative Test for Serial Correlation: Long Run Demand Function for Diamonds

Lags	Equation 1		Equation 2	
	F-Statistic	P-Value	F-Statistic	P-Value
2	1.986	0.1561	1.724	0.1967
8	1.825	0.1261	1.461	0.2276
9	1.633	0.1698	1.301	0.2940

In the short-run demand function, there are 36 observations and eight explanatory variables, and the corresponding d-statistics for equations 1 and 2 are 1.80979 and 1.771846, respectively (see Table 15). Both statistics fall within the range $d_u = 1.735$ and $4 - d_u = 2.265$, confirming that there is no first order serial autocorrelation in the model. This is established at 1% level of significance. Testing for higher-order serial correlation using Durbin's Alternative Test, similar results are found. Table 17 reports a summary of these results, which are also reported with experiments of 2, 8 and 9 lags.

Table 17: Durbin's Alternative Test for Serial Correlation: Short Run Demand Function for Diamonds

Lags	Equation 1		Equation 2	
	F-Statistic	P-Value	F-Statistic	P-Value
2	0.363	0.6989	0.362	0.6998
8	0.838	0.5810	1.048	0.4369
9	0.891	0.5513	1.005	0.4706

4.2.2 Perfect Multicollinearity

OLS also assumes that there is no perfect multicollinearity in the model; that is, there is no perfect or exact linear relationship among the regressors. This is a straightforward case to investigate because STATA 11, which was used for the estimations, drops any explanatory variable that exhibits an exact relationship with another regressor. None of our regressors was dropped in the estimations, confirming the absence of perfect multicollinearity. It is worth mentioning at this point that multicollinearity is inherent in most data that are used in empirical analyses and it becomes harmful when an exact relationship among any regressors shows up. Gujarati (2004) summarises this succinctly as follows:

'… the assumption of no multicollinearity pertains to our theoretical model. In practice, when we collect data for empirical analysis, there is no guarantee that there will not be correlations among the regressors. As a matter of fact, in most applied work it is almost impossible to find two or more variables that may not be correlated to some extent … What we require is that there be no exact relationships among the regressors … In short, the assumption of no multicollinearity requires that we include only those variables that are not exact linear functions of one or more variables in the model.' Gujarati (2004:205).

To the extent that no regressor was dropped during the estimations indicates that there is no perfect multicollinearity among the regressors in both the long-run and short-run demand functions for diamonds that we estimated.

4.2.3 Autoregressive Conditional Heteroskedasticity

A test for the presence of autoregressive conditional heteroskedasticity (ARCH) in the errors is also carried out. This is a test for time-dependent volatility (StataCorp, 2014). Using Engle's Lagrange Multiplier (LM) Test, we find no evidence that the errors are autoregressive conditional heteroskedastic (see Table 18 for the test results). The test results in Table 18 report experiments for ARCH(1), ARCH(2), ARCH(3), ARCH(4), ARCH(8), ARCH(10) and ARCH(12).

Table 18: Test for Heteroskedasticity

Lags	Long Run Demand Function for Diamonds				Short Run Demand Function for Diamonds			
	Equation 1		Equation 2		Equation 1		Equation 2	
	Chi2	Prob>Ch2	Chi2	Prob>Ch2	Chi2	Prob>Ch2	Chi2	Prob>Ch2
1	0.478	0.4894	0.492	0.4832	0.146	0.7021	0.103	0.7484
2	0.797	0.6713	1.076	0.5840	0.553	0.7583	0.683	0.7106
3	1.736	0.6290	2.412	0.4915	0.601	0.8963	0.540	0.9100
4	3.053	0.5490	3.832	0.4293	1.895	0.7550	1.596	0.8095
8	7.953	0.4381	7.746	0.4586	1.985	0.9815	2.621	0.9559
10	8.920	0.5398	6.614	0.7613	2.755	0.9866	3.677	0.9608
12	9.449	0.6642	6.257	0.9026	5.156	0.9526	5.646	0.9328

4.3 Government Revenue Function for Diamonds

Estimation results of the government revenue function for diamonds are summarised in Table 19. Three separate equations are estimated, each using a different proxy of diamond prices. Rapaport diamond prices for 1 carat, 3 carats and 5 carats are used to proxy diamond prices in equations 1, 2 and 3 respectively.[18] Of the three equations, equation 1 is regarded as the main equation for two reasons. First, most diamonds are less than 1 carat (80% of the diamonds are under 0.2 carats). Thus, the 1 carat rapaport prices provide a more realistic proxy of actual diamond prices. Second, our dataset has more observations of 1 carat rapaport prices than 3 and 5 carat rapaport prices, which makes the estimations with 1 carat rapaport prices more reliable. We nonetheless include regressions with 3 and 5 carat rapaport prices as proxies of diamond prices as a robustness check of the results.

The estimation results in Table 19 show that government revenue from diamonds is price inelastic in all three equations, with estimated elasticities of 0.90, 0.26 and 0.25 in equations 1, 2 and 3 respectively.

[18] *Rapaport diamond prices are the primary source of diamond prices used by dealers to establish prices in all the major markets (RAPNET Diamond Network, 2014).*

Since equation 1 is the primary regression (for reasons explained earlier), it can safely be concluded that the price elasticity of government revenue from diamonds is around 0.90. In the previous section, it was established that demand for diamonds is price inelastic, indicating that an increase (a decrease) in diamond prices causes a less than proportionate decrease (increase) in quantity demanded and an increase (a decrease) in revenue accruing to diamond traders. It is natural, therefore, to expect government revenue from dividends, royalties and taxes in the diamond industry to increase (decrease) as prices and revenue received by diamond traders are increasing (decreasing). The increase in government revenue, however, will be less than proportionate to the price increase as reflected in the estimated elasticity.

Table 19: Government Revenue Function for Diamonds: A Two-Stage Least Squares Estimation

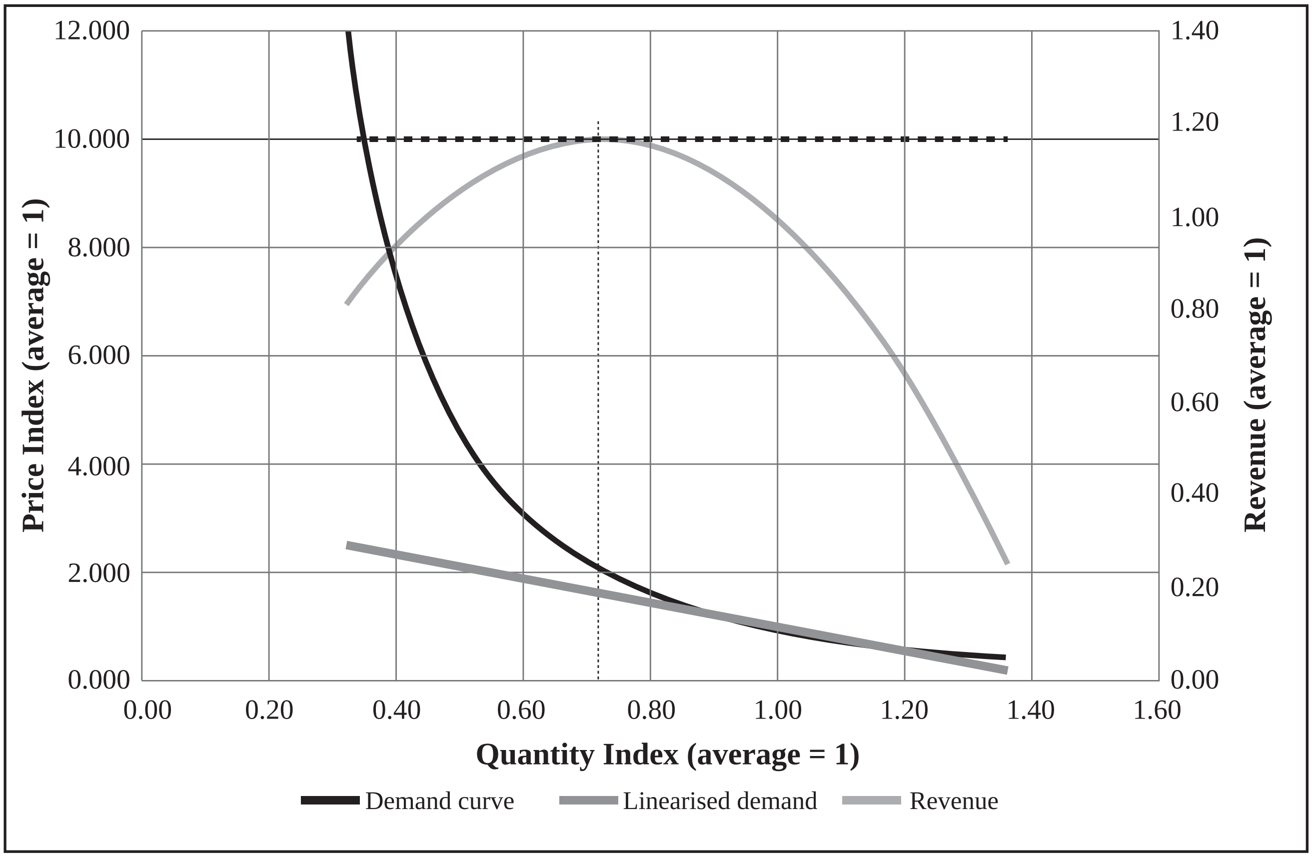
Dependent Variable: Government revenue from diamonds			
Explanatory variables	**Equation 1**	**Equation 2**	**Equation 3**
Price of diamonds (-2)	0.9022878*** [0.3359142] (0.007)	0.2621788** [0.1026928] (0.011)	0.2542723** [0.1049134] (0.015)
Quantity of diamonds (-1)	1.008209*** [0.0807466] (0.000)	1.018015*** [0.0777847] (0.000)	1.025566*** [0.0796758] (0.000)
Dum06	-0.0594551 [0.0935509] (0.525)	-0.05395 [0.0985545] (0.584)	-0.0706041 [0.108729] (0.516)

Standard errors []; p-values (); *** p<0.01; ** p<0.05; * p<0.1

Table 19 also shows that quantity traded and output are positively related. With the estimated elasticity of 1.0, it can be inferred that a unit increase in quantity traded of diamond will result in a proportionate increase in government revenue from diamonds, everything else remaining the same. This unit elasticity is consistent in all three equations. The dummy variable capturing the effect of the agreement between the Government of Botswana and De Beers signed to establish DTC Botswana in May 2006, is observed to be statistically insignificant in all three equations.

Appendix F: Calculation of Price Elasticity

In the main report we refer to the possibility of a diamond cartel reducing the global supply of diamonds to push up price and revenue. We derived the numbers in the report by numerical estimation. This supplementary note sets out the algebra



The estimated non-linear demand curve is given by

$$Q_t = ß_0 P_t^{\beta_1} \prod_i Z_{i,t}^{\beta_i}$$

where

Q = global demand for diamond
P = global price of diamonds
Z_i = other factors affecting demand for diamonds
b_1 = price elasticity of demand for diamonds
b_i = parameters
t = time subscript

As pointed out in the report, this demand curve does not have a maximum revenue. It approaches the maximum as Q approaches zero. We therefore assume that the tangent at the average quantity is the demand curve. Write the equation for this as

$P = a + bQ$

(we assume that the other factors are constant as the quantity decreases, so we can ignore them)

Below we derive the results with both a numerical example assuming that there is an elasticity at the average quantity of -0.45 and a more general algebraic derivation with an elasticity (at the point of tangency) of e (e < 0).

In

From the definition of price elasticity

$$\frac{\partial Q}{\partial P} \cdot \frac{P}{Q} = -0.45 \qquad \frac{\partial Q}{\partial P} \cdot \frac{P}{Q} = e$$

we can derive the slope of the demand curve at any p

$$\frac{\partial Q}{\partial P} = -0.45 \cdot \frac{P}{Q} \qquad \frac{\partial Q}{\partial P} = e \cdot \frac{P}{Q}$$

The slope of the demand function (b) is the inverse of this:

$$\frac{\partial P}{\partial Q} = \frac{1}{-0.45} \cdot \frac{P}{Q} = -2.22 \cdot \frac{P}{Q}$$

$$\frac{\partial P}{\partial Q} = \frac{1}{e} \cdot \frac{P}{Q} = b$$

Assume that the elasticity estimate is for the average quantity (of the data on which the estimate is based).

Let $\overline{Q}$ be the average quantity and let $\overline{P}$ be the associated price. Then we can write the linear demand equation as:

$$P = a - \left(2.22 \cdot \frac{P}{Q}\right) \cdot Q$$

$$P = a + \left(\frac{1}{e} \cdot \frac{P}{Q}\right) \cdot Q$$

By definition $\overline{Q}$ and $\overline{P}$ are a solution to the equation:

$$\overline{P} = a - 2.22 \cdot \frac{P}{Q} \cdot \overline{Q}$$

$$\overline{P} = a + \frac{1}{e} \cdot \frac{P}{Q} \cdot \overline{Q}$$

Therefore we can solve for *a*

$$\overline{P} = a - 2.22 \cdot \overline{P} \qquad \overline{P} = a + \frac{1}{e} \cdot \overline{P}$$

$$a = 3.22 \cdot \overline{P} \qquad a = \left(1 - \frac{1}{e}\right) \cdot \overline{P} = \left(\frac{e-1}{e}\right) \cdot \overline{P}$$

Therefore the equation for the (linear) demand curve that is tangent to the (non-linear) estimated curve at the average price and quantity, is

$$P = 3.22 \cdot \overline{P} - 2.22 \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q$$

$$P = \left(\frac{e-1}{e}\right) \cdot \overline{P} + \frac{1}{e} \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q$$

Multiply this by Q to get the revenue equation

$$R = P \cdot Q = 3.22 \cdot \overline{P} \cdot Q - 2.22 \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q^2$$

$$\frac{\partial R}{\partial R} = 3.22 \cdot \overline{P} - 4.44 \cdot Q = \left(\frac{e-1}{e}\right) \cdot \overline{P} \cdot Q + \frac{1}{e} \cdot Q^2$$

Differentiate and set equal to zero

$$\frac{\partial R}{\partial Q} = 3.22 \cdot \overline{P} - 4.44 \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q = 0$$

$$Q^* = \left(\frac{3.22}{4.44}\right) \cdot \overline{Q} \Rightarrow \frac{Q^*}{\overline{Q}} = 0.725$$

Solve to get the revenue maximising output as a proportion of the average output:

$$Q^* = \left(\frac{3.22}{4.44}\right) \cdot \overline{Q} \Rightarrow \frac{Q^*}{\overline{Q}} = 0.725$$

$$\frac{2}{e} \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q = \left(\frac{e-1}{e}\right) \cdot \overline{P}$$

$$\frac{Q^*}{\overline{Q}} = -\left(\frac{e-1}{e}\right) \cdot \frac{e}{2} = \left(\frac{1-e}{2}\right)$$

Substitute this back into the equation for the demand curve and we get the revenue maximising price relative to the average price:

$$P^* = 3.22 \cdot \overline{P} - 2.22 \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q^*$$

$$P^* = \left(\frac{e-1}{e}\right) \cdot \overline{P} + \frac{1}{e} \cdot \frac{\overline{P}}{\overline{Q}} \cdot Q^*$$

$$P^* = 3.22 \cdot \overline{P} - 2.22 \cdot \overline{P} \cdot 0.725$$

$$P^* = \left(\frac{e-1}{e}\right) \cdot \overline{P} + \frac{1}{e} \cdot \left(\frac{1-e}{e}\right) \cdot \overline{P}$$

$$\frac{P^*}{\overline{P}} = 3.22 - 2.22 \cdot 0.725 = 1.61$$

$$\frac{P^*}{\overline{P}} = \left(\frac{e-1}{e}\right) + \frac{1}{e} \cdot \left(\frac{1-e}{2}\right)$$

$$\frac{P^*}{\overline{P}} = \left(\frac{2e-2+1-e}{2e}\right) = \left(\frac{e-1}{2e}\right)$$

The maximum revenue relative to the average is given by:

$$\frac{R^*}{R} = \frac{P^*Q^*}{PQ} = (1.61)\cdot(0.725) = 1.16$$

$$\frac{R^*}{R} = \frac{P^*Q^*}{PQ} = \left(\frac{e-1}{2e}\right)\cdot\left(\frac{1-e}{2}\right) = \frac{e-1-e^2+e}{4e}$$
$$= \frac{-1+2e-e^2}{4e} = -\frac{1-2e+e^2}{4e}$$

1. Maximising Revenue for the Non-linear Demand C

$$Q_t = ß_0 P_t^{\beta_1} \prod_i Z_{i,t}^{\beta_i}$$

Multiply the demand by price to get revenue

$$PQ_t = ß_0 P_t^{1+\beta_1} \prod_i Z_{i,t}^{\beta_i}$$

Differentiate and simplify

$$\frac{\partial R}{\partial Q} = (1 + ß_1)\, ß_0 P_t^{\beta_1} \prod_i Z_{i,t}^{\beta_i} = (1 + ß_1) \cdot Q$$

Set equal to zero to find maximum. Given the elasticity is not -1, Q will have to be equal to zero (if the elasticity is -1, all points give rise to the same revenue).

Table 20: Revenue Maximising Outputs for Different Elasticities (assuming linear demand curve)

Elasticity	Ratio of revenue maximising to average			% change of revenue maximising from average		
	$Q^*/\overline{Q}$	$P^*/\overline{P}$	$R^*/\overline{R}$	Q^*	P^*	R^*
-0.100	0.550	5.500	3.025	-45.0	450.0	202.5
-0.200	0.600	3.000	1.800	-40.0	200.0	80.0
-0.300	0.650	2.167	1.408	-35.0	116.7	40.8
-0.400	0.700	1.750	1.225	-30.0	75.0	22.5
-0.425	0.713	1.676	1.194	-28.8	67.6	19.4
-0.450	0.725	1.611	1.168	-27.5	61.1	16.8
-0.475	0.738	1.553	1.145	-26.3	55.3	14.5
-0.500	0.750	1.500	1.125	-25.0	50.0	12.5
-0.525	0.763	1.452	1.107	-23.8	45.2	10.7
-0.550	0.775	1.409	1.092	-22.5	40.9	9.2
-0.575	0.788	1.370	1.079	-21.3	37.0	7.9
-0.600	0.800	1.333	1.067	-20.0	33.3	6.7
-0.700	0.850	1.214	1.032	-15.0	21.4	3.2
-0.800	0.900	1.125	1.013	-10.0	12.5	1.3
-0.900	0.950	1.056	1.003	-5.0	5.6	0.3
-1.000	1.000	1.000	1.000	0.0	0.0	0.0
-1.100	1.050	0.955	1.002	5.0	-4.5	0.2
-1.200	1.100	0.917	1.008	10.0	-8.3	0.8
-1.300	1.150	0.885	1.017	15.0	-11.5	1.7
-1.400	1.200	0.857	1.029	20.0	-14.3	2.9
-1.500	1.250	0.833	1.042	25.0	-16.7	4.2

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Table A1: A Macro SAM for Botswana, 2007, P Million

		mact	mcom	mlab	mmix	mcap	Ment	mhhd	mgov	matx	mdtx	metx	mftx	mmtx	Mstx	ms-i	mstk	mrow	**mtot**
mact	Activities		111,493																111,493
mcom	Commodities	38,856						26,096	14,726							18,162	7,364	36,057	141,260
mlab	Labour	19,905																	19,905
mmix	Mixed Income	1,066																	1,066
mcap	Gross Operating Surplus	51,314																	51,314
ment	Enterprises					47,251			1,939										49,190
mhhd	Households			19,436	1,066		9,884		744									528	31,659
mgov	Government						10,933			352	6,475			1,052	1,803			6,257	26,872
matx	Activity Tax	352																	352
mdtx	Direct Tax						3,778	2,698											6,475
metx	Export Tax																		
mftx	Factor Tax																		
mmtx	Import Tax		1,052																1,052
mstx	Sales Tax		1,803																1,803
ms-i	Savings - Investment						24,595	2,866	9,463									-11,398	25,525
mstk	Changes in Stocks															7,364			7,364
mrow	Rest of the World		26,912	468		4,063													31,443
mtot	**Total**	111,493	141,260	19,905	1,066	51,314	49,190	31,659	26,872	352	6,475			1,052	1,803	25,525	7,364	31,443	

TABLES

Table 21: Dimensions of a Preliminary 2007 SAM for Botswana

ACTIVITIES		COMMODITIES	
aaliv	Livestock	caliv	Livestock
aacrp	Crops	cacrp	Crops
aaoth	Other Agriculture	caoth	Other agriculture
amind	Diamonds	crnind	Diamonds
arncop	Copper	cmcop	Copper
amcoa	Coal	cmcoa	Coal
amins	Soda Ash	cmins	Soda Ash
amino	Other Mining	crnino	Oth min & prosp
ameat	Meat & Meat Products	crneat	Meat
abevs	Beverages	cbevs	Beverages
atext	Textiles	cothf	Other food
aleat	Tanning & Leather Products	ctxcl	Txt, clth &footw
aothrn	Other Manufacturing	cpetr	Petroleum
awate	Water	cmacri	Mach &equipm
aelec	Electricity	ctreq	Transp equipm
acnst	Construction	comnf	Other manf
atrde	Trade	cwele	Water & electr
aacco	Hotels & Restaurant	ccnst	Construction
aroad	Road	ctrad	Trade
arail	Railway	cacco	Accom & rest
aairt	Air	ctrnp	Transp
acomm	Communication	ccomm	Communications
aotrp	Other Transport	cfini	Fin & insur
afini	Banking & Insurance	cbuss	Buss serv
abuss	Business Services	cdwel	Dwellings
apros	Propecting	ccgrt	Centr govt serv
adwel	Ownership of Dwellings	clgvt	Loc govt serv
acgvt	Central Government	ceduc	Education
algvt	Local Government	chprv	Health serv priv
adorns	Domestics Services &Trad'l Doctors	chpub	Health serv publ
aoths	Other Personal Services	cpsrv	Pers serv to HH
apnpi	Prof & Non Prof Inst Serv HH	cdsrv	Dom services
Factors		**Institutions**	
fprf	Professional & technical	ent	Enterprises
famn	Admin & managerial	hulw	Urban low (0-1 500 in 02/3)
fde	Clerical	hurnl	Urban medium low (1500-4000 in 02/3)
fskm	Skilled manual	humh	Urban medium high (4000-8000 in 02/3)
fusk	Unskilled	huhi	Urban high (8000+ in 02/3)
fmix	Mixed income	huvl	Urban villages
fcap	Gross operating surplus	hrur	Rural areas
		gov	Government
		row	Rest of the World

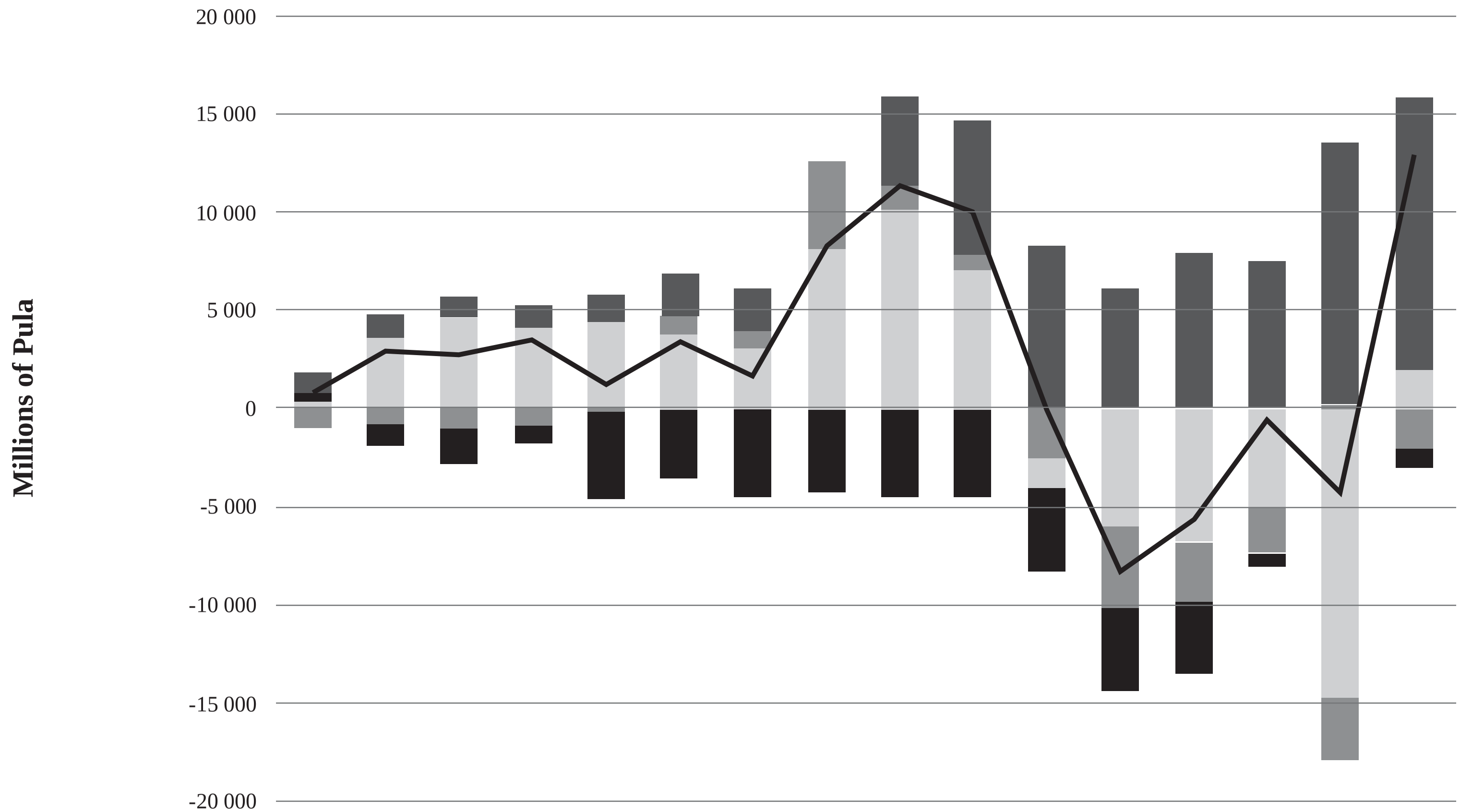
Households		**Government**	
Now	Urban low (0-1 500 in 2002/3)	gov	Government
hmel	Urban medium low (1500-4000 in 02/3)	atax	Activity tax
hmeh	Urban medium high (4000-8000 in 02/3)	dtax	Direct tax
hhih	Urban high (8000+ in 02/3)	mtax	Import duties
hurv	Urban villages	stax	Sales tax
hrur	Rural areas		
Other			
s-i	Savings-investment		
dstk	Change in stocks		

Table 22: Multipliers for Botswana

	SUT Multipliers		SAM Multipliers	
	Activity	Commodity	Activity	Commodity
	[1]	[2]	[3]	[4]
Livestock	1.09	1.48	1.78	2.63
Crops	0.65	1.52	0.79	1.74
Other agriculture	1.12	1.85	1.40	2.31
Diamonds	0.97	1.08	1.15	1.39
Copper	1.21	1.47	1.52	1.98
Coal	1.03	1.95	1.32	2.44
Soda Ash	1.17	1.81	1.43	2.22
Oth min & prosp	0.95	1.36	1.21	1.80
Meat	1.44	1.83	1.96	2.71
Beverages	1.17	1.98	1.38	2.34
Other food	0.83	1.67	1.00	1.95
Txt, clth & footw	1.10	1.92	1.29	2.23
Petroleum	0.15	1.18	0.19	1.24
Mach & equipm	0.52	1.55	0.64	1.76
Transp equipm	0.69	1.50	0.79	1.68
Other manf	0.59	1.50	0.70	1.69
Water & electr	1.17	1.39	1.56	2.04
Construction	1.49	2.02	1.75	2.45
Trade	1.27	1.46	1.60	2.01
Accom & rest	0.92	1.32	1.15	1.71
Transp	0.68	1.39	0.84	1.66
Communications	1.09	1.34	1.44	1.91
Fin & insur	1.32	1.69	1.59	2.15
Business serv	0.92	1.37	1.16	1.77
Dwellings	1.11	1.27	1.38	1.73
Centr govt serv	1.16	1.35	1.77	2.37
Loc govt serv	1.08	1.16	1.73	2.25
Education	1.20	1.43	1.78	2.40
Health serv priv	1.18	1.43	1.74	2.36
Health serv publ	1.16	1.33	1.78	2.37
Pers serv to HH	1.24	1.51	1.69	2.26
Dom services	1.00	1.00	2.04	2.74
Margins on domestic sales	1.27	1.46	1.60	2.01
Margins on imports	1.27	1.46	1.60	2.01
Margins on exports	1.27	1.46	1.60	2.01
Factor Incomes:				
Professional & technical	na	na	1.03	1.72
Admin & managerial	na	na	1.01	1.67

Clerical	na	na	1.05	1.75
Skilled manual	na	na	1.05	1.76
Unskilled	na	na	1.06	1.78
Mixed income	na	na	1.07	1.78
Gross operating surplus	na	na	0.17	0.28
Institutional Incomes:				
Enterprises	na	na	0.20	0.33
Urban low (0-1500 in 02/3)	na	na	1.33	2.10
Urban medium low (1500-4000 in 02/3)	na	na	1.16	1.89
Urban medium high (4000-8000 in 02/3)	na	na	1.10	1.81
Urban high (8000+ in 02/3)	na	na	1.00	1.65
Urban villages	na	na	1.12	1.87
Rural areas	na	na	1.09	1.86

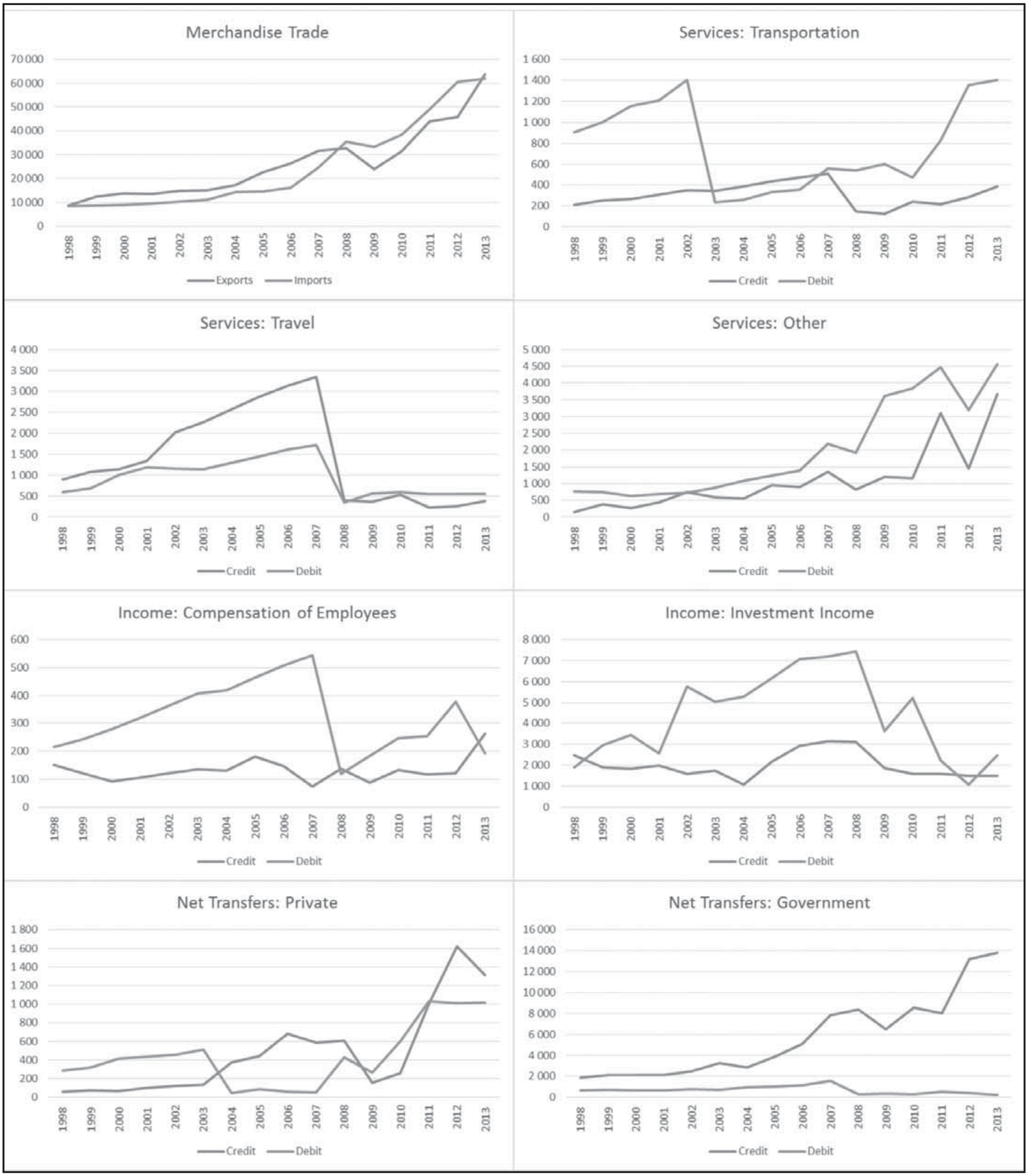
Figure 25: Current Account Balance and Components, 1998-2013



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Net current Transfer Received	1 015	1 164	1 108	1 153	1 367	2 194	2 229	3 227	4 615	6 837	8 302	6 101	7 942	7 463	13 395	13 853
Net Income Received	505	-1 213	-1 792	-801	-4 418	-3 543	-4 503	4 270	-4 511	-4 531	-4 314	-1 870	-3 733	-770	175	-892
Net Services Trade	-988	-721	-1 136	-1 010	-182	949	870	1 254	1 150	747	-1 438	-3 070	-2 985	-2 317	-3 129	-2 098
Net Merchandise Trade	328	3 629	4 603	4 149	4 477	3 782	3 063	8 123	10 159	7 094	-2 574	-9 480	-6 825	-4 982	-14 772	-2 027
Current Account Balance	860	2 859	2 782	3 482	1 244	3 382	1 659	8 333	11 413	10 147	-25	-8 319	-5 602	-605	-4 331	12 890

Source: *Bank of Botswana, Bulletin of Financial Statistics January 2010 and May 2014, Table 6.1*

Figure 26: Movement in Components of the CAB (millions of Pula, current prices)



Source: *Bank of Botswana, Bulletin of Financial Statistics January 2010 and May 2014, Table 6.1*

Figure 27: Movements in the CAB Components
(% GDP market prices)

Figure 28: Government Budget Trends, 2000 – 2012

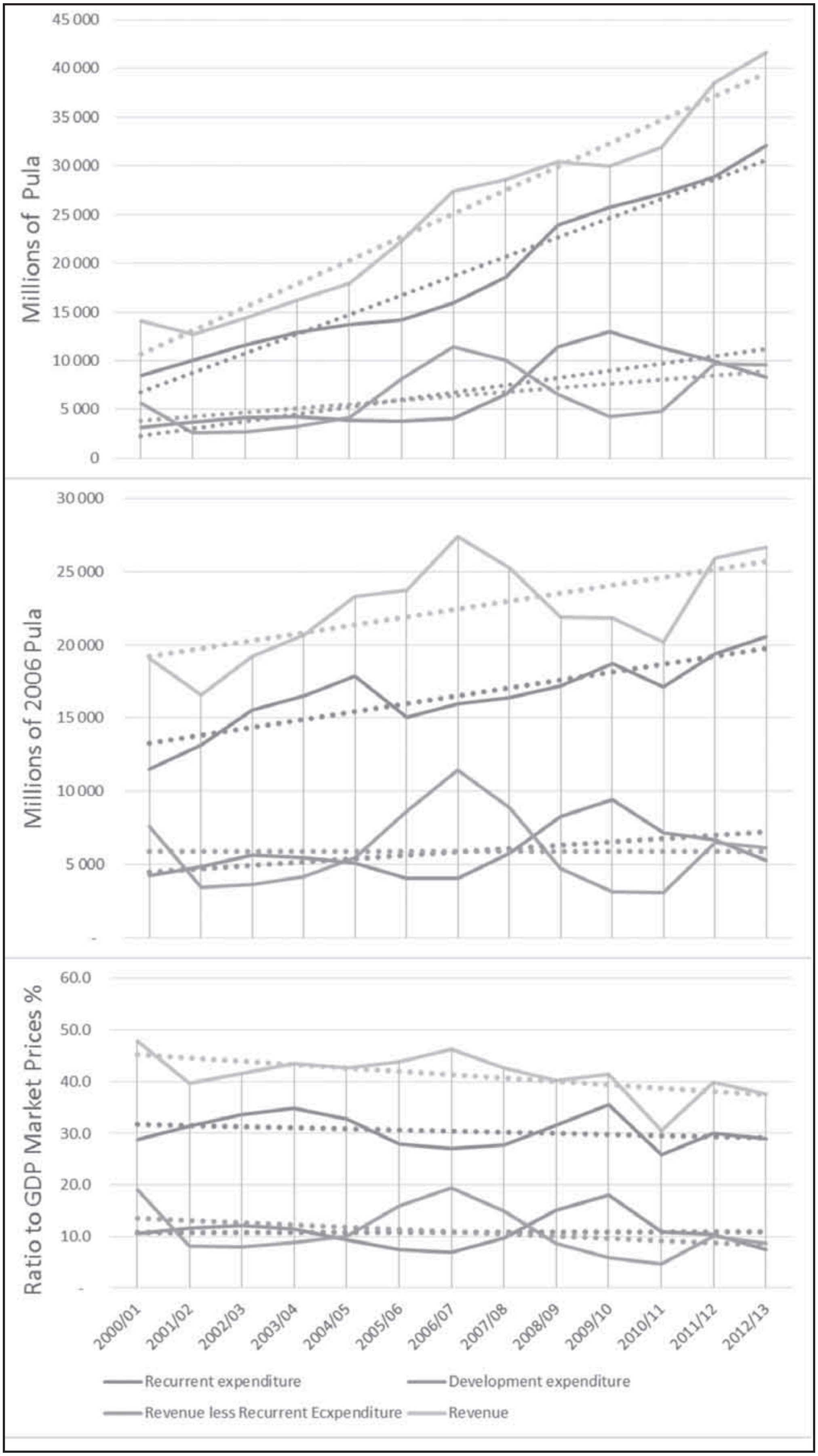
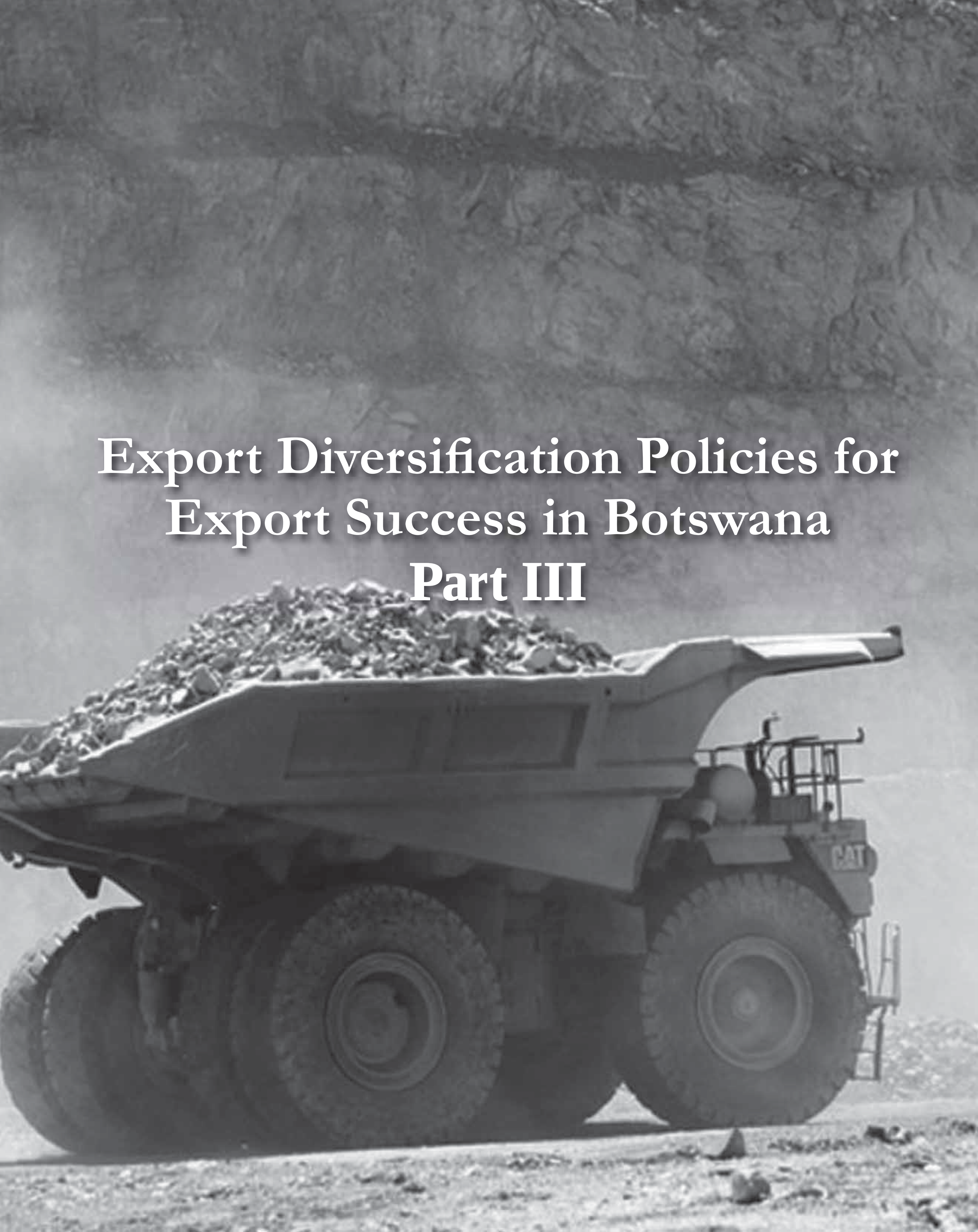


Table 23: Cost structure of Diamond Mining

	Input costs		Imported supply %	Importance for Supplier
	Pula million	% Share		
Livestock	5.32	0.02	5.89	0.81
Crops	48.43	0.19	58.93	1.65
Oth min & prosp	6.64	0.03	18.55	0.33
Other food	3.43	0.01	51.15	0.09
Txt, clth & footw	2.46	0.01	35.73	0.07
Petroleum	331.37	1.31	100.00	7.40
Mach & equipm	49.86	0.20	89.65	0.56
Transp equipm	145.10	0.58	57.22	2.96
Other manf	523.63	2.08	69.40	3.90
Water & electr	255.29	1.01	2.20	8.02
Construction	2.58	0.01	0.52	0.02
Accom & rest	45.49	0.18	25.89	0.94
Transp	40.02	0.16	44.69	0.70
Communications	7.26	0.03	5.25	0.55
Fin & insur	4.13	0.02	13.52	0.17
Business serv	69.55	0.28	27.71	1.61
Pers serv to HH	4.18	0.02	3.73	0.27
Total intermediates	1,544.74	6.13		-
Professional & technical	168.27	0.67	-	-
Admin & managerial	275.90	1.09	-	-
Clerical	65.73	0.26	-	-
Skilled manual	212.49	0.84	-	-
Unskilled	88.65	0.35	-	-
Gross operating surplus	22,854.01	90.66	-	-
Total	25,209.78	100.00	-	-

Source: *A Preliminary 2007 SAM for Botswana and own calculation*

Export Diversification Policies for Export Success in Botswana
Part III

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Report on

Export Diversification Policies For Export Success In Botswana

Part III

Roman Grynberg
Margret Sengwaketse
Masedi Motswapong
Kedibonye Sekakela

June 2013

A report prepared by the Botswana Institute for Development Policy Analysis for the Botswana Confederation of Commerce, Industry and Manpower (BOCCIM) and the Ministry of Finance and Development Planning.

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ACP	African, Caribbean and Pacific (states)
AGOA	African Growth and Opportunity Act
ASCM	Agreement on Subsidies and Countervailing Measures
ASEAN	Association of Southeast Asian Nations
BDC	Botswana Development Corporation
BEDIA	Botswana Export Development and Investment Authority
BEE	Black Economic Empowerment
BIDPA	Botswana Institute for Development Policy Analysis
BITC	Botswana Investment and Trade Centre
BLNS	Botswana, Lesotho, Namibia and Swaziland
BOB	Bank of Botswana
BOBS	Botswana Bureau of Standards
BOCCIM	Botswana Confederation of Commerce, Industry and Manpower
BRICS	Brazil, Russia, India, China, South Africa
CBM	Coal Bed Methane
CCA	Customs Controlled Area
CEDA	*Citizen Entrepreneurial Development Agency*
CIF	Innovation for Competitiveness Fund
CIP	Centre For Public Integrity
CONICYT	Commission Nacional de Investigación Cientifica y Tecnológica
CORFO	Production Development Corporation
CPO	Crude Palm Oil
CSO	Central Statistics Office
DAO	Development Approval Order
DSM	Dispute Settlement Mechanism
DTAA	Double Taxation Avoidance Agreement
DTI	Department of Trade and Industry
DTC	Diamond Trading Company
DTCB	Diamond Trading Company Botswana
DTI	Department of Trade and Industry
EATR	Effective Average Tax Rate
EBIT	Earnings Before Interest and Taxation
EDD	Economic Diversification Drive
EEZ	Exclusive Economic Zone
EIU	Economist Intelligence Unit
EPA	Economic Partnership Agreements
EPZ	Export Processing Zone
EU	European Union
FAP	Financial Assistance Policy
FDI	Foreign Direct Investment
FTA	Free Trade Agreements

FTZs	Free Trade Zones
GCR	Global Competitiveness Report
HHI	Herfindahl-Hirshman Index
ICT	Information and Communication Technology
IDZ	*Industrial Development Zone*
IFC	International Finance Corporation
IFSC	International Finance and Services Centre
IRR	Internal Required Rate
IMF	International Monetary Fund
IMPs	Industrial Master Plans
IRPA	Intensification of Research in Priority Areas
IRR	Internal Required Rate
ISIC	International Standard Industrial Classification
ITT	Innovation and Technology Transfer
KBL	Kalahari Breweries Limited
LDCs	Low Developing Countries
LNW	Licensed Manufacturing Warehouse
LPP	Local Procurement Programme
MARDI	Malaysian Agricultural Research and Development Institute
MET	Ministry Of Environment and Tourism
METR	Marginal and Average Effective Tax Rates
MFA	Multi-Fiber Agreements
MFDP	Ministry of Finance and Development Planning
MITI	Ministry of International Trade and Industry
MTI	Ministry of Trade & Industry
MPOB	Malaysian Palm Oil Board
MPOPC	Malaysia Palm Oil Promotion Council
NBL	Namibian Breweries Limited
NCS	Namibian Custom Smelter
NDB	Namibian Development Bank
NDP	National Development Plan
NEP	National Economic Policy
NES	National Export Strategy
NESIC	National Export Strategy Implementation Council
NPV	Net Present Value
NSO	National Strategy Office
PORIM	Palm Oil Research Institute of Malaysia
PORLA	Palm Oil Registration and Licensing Authority
PPO	Processed Palm Oil
RSA	Republic of South Africa
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAPP	Southern African Power Pool

SAPRN	Southern African Poverty Regional Network
SEZs	Special Economic Zones
SIRIM	Standards & Industrial Research Institute of *Malaysia*
SITC	Standard International Trade Classification
SMELP	Small, Medium Enterprises Linkage Programme
SMME	Small, Medium and Micro Enterprises
SNA	System of National Accounts
SRDP	Selibe Phikwe Regional Development Programme
STC	Secondary Tax on Companies
TDCA	The Trade, Development and Cooperation Agreement
TMP	Tenth Malaysia Plan
TNCs	Trans-national Corporations
TRC	Mauritius Tax Residency Certificate
UNCTAD	United Nations Conference on Trade and Development
UK	United Kingdom
USA	United States Of America
USAID	United States Agency for International Development
VAT	Value Added Tax
WB	World Bank
WEF	World Economic Forum
WHT	Withholding Taxes
WTO	World Trade Organization

ANNEXURES

Export Diversification Policies for Export Success in Botswana

Executive Summary

Background

This study is part of a series commissioned by the Botswana Confederation of Commerce, Industry and Manpower (BOCCIM) and the Ministry of Finance and Development Planning to prepare for the decline in minerals revenues which is expected to occur in the next decade. The first report, entitled 'Minerals and Energy Revenue and Export Projections', has now been completed and sets the stage for the current analysis. That report concluded, inter alia, that:

> While the decline in government mineral revenues from diamonds seems unlikely to occur within the period of projection for this study (2012–2027), we would like to caution that there would be a significant crunch when the open-pit mining operations (at Jwaneng) cease, beginning in about 2027.

At the time of this book going to press an entirely new resource assessment of the Debswana diamond deposits had been made public. HE Lt General Kama Ian Khama in the 2014 State of the Nation Address had said quite clearly that:

> Growing global demand for gem diamonds has further dovetailed with upward estimates of domestic production based on both the ongoing and anticipated opening of new mines and an extension in the life spans of existing mines through new recovery methods. Together, these developments should ensure that we will remain a leading global producer over the next three decades, until at least 2050.

Mr M Masire of the Botswana Diamond Hub elaborated the following weeks that diamond production from Botswana is expected to remain at approximately current levels i.e. 23Mcts[1]. This is not to suggest that large-scale diamond mining will continue until 2050. While the basis of the 10th National Development Plan and the old resource assessment are no longer valid the question of what needs to be done in order to diversify the economy remains valid. Only the date of the eventual depletion has now shifted from 2027. What is unknown is the level of investment that will be required at Orapa and Jwaneng in order to sustain such a volume of diamond production.

Botswana has maintained a policy of economic diversification away from diamond mining since NDP (National Development Plan) 5 (1980–85) yet has only experienced the most modest diversification. This report analyses the question of why Botswana has as yet failed to diversify to the extent desired and what measures need to be put into place that would address the root causes of the failure of diversification.

The calculations of the cash flow modelling and the accompanying sensitivity analysis is not included in this report and can be found on the BIDPA web site at www.bidpa.bw

[1] *Mr Mmetla Masire, Botswana Diamond Hub under MMEWR, 7th November 2014. https://www.youtube.com/watch?v=EEZtD0r_OYc downloaded 22nd January 2015.*

Summary of Conclusions

The following conclusions come from the analysis in this report:

(i) Botswana experienced two periods of economic diversification in its post-independence era. The first was in the mid-1990s when the country developed an automobile assembly industry which was terminated by the closure of the plant caused by both poor management and pressure from South Africa. The second period has been over the last four years following the domestication of diamond cutting and polishing. The only sector of diversification that was largely market- as opposed to government-lead was the development of the tourism sector.

(ii) Economists offer numerous explanations for why Botswana has failed to diversify its economy. One hotly contested explanation for this failure is the evidence of Dutch Disease i.e. an appreciation of the real effective exchange rate but, as ever, there remains considerable disagreement amongst economists. The second is the existence of the broader condition commonly referred to as the 'Resource Curse'. One particular manifestation results from rapidly rising wages and salaries. This report finds strong evidence that salary levels in Botswana are not only high by regional standards but are responsible for a significant proportion of Botswana's cost disadvantage in industry.

(iii) Economic diversification in neighbouring countries used as comparators for this analysis has also not occurred with the exception of Mauritius and Mozambique. In the case of the former the transformation was funded by the international community which provided treaty arrangements (Cotonou, AGOA and the Mauritius India DTAA) which provided incentives for that diversification. Mozambique was transformed from an agricultural exporter to a major global exporter of aluminum. However, this diversification is an enclave form with only the most limited of connection to the Mozambique economy. Diversification in Namibia has occurred within the mining sector away from diamonds to base and energy metals and it is the model most likely to be emulated by Botswana in the coming years.

(iv) In the two non-African resource-rich countries considered in detail, Chile and Malaysia, it is only Malaysia that has succeeded in diversifying its economy to the point where it is not a captive of its geography or geology. Malaysia's political elite pursued a state-lead but market-oriented policy of transformation. Chile pursued a diversification strategy that is largely resource based and, despite rapid economic growth, is still dependent upon its natural resources for its prosperity and development. In both cases governments provided leadership, incentives and subsidies to develop new industries. Significantly, both countries were willing to pursue export incentive reform as they moved to restructure their export sectors and move up the value chain.

(v) Treaty arrangements such as the World Trade Organisation (WTO) and Economic Partnership Agreements (EPA) do provide serious limitations on policy options available to Botswana. Some of the export subsidy policies used by Malaysia in the past would almost certainly now be WTO-incompatible. The practical question remains as to whether, given Botswana's size and relative commercial insignificance, any trading partner would be willing to use the dispute settlement mechanism to assure enforcement.

(vi) Some Southern African Customs Union (SACU) members provide considerable tax and financial incentives to export-oriented firms. Namibia and South Africa were examined in detail. Namibia has provided tax-free export processing zones to export-oriented firms. South Africa has provided considerable up-front support for firms investing in the country. It has also recently provided 100–200% capital cost allowances which, with indefinite loss carry forward, would constitute a tax holiday of considerable duration in capital-intensive industries. Both have high costs structures and Namibia has been unable to attract any significant investment in its Export Processing Zone (EPZ) beyond diamond polishing and base metal smelting and refining.

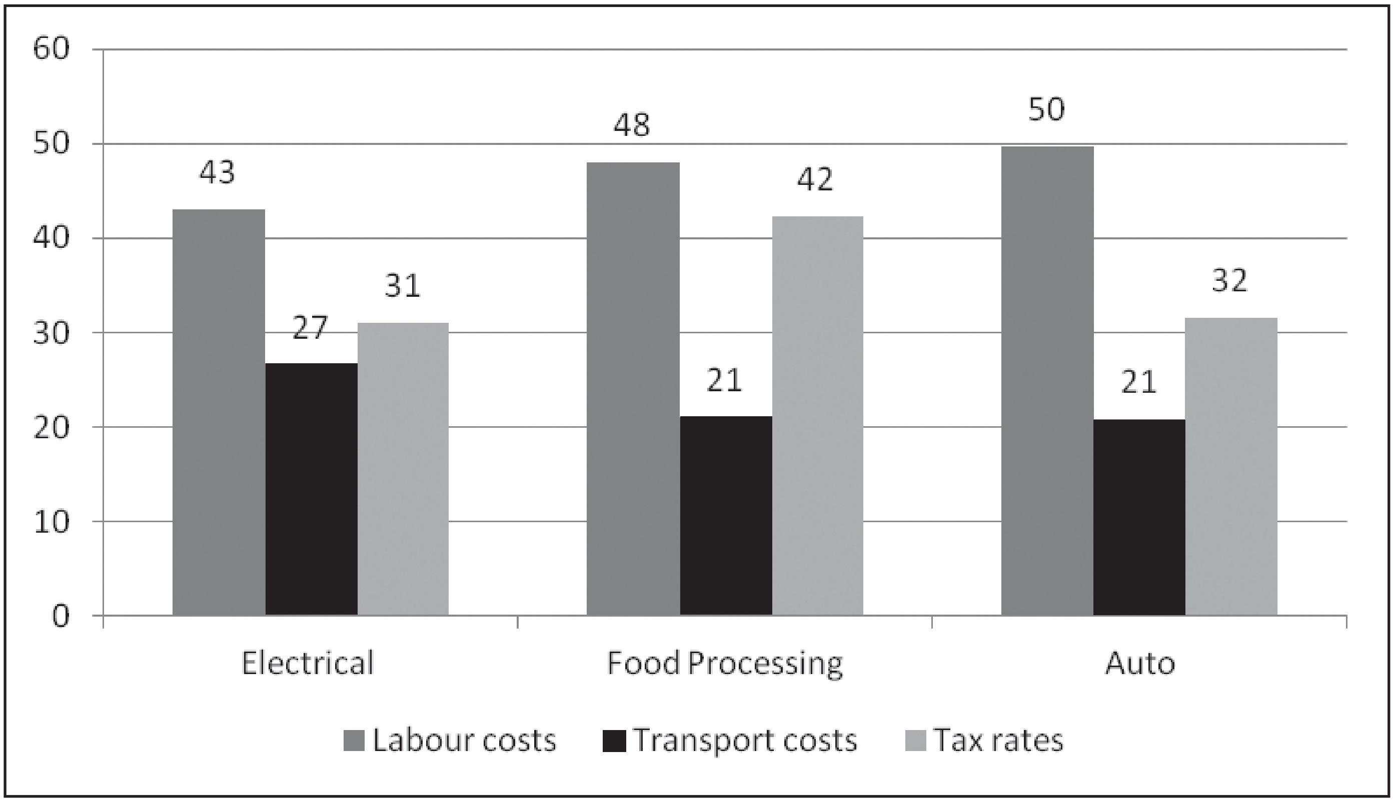
(vii) An international survey of business costs was undertaken by the Economist Intelligence Unit for this study and compared costs in SADC countries (Botswana, Mauritius, Mozambique, Namibia, South Africa Tanzania and Zambia) and three Asian comparators (China, India and Malaysia). Botswana's greatest strengths lie in the low cost of energy, rentals and unskilled labour. Its greatest source of disadvantage stems from the cost of skilled and professional labour and management, transport costs and interest rates on loans.

(viii) Models were developed of export-oriented firms in electrical assembly, auto parts manufacturing and food processing. These were based on the assumption that these companies faced the most advantageous tax system available in the respective countries. The models were moved around the 10 countries for which data was available. In the ranking of the countries Botswana ranked close to the bottom in terms of standard financial measures i.e. Net Present Value (NPV), Internal Required Rate (IRR), and Marginal and Average Effective Tax Rates (METR). Only in low-transport-cost and energy-intensive industries does Botswana approach the middle ranking of countries by cost and rate of return. Given its current cost structure and tax system, Botswana is uncompetitive in this range of industries.

(ix) Sensitivity analysis was undertaken on industrial policy variables and it was found that applying a tax holiday to those industries where Botswana's cost advantage was greatest would tip the balance in favour of an investment in Botswana. In those industries which were intensive in their use of inputs for which Botswana experienced its greatest disadvantage i.e. management and professionals and transport no combination of policy interventions would change the outcome.

(x) When comparing the rate of return (net present value) of investing in Botswana in comparison to what is generally the least cost producer in the sample (i.e. India) it was found that on average, labour and transport costs and India's taxation system would explain on average 44%, 23% and 33% of the difference in the return on the investment. In other words it is skilled and professional labour and management costs, and not transport costs, that are the most significant barriers to diversification of the economy. The chart below summarises the results of the impact on Net Present Value of particular costs for the three industries studied.

Figure 1a: Percentage difference between the Indian and Botswana Net Present Value explained by various costs



Source: *EIU and authors' estimates*

3. Summary of Recommendations

(i) The private sector in Botswana is moving to invest in extraction of the base and energy metals including CBM. Industrial policy in Botswana appears unconnected to the range of developments occurring in the mining sector. Possibilities for backward and forward linkages exist and will not be exploited unless there is a range of new policies and actions to avoid the export of unprocessed raw materials with no local value addition.

(ii) Reform of an economy is both a long process, and politically and economically expensive. Based on the lessons from Asian success stories it needs to be lead consistently at the highest levels of government and implemented by an elite cadre of highly professional, well-paid officials who are motivated by the drive towards transformation of the country.

(iii) Botswana's tax incentives are no longer competitive with those of its neighbours which are pursuing what International Monetary Fund (IMF) researchers have referred to as a 'partial race to the bottom' in terms of tax incentives. Botswana needs to reform its tax incentive system or it will not attract investment. The creation of tax-free Export Processing Zones would be an important first step.

(iv) To merely reform the tax system without addressing the underlying causes of the lack of competitiveness of firms located in Botswana would be largely futile and not result in long-term sustainable investment. This has certainly been the experience of Namibia. Thus Botswana has to address its skilled professional and labour cost, transport costs and its interest rates.

i. Opening the middle and top end of the labour market in Botswana to international competition for professional and skilled workers and managers will have the effect of driving down costs. Dismantling the restrictive trade practices of professional associations in the recognised professions in Botswana is vital along with training more Batswana in the recognised professions.

ii. Eliminating the barriers to increased competition in trucking and removing restrictions that raise the transport costs of getting containers to ports is essential.

iii. The building of new and low-cost heavy-gauge railway to the coast is essential for the development of the coal and base metal sectors. This will be very expensive but will enable a transformation of Botswana. It will also lower the cost of container shipping to the coast.

iv. The conduct of a selective low interest rate policy for projects of national importance.

(v) Botswana has a combination of vast potential energy resources and what are emerging as very substantial deposits of base metals. It needs to develop synergies between these resources in line with the sort of policies used in Malaysia, South Africa and other countries to provide strong incentives for firms to locate. Botswana, no matter how well it manages industrial policy, will always be disadvantaged by virtue of being small and landlocked but it can compensate investors for that disadvantage by providing electricity, the source of which it has in abundance, by pricing at marginal cost to strategic industries in its EPZ.

Introduction

1

This report was commissioned by the Botswana Confederation of Commerce, Industry and Manpower (BOCCIM) with the Botswana Institute for Development Policy Analysis (BIDPA) as the principal implementing agency. The project is funded by the African Development Bank under the auspices of the Botswana Ministry of Finance and Development Planning as an input into the understanding of measures needed to accelerate the diversification of the Botswana economy away from its dependence on diamond mining.

The programme of research involved a series of three studies. The first has been completed and involved an analysis of the Future Mining Projects and Developments in Botswana. The study concluded that should all the known deposits of base metals, energy minerals and coal be developed in the country in the coming years, the loss of revenues and exports from the scheduled decline in diamond revenues, post-cut 8 at the Jwaneng diamond mine will mean that Botswana will face a 'fiscal cliff' around 2025 if not slightly earlier.

The second study, which is yet to be completed, undertakes a CGE modelling exercise to determine the magnitude of the adjustment that Botswana will need to undertake as a result of the fiscal cliff. The Terms of Reference for the entire study is found in Annex I to this report.

This decline in revenues from diamond mining has been deferred from what was originally expected at the time of NDP 9, when the decline was expected to occur in 2018. However, this initial report signals a serious need for immediate preparation both in terms of the expected decline in revenue and a diversification of the economic base. Diversification of Botswana's economic base away from diamond mining has been a priority objective of government since at least 1980 but it has not yet eventuated to the degree desired.

A veritable industry has developed over the years around the issue of diversification in Botswana. Numerous scholarly and consultancy studies have been undertaken on the subject. This report takes an entirely different approach to the matter to address the issue of why diversification has proven to be elusive and what measures are needed in order to assure the country's long-term competitiveness. The approach taken in the study is an information-intensive approach to understanding the costs of operating a business in Botswana in comparison to that of other jurisdictions. Actual unit business costs in Botswana, as compared to those of African and Asian competitors, are simply unknown and the approach taken here has been to gather the data by means of an international survey conducted by the Economist Intelligence Unit. Most of the data was gathered in May 2012 though final completion of the survey was held up until September 2012. Thus the data used in this report is relatively up-to-date and makes comparisons of business costs in 13 countries. Ten of these are African with three Asian comparators – China, India and Malaysia. The data was gathered in major urban centres.

The data is used in two different ways. The first is simple descriptive, which shows data comparisons for various costs for the countries in the sample. The second is to use the data for modelling of hypothetical firms. The factor usage and intensity of the firms was derived from an adaptation of the KPMG models used in its annual publication *Competitive Alternatives*. The results from the financial analysis and cash flow modelling are very revealing and add considerably to our understanding of what constrains Botswana's diversification and what policy measures should be put in place to address these.

The terms of reference for this study are:

- Review the existing literature on economic diversification and draw on the lessons of successful examples;

- Consider the experience of neighbouring countries with economic diversification and why some have been relatively successful and why others have been less successful;

- After reviewing Botswana's experience with diversification consider why it has not yet borne fruit;

- Consider whether the provisions of existing and proposed trade agreements will inhibit Botswana's ability to diversify;
- Prepare a comparative cost analysis of the direct costs of doing business in 8 SADC countries (Botswana, Namibia, Malawi, Mauritius Mozambique, Swaziland, South Africa, and Zambia).

- Using cash flow models of internationally (i.e. export) competitive firms in RSA and other SADC countries determine the sources of private sector cost advantage and disadvantage from locating those firms in Botswana.

- Recommend measures to diminish the sources of cost disadvantage that the private sector faces in Botswana;

- Develop, in conjunction with the private sector, an appropriate response strategy to the long-term development of the private sector in Botswana;

- Make recommendations to the government of Botswana to improve the economic diversification process, its governance structure and consider alternative strategies; and,

- Prepare a report on the above.

The first two bulleted points of the terms of reference above are addressed in Chapters 3 and 4 below. The third bulleted point regarding the experience of Botswana with diversification is addressed in Chapter 2 along with the broader literature review on diversification. The fourth bulleted point is considered in some detail in Chapter 5 where the treaties are considered but within the context of financial incentives and tax provisions available in neighbouring countries that are members of the Southern African Customs Union (SACU), which is undoubtedly the treaty arrangement that has most influenced the development of Botswana.

The comparative costs of production in various SADC and Asian comparators are found in Annex 4. These are presented in the manner required by copyright and intellectual property rights by the Economist Intelligence Unit (EIU) which was sub-contracted to collect the global data base needed for the cash flow analysis. The graphic presentation of the data is combined with a Commonwealth secretariat data base from 2002 which was based on an almost identical survey conducted at the time. The data from 2002 is useful for purposes of comparison over time to show the pace of change of various costs.

Bulleted points 6 and 7 pertaining to the actual financial analysis and cash flow modelling are addressed in the context of Chapter 6. Recommendations regarding policy are discussed in Chapter 7. The results of this chapter provide entirely new insights into the reasons why diversification has not occurred at a faster pace. The final concluding chapter gives a more thorough examination of the policy conclusions and recommendations.

Botswana's Export Diversification Experience

2

2.1 Introduction

This chapter considers Botswana's diversification experience and discusses why it has not yet proven as successful as had been hoped. For thirty years diversification of exports away from dependency on minerals in general and diamond mining in particular has been an objective for Botswana policy makers[2]. Indeed, a voluminous literature in development economics has developed over time so as to explain why Botswana has not diversified its economic base. As will become evident below the data does not present as entirely negative a picture as one would expect for a country that is amongst the most stable and, historically, the most rapidly expanding in Africa. What has occurred has been the development of several important sectors over the last thirty years. Perhaps the most significant and the most market-driven has been the tourism sector which, unlike others, was not the explicit product of government policy. However, there have been periods of diversified export development in Botswana including the aborted attempt to develop a motor vehicle industry in the country in the 1990s. In the last four years the government has also embarked on a policy of beneficiation of diamonds which has significantly increased the share of manufactured exports in total exports. In both cases the diversification was policy driven rather than simply the result of market trends.

The first section of the chapter analyses some of the issues surrounding the measures of economic diversification to give a more balanced and less cursory examination of Botswana's diversification experience. Section three reviews the extensive economic literature that exists as to why Botswana and other similar resource-dependent countries have not experienced a rapid rate of diversification. The section also reviews the conduct of national industrial policy, specific measures, instruments and institutions that were established to foster economic diversification; and other measures to promote industrial development and it discusses how these have contributed to economic diversification efforts. Section four concludes.

The government considers the diversification of the economy into both manufacturing and service sectors and away from minerals in general and diamonds mining in particular as an integral part of economic strategy. In the early 1980s, the government attempted to accelerate economic diversification efforts through the introduction of the Financial Assistance Policy (FAP) which was abandoned in 2001 as a result of both abuse and the widespread view that it failed to deliver tangible results. Since the end of the FAP the government has not moved to introduce significant new measures that would attract FDI and has relied on its generally stable economic environment as the main draw for investment.[3]

A decade of policy statements in virtually

[2] *The earliest mention of diversification as being the policy objective of the government of Botswana was in the 5th National Development Plan (1979–85). The government's objectives and strategies 'Main objective of Government Policy are: to diversify the economy as the basis of balanced long term economic growth', page 207, NDP 5, Ministry of Finance and Development Planning, Government Printer, Gaborone*

[3] *Equity positions along with low interest loans remain available to foreign investors on projects that are undertaken as joint ventures with the Botswana Development Corporation. Following the termination of the FAP, CEDA was established to provide subsidised financial assistance to local entrepreneurs (but not foreign investors).*

every area of commercial policy, for example, trade, exports, investment and Small, Medium and Micro Enterprises (SMME) policy, has ensued but with few new instruments being implemented. Several strands of policy have emerged in Botswana, one in effect managed by the Ministry of Trade and Industry which has primary responsibility for managing diversification away from diamonds. The Botswana Excellence strategy which is based on openness and integration was adopted in 2008 and promoted the development of agriculture, tourism, diamonds, transport and mining more generally.[4] With the Economic Diversification Drive (EDD), phase I the government has taken a more inward-looking policy. The medium- to long-term EDD strategy is expected provide greater assistance to firms to become more internationally competitive.

2.2 Measuring economic diversification

2.2.1 Diversification of GDP and Exports

In any discussion of the issue of diversification it is necessary first to consider an appropriate definition of economic diversification. In general when economists refer to diversification it is with regard to either exports or GDP. The diversification of the GDP is a process that occurs as the economy grows and the consumption basket normally and almost organically moves from demand for goods to that of services. As incomes rise, this diversification of GDP will occur almost automatically. However, the diversification of exports is a more rigorous and difficult process because it involves the development of tradable sectors which can include both goods and services and are by their nature commercially and internationally competitive. Section considers diversification of GDP and then exports. The final section considers diversification into the service sector. There is considerable ambiguity over what constitutes manufactured production as it pertains to mineral and diamond processing and in Annex II there is a brief discussion of what constitutes manufactured products in a diamond-based economy given the various trade and industrial classifications.

2.2.2 Measurement of diversification

2.2.2.1 Diversification of GDP

Figures 1 and 2 below describe the diversification for Botswana's GDP. The commonly used diversification index in economics is the inverse of the Herfindahl-Hirschman Index (HHI), which is used to measure disparity (Hirschman, 1964).[5] The higher the index signals economic diversification and the lower the index signals an absence of economic diversification.

As can be seen from Figure 1, the HHI index generally declined from the mid-1970s to the late 1980s, indicating that the economy became increasingly dependent on the mining sector in general; the share of mineral output to total GDP increased from 12% in 1975 to 51% in 1988 (Figure 2). It should be noted that this index is of GDP and uses existing government categories based on the UN System of National Accounts (SNA) and therefore all diamonds production is classified as mineral products. It therefore understates the degree of economic diversification in the post-2008 period. The diversification index did increase between 1988 and 1992. This was largely due to the decline in mineral output due to the world economic recession in 1989 which resulted in a fall in the demand for diamonds as well as weak prices for copper and nickel. There was modest diversification in the mid-1990s as automobile and textile exports were expanding and again post-2008 as diamond prices and volumes went into decline.

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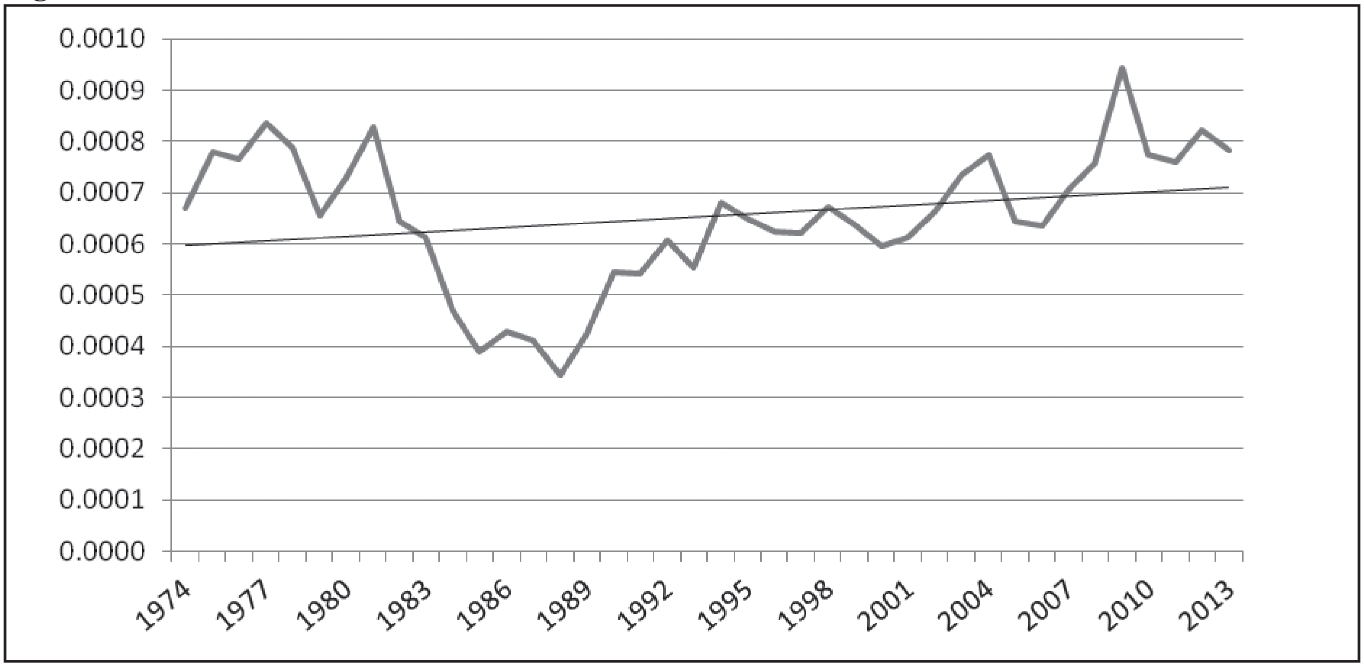
[4] *The implementation of the Botswana Excellence Strategy has been limited.*

[5] *The diversification index was computed as:* $$I_\alpha = \left(\sum_{t=1}^{N} (Si^\alpha)\right)^{1/(1-\alpha)}$$

Where Si is the share of the i^{th} economic activity to GDP and α is a parameter, $\alpha \geq 0$, $\alpha \neq 1$, $\alpha = 2$.

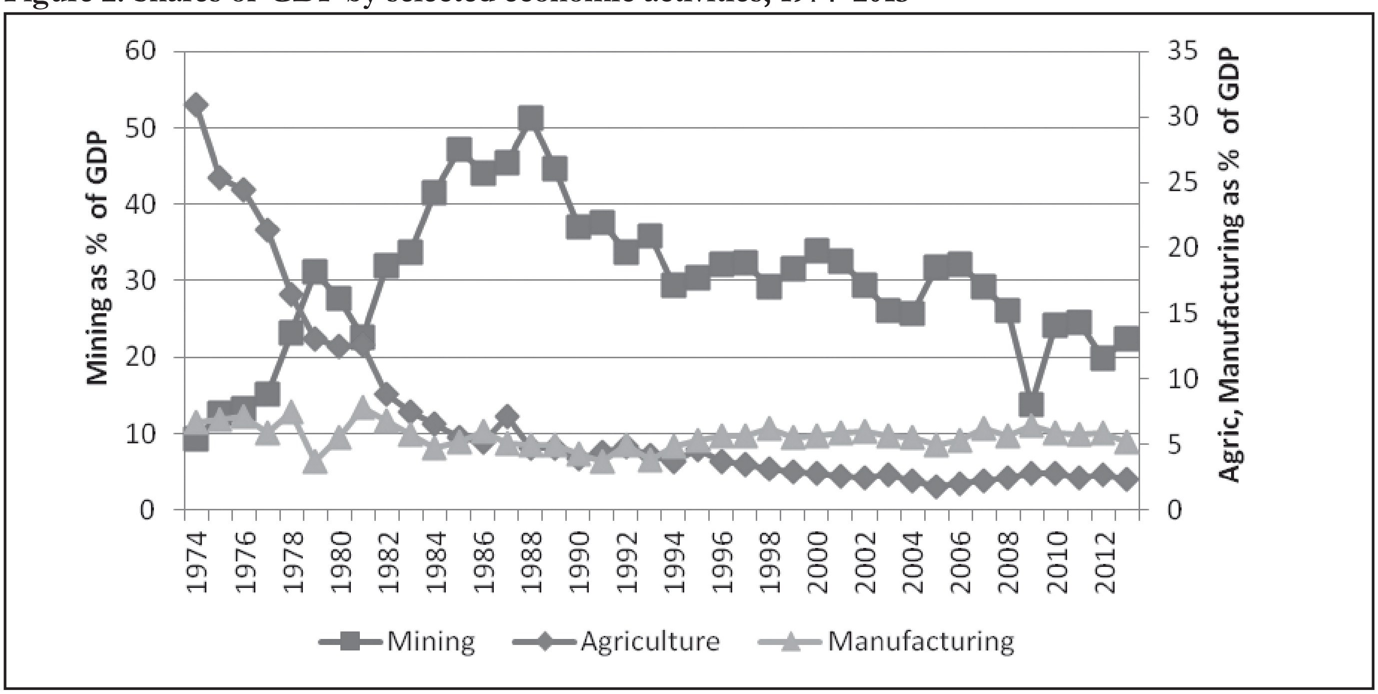
Figure 1: GDP diversification indices



Source: *CSO, various, and authors' calculations*

The share of mining output to total GDP decreased from 41% in 2008 to 26% in 2009 (Figure 2). Overall, the index shows a declining trend, demonstrating that the economy has experienced a decreasing diversification over the period. The index shows that Botswana economy remains heavily dependent on the mining sector and little or no success has been achieved in diversifying the economy away from the mining sector. This is despite the fact that the government has in the past come up with numerous economic strategies to accelerate economic diversification. International experience has shown that diversification is a challenging task and structural changes are usually slow to be implemented (Sekwati, 2010).

Figure 2: Shares of GDP by selected economic activities, 1974–2013

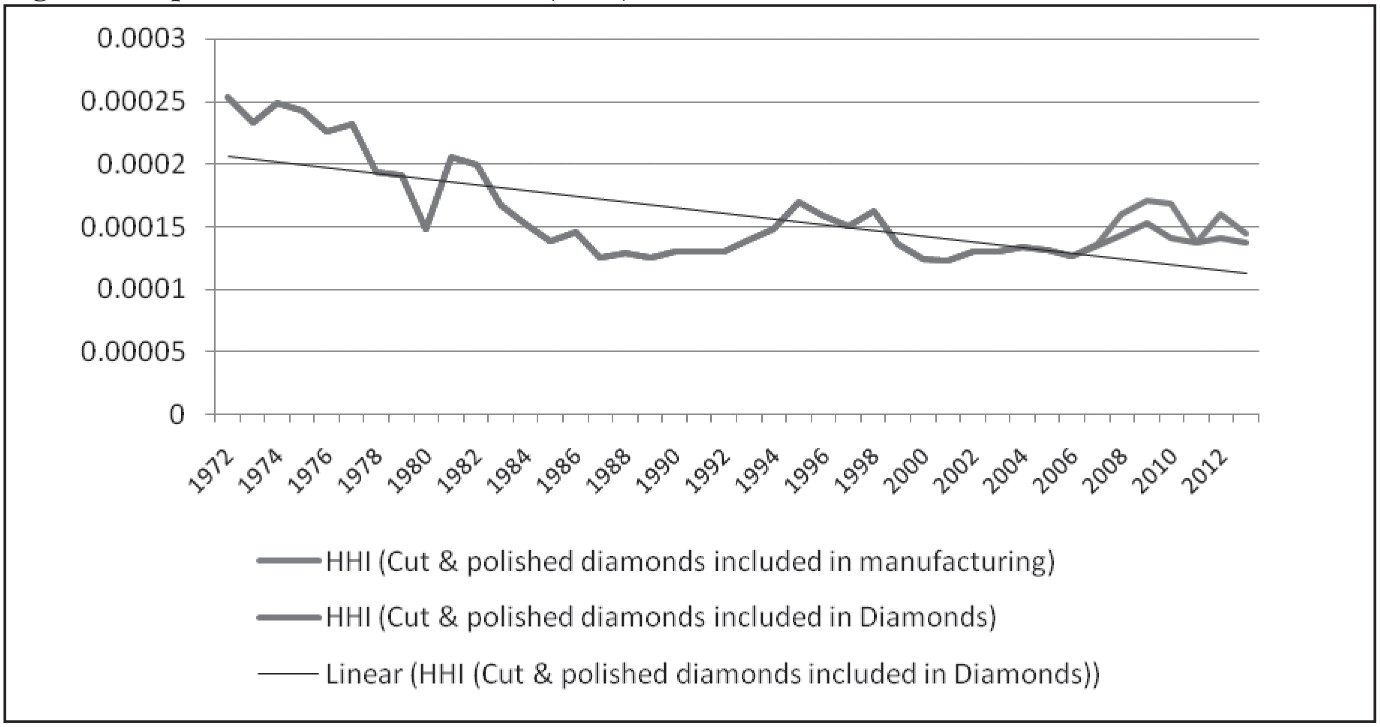


Source: *CSO, various, and authors' calculations*. NB: The *definition of manufacturing in GDP does not include diamond cutting and polishing*

2.2.2.2 Diversification of the exports of goods

Indicators of economic and export concentration reflect much the same trend as found above and the government's efforts have achieved only limited success. According to BIDPA and the World Bank (2006) the proportion of non-traditional exports in total merchandise exports was 10% in the early 1990s until the present. Trends in the Hirschman-Herfindahl Index of export concentration, a broader measure of diversification, showed no sustained progress in either economic or export diversification (Figure 3).

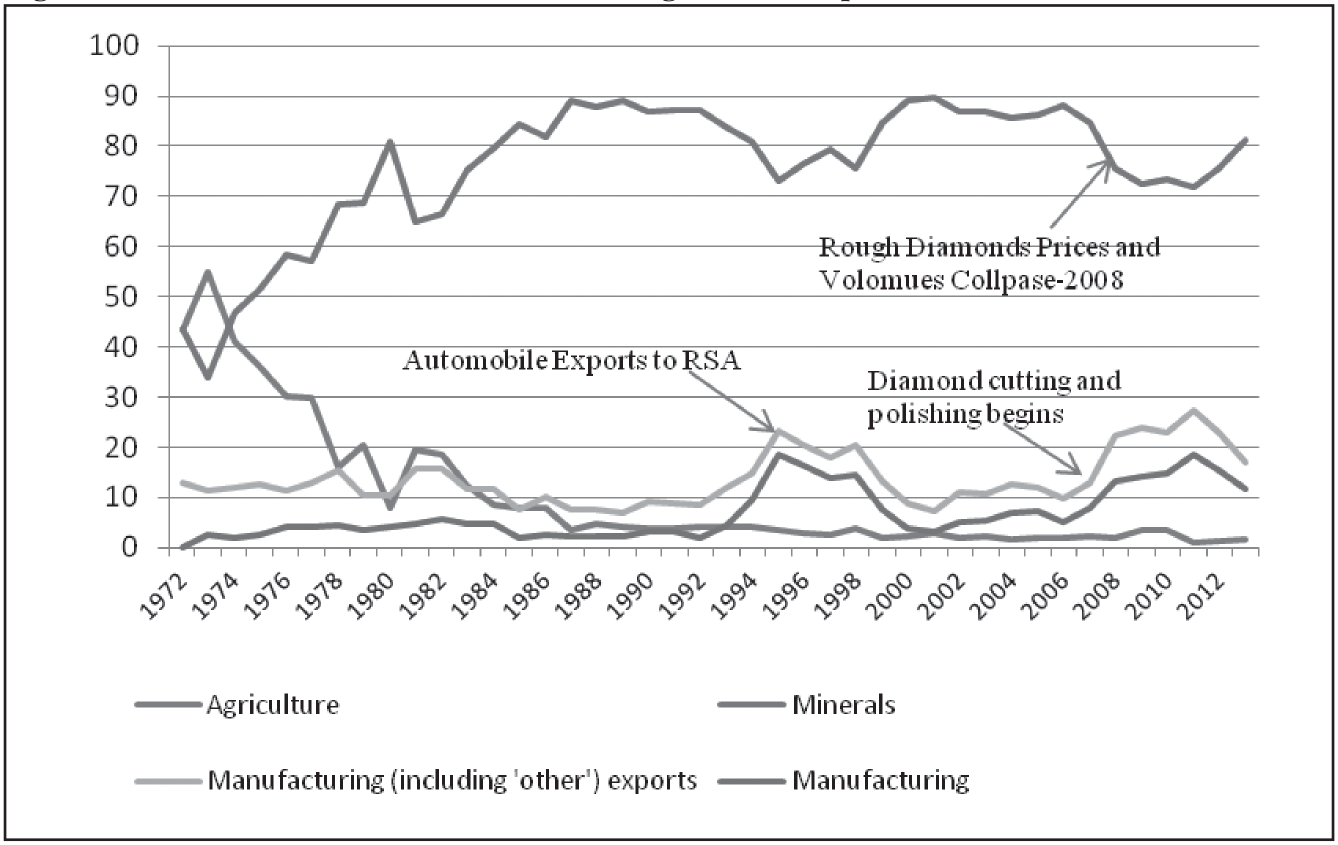
Figure 3: Exports Diversification Index (HHI)



Source: *CSO, various, and authors' calculations*

What is evident from Figure 4 is that there was a period in the 1990s when the share of manufacturing to total exports increased substantially, peaking at 18.6% of total exports in 1996 but collapsing to 3.8% by 2000. The second period in which the share of manufactured exports has risen sharply has been the period 2008–2011 when the government began to implement the policy of diamond beneficiation. This earlier period of apparent industrialisation was not a statistical aberration resulting, as has been so often the case, from a decline in diamond prices or volumes as occurred in 2008/9. In fact diamond volumes and prices expanded strongly during the period but the observation was a result of the expansion of the manufacturing sector. Two factors alone explained the rapid growth of the share of manufacturing exports. One was the opening in 1994 of the Hyundai automobile factory in Botswana, which proved to be remarkably successful in generating exports to South Africa and elsewhere. This company also began to produce Volvos for the South African and world market. The second was the expansion of the textile industry, which grew rapidly in the last decade until the end of the Multi-Fiber Agreements (MFA) arrangement in 2005 and exports to the EU and US collapsed.

Figure 4: Shares of mineral, manufactured and agricultural exports, 1972–2013



Source: *CSO, various, and authors' calculations*

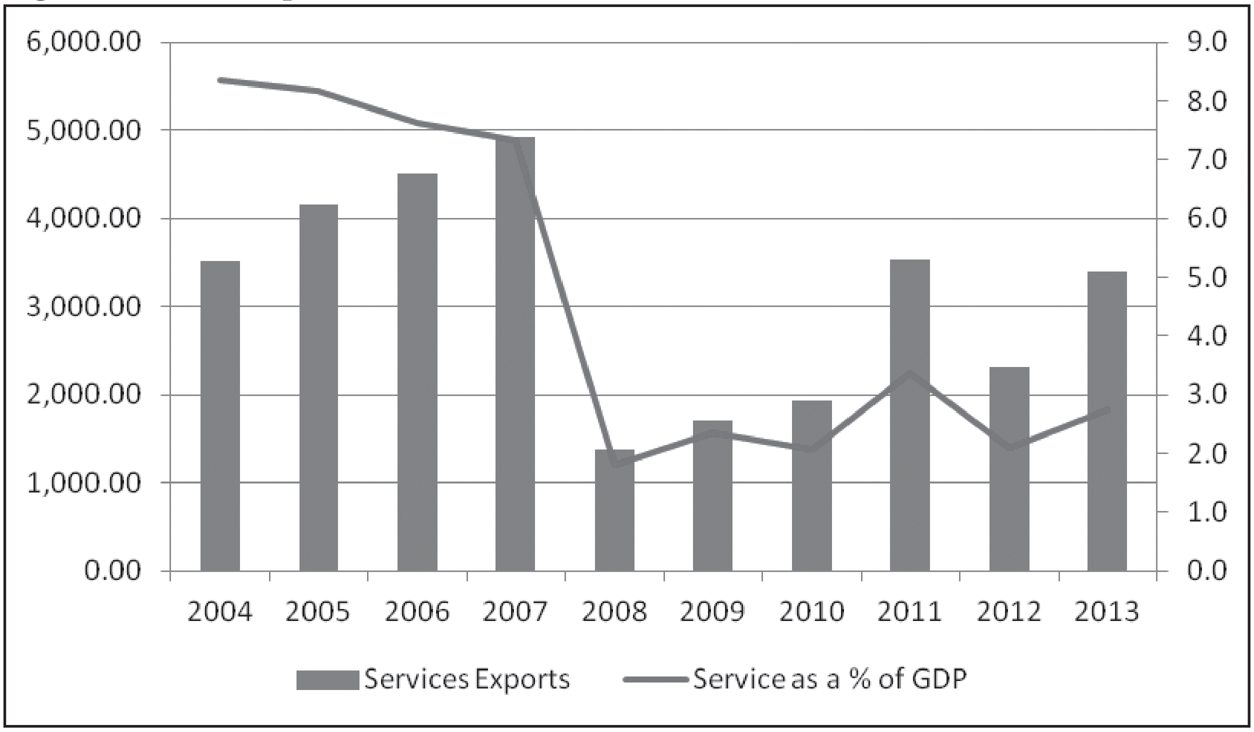
In the last four years there was a second period of industrial export growth in which manufactured exports as a percentage of the total exports rose sharply. This was a result of the increase in cut and polished diamond exports which rose to P4.5 billion in 2011, the last year for which such data is available. However, what also heightened the impact of this change on the share of manufactures in total exports was the simultaneous decline in 2008/9 rough diamond production and prices in response to the global economic crisis. Another important development was the growth of the significance of 'other' exports in manufactured exports. By 2010 this category, which includes a number of sundry exports, was P2.7 billion or approximately 4% of total exports. The growing significance of the 'other exports' which includes a host of minor exports is presented in Annex III. However, it should be noted that Botswana does consistently export a fairly wide range of 'other' products that do not fit into the traditional categories. These include products like chewing gum, explosives, vaccines, foam products, paper bags, metal cans, sweet biscuits, toilet liners and sunflower seeds. Most of these exports are within the SACU region and hence subject to the tariff protection of SACU common external tariff.

2.2.2.3 Diversification of production and export of services

A second leg of Botswana's export diversification strategy lies in the development of the service sector using electronic and other means for delivery that are not related to Botswana's small landlocked country status. The export of services is dependent, at present, on two sectors. The first is the tourism sector which expanded fairly rapidly at the beginning of the last decade but real travel receipts stagnated throughout the current decade and, as was the case in so many tourism destinations, then went into sharp decline with the onset of the ongoing international economic crisis in 2008. The tourism sector has grown by virtue of the country's world-class natural tourism and wildlife resource in the north of the country. However, given the extremely fragile ecosystems of the Okavango and the Chobe River systems, very substantial increases in tourism numbers in this sector may not prove to be sustainable.

Figure 5 shows services exports and their contribution to GDP during the period 2004 to 2013. The following observations are made with regard to the above. First, although services exports have fluctuated during the period under review, they have increased over the years. Secondly, with the exception of 2008 to 2013, the share of services sector exports in GDP also increased during the period. On average, the services sector exports now contributes 6% to GDP per annum.

Figure 5: Services exports, 2004–2013

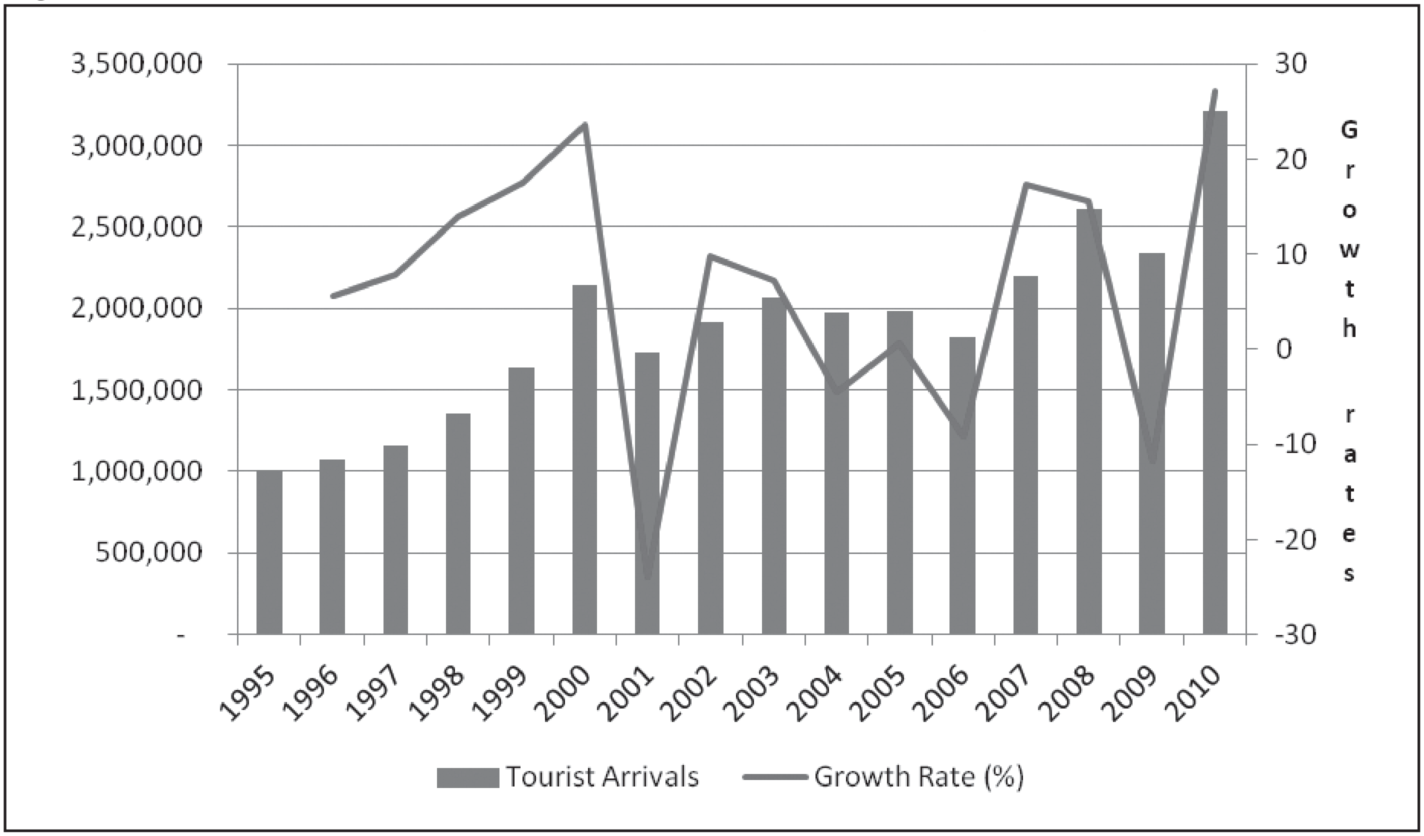


Source: *Bank of Botswana, various years*

As discussed earlier, tourism is one of the sectors that made a significant contribution to services exports. According to BIDPA and World Bank (2006), Botswana has comparative advantage in the sector given its diverse and abundant wildlife and natural resources. Some of the notable natural resources which are also popular tourist destinations for international tourists are the Okavango Delta and Chobe. Between 2002 and 2011, trade and hotels (a proxy for the tourism-sector activities) contributed on average, 3.9% per annum to GDP. The tourism sector's contribution to GDP suggests that tourism already makes a significant contribution to the growth and economic diversification in Botswana. Figure 6 shows trends in tourists' arrivals for the period 1995 to 2010.

The tourists' arrival figures depict some increase over the years; however a decline was seen in 2008, probably in response to the global economic downturn during the period. The tourism sector's contribution to GDP and exports can increase further. There is a need to increase infrastructure in existing parks to accommodate changes in market trends and to diversify tourism products away from popular tourism destinations such as the Okavango Delta and Chobe.

Figure 6: Tourist arrivals, 1995–2010



Source: *World Travel and Tourism Council, 2012*

2.3 Botswana's limited diversification – a review of the literature

This section considers the various explanations that have been offered in the economic literature for why highly resource-dependent countries have generally failed to grow and diversify their economies. Some of the studies considered are general in nature, referring to the generic group of resource-dependent countries, while others refer to the specifics of the situation prevailing in Botswana. The apparently disproportionate preoccupation of development and macroeconomists with the transformation of Botswana is understandable. First, the country has experienced rapid rates of economic growth from independence until 2000 which is not what has been experienced in many other resource-dependent countries. Since then growth rates have been generally below the sub-Saharan Africa average. Although Botswana grew very rapidly until 2000, it has not transformed its export base as seen above. Given that the growth of GDP/capita in Botswana is predicted on one depreciating sector, the fact that growth rates in the current decade have fallen sharply is not surprising. However, the observation of very high rates of economic growth is not consistent with the resource curse hypothesis, nor is the country's reputation for good governance (IMF, 2007), and yet the failure to diversify is very much consistent with that hypothesis. It is precisely for this reason that a virtual industry of economic researchers has developed over the years attempting to explain the apparent contradiction in outcomes-high but declining growth rates with a failure of diversification.

2.3.1 Resource Curse and Dutch Disease

According to the literature (Sachs and Warner, 1995; Ostensson et al, 2000; Iimi, 2006a; Frankel, 2010), natural resource-abundant economies tend to grow more slowly than resource-scarce ones. The disappointing economic growth performance peculiar to resource-rich countries is referred to as the 'resource curse'. The resource curse can occur through several transmission mechanisms. The most common and most widely accepted is referred to as 'Dutch Disease' and is often mistakenly seen as the only manifestation of the resource cure. Certainly the appreciation of the real effective exchange rate is the mechanism most commonly associated with the resource curse but there are numerous other manifestations. Even where the real effective exchange rate has not appreciated other aspects of the resource curse are felt through the effect on wages, political economy effects, rent-seeking behaviour, etc which may manifest themselves. The section below considers different aspects of this transmission mechanism.

2.3.1.1 Dutch Disease

The poorer than expected performance of the manufacturing sector in Botswana has prompted debates (e.g. BIDPA and World Bank, 2006) over whether the sector may have been adversely affected by the rapidly expanding mining sector. The negative relationship between a booming sector and lagging tradable sector is termed 'Dutch disease', a form of natural resource curse where a boom-induced real appreciation causes another tradable but lagging sector to contract. Studies on Dutch disease in Botswana have produced mixed results. Some studies (Harvey, 1991; Blomström and Norberg, 1993; Iimi, 2006b; Delèchat and Gaertner, 2008) suggest no evidence of Dutch disease effects in Botswana. Mogotsi (2002) on the other hand, concludes that there were Dutch disease effects since the real exchange rate appreciated significantly and government spending increased sharply during boom years. Pegg (2009) argues that Botswana suffers from Dutch disease symptoms but not through the mechanisms suggested by the standard Dutch disease model. The author posits that although Botswana's exchange rate did not appreciate as predicted by the Dutch disease model, the country nevertheless experienced Dutch-disease-like symptoms through a rapid growth in government wages and salaries that have made Botswana a relatively high-cost economy and crowded out private formal-sector employment.

Hillbom (2008) argues that Botswana did not suffer typical Dutch disease symptoms because manufacturing was insignificant at independence and therefore the sector could not be adversely affected by resource movement effects to other sectors. Hillbom (2008) posits that Botswana is in a natural resource trap and argues that as long as diamonds constitute a dominant share of government revenue, this in effect discriminates against economic diversification since there are few incentives to industrialise and improve productivity and thereby change the structure of the economy.

Although the debate on whether or not Botswana has suffered from Dutch disease effects is far from settled, the arguments above suggest that Botswana did suffer from some kind of Dutch disease but perhaps of a type different from that found in the traditional literature i.e. not through an appreciation of the real effective exchange rate. Two other arguments from literature support the view that Botswana has suffered from some form of Dutch disease. The first argument is put forward by Davies (1995). He argues that Dutch disease ceases to be a temporary phenomenon if mineral booms are of long duration, as was the case in Botswana, but tend to describe a country's transition from a long-run equilibrium to another. He concludes that changing from mineral-based comparative advantage is a slow process and highlights the difficulty associated with forcing diversification in a resource-rich economy, contrary to its comparative advantage. The second argument is that by Hirschman (1958). His main argument is that in a small resource-rich economy, linkages with the rest of the economy are few and suggest that active government participation is necessary to achieve diversification.

2.3.1.2 Other manifestations of the resource curse

as discussed above the appreciation of the real effective exchange rate is not the only possible transmission mechanism for resource curse effects through the economy. Natural resource wealth may provide a false sense of security, leading the government to neglect human capital accumulation and economic growth-promoting strategies (Papyrakis and Gerlagh, 2004; Gylfason and Zoega, 2006). Secondly, natural resource wealth may create opportunities for rent-seeking behaviour, corruption and civil conflict (Bulte et al., 2005; Gylfason and Zoega, 2006; Oomes and Kalcheva, 2007) and it may crowd out entrepreneurial activity and other growth-promoting activities (Oomes and Kalcheva, 2007). Finally, natural resource wealth can also facilitate the creation of poor-quality institutions (Bulte et al., 2005). A full and complete review of the literature is contained in a number of works (e.g. Frankel, 2010)

In the literature (e.g. Iimi, 2006a), Botswana is generally but not universally considered an economic success story that has escaped the natural resource curse in the various forms described above. Three arguments support this view. First, Botswana's diamond-led economic growth record has been spectacular (Harvey, 1991; Iimi, 2006a; Ploeg, 2006) and sustained over a long period (Harvey, 1991). Since the 1980s, mining has contributed about 40% of Botswana's average annual growth rate of 7.8% (Iimi, 2006a). While the share of mining in GDP has remained significant, it declined between 2001 and 2011. The average annual share of the mining sector in GDP during that period was 37.5%. Second, unlike some other African countries, Botswana has not experienced domestic instability and conflict over the control of mineral resources since the vast majority of people are ethnic Tswana and the central government, not tribal authorities, holds mineral rights and control (IMF, 2007) and the government has maintained a good natural resource management record (Iimi, 2006a). Third, Acemoglu et al. (2003) attribute Botswana's economic success to good institutions, a conclusion supported by Transparency International's Corruption Perceptions Index which, in 2006, ranked Botswana among the top 25% least corrupt countries (the highest in Africa) (IMF, 2007). However, IMF (2008) suggests some deterioration in regulatory quality, government effectiveness and the control of corruption. The observation on corruption is supported by firms that participated in the 2006 and 2010 World Bank investment climate surveys. In 2006 firms rated corruption as the seventh most important constraint to investment, after access to finance; macroeconomic instability; tax rates; crime; access to land; and competitors from the informal sector. In 2010, of the ten most serious constraints to investment (tax rates; customs and trade regulations; electricity; business licences and permits; crime, theft and disorder; practices of the informal sector; corruption; access to finance; access to land; and inadequately educated workforce), firms found corruption to be the fourth most important impediment to investment (after inadequately educated workforce; access to land; and access to finance).

In summary, Botswana seems to have avoided the most egregious manifestations of the resource curse. Views are mixed as to whether or not Botswana has suffered from Dutch disease. It seems in the 40 years of natural resource boom, Botswana has avoided Dutch disease effects predicted by the standard Dutch disease model but may have experienced some form of the resource curse of the type described by Davies (1995). As the natural resource boom was not a temporary phenomenon but spanned several decades, diversification from the country's mineral-based comparative advantage seems to have proven difficult.

2.3.2 Political incentive structures and diversification in Botswana

In addition to the possible resource curse effects discussed above, the literature advances two further possible explanations as to why Botswana has not diversified its economy. The first reason is with regard to lack of incentives for diversification and the second is that resource abundance has created incentives for a commitment to an economic ideology that discourages the formation of a robust partnership with the private sector. With regard to the lack of incentives, one of the arguments advanced by Dunning (2005) is that due to the stability and size of diamond revenues, incentives to diversify have, relative to other resource-dependent countries, been significantly diminished in Botswana. This view is supported by Pegg (2010) who argues that leaders in Botswana have initiated very few initiatives towards industrial development and improvements in productivity resulting in very limited changes in the structure of the economy. Interviews with political leaders from the ruling and opposition parties conducted by Kvaran (2011) corroborated this hypothesis. The interviews highlighted that, just like the political leadership, the electorate did not consider diversification a priority.

With regard to a lack of a robust relationship between the government and the private sector, Conteh (2008) posits that Botswana has maintained a monetary and fiscal environment conducive to private sector development but private sector development has performed below expectation. Conteh (2008) explains the lack of diversification in terms of government's reluctance to complement macroeconomic management and planning with a restructuring of the public sector and a reorganisation of implementation. The author suggests more coordination within agencies and ministries within government and the development of a more robust relationship with the private sector.

Some authors have also attributed Botswana's lack of diversification to incentives created by resource abundance which biased spending towards activities that secured the position of the government. These activities included a large public sector with high wages and unproductive programmes. The argument is closely linked to the one made by IMF (1999), which argues that productivity in the mining sector has supported relatively high wages in the mining and public sector and that these wages have been extended to manufacturing and services. The report further indicates that a combination of relatively high wages and declining productivity in manufacturing may have made the sector unattractive to foreign investors. Closely linked to this view is that of IMF (2007) which suggests that reliance on mineral wealth may have slowed down industrialisation by diminishing the need to coordinate labour supply and demand. The report further argues that an abundance of natural resources can lessen the political incentive to pursue the difficult and costly policies necessary to develop a labour-intensive non-mining manufacturing sector.

Diversification and transformation of an economy such as that of Botswana, based on anything other than a market-lead approach, runs a political as well as an economic risk of government picking industries that it perceives as 'winners'. Economists, unsurprisingly, have focused on the economic aspects of why this approach might be both risky and undesirable but there is strong political and management motivation in avoiding these possible risks. Political considerations in avoiding an active industrial policy include the considerable cost to develop these industries that may fail and the consequent professional association of particular policy makers with those failures. Such an association has in many countries terminated political and bureaucratic careers as was the case in those countries that attempted, often disastrously, a statist approach to industrial policy in the early post-independence period. Hence, in light of past experience, there exists a natural and conservative proclivity amongst policy makers towards a more *laissez faire* approach as the one most likely to result in steady advancement in a political and bureaucratic career. Such an approach may not be consistent with the diversification needs of a country such as Botswana where there are numerous market co-ordination failures. Moreover, the pressure to take such professional risks associated with a statist approach to diversification remains minimal so long as the revenues from diamond mining continue at levels that maintain the functioning of the public sector.

2.3.3 Geography, transport and utility costs

Apart from the resource curse or resource trap discussed above, Pegg (2010), amongst others, argues that poor performance in Botswana was the result of a small domestic market, the landlocked nature of the country, high transportation and utility costs and a general lack of entrepreneurial skills. These factors together do in part explain the slow pace of diversification away from diamond production.

2.3.3.1 Being small and landlocked

Given the small size of Botswana's population, the small domestic market has been an impediment to industrial development. However, the small size of Botswana's market need not be a constraint. As argued above, being a member of SACU, Botswana has overcome the disadvantage of small product markets because Botswana producers face a SACU market of 52 million people. Although membership of SACU is beneficial to Botswana in terms of access to a large product market, being close to Gauteng – a dense market with large pools of labour and intermediate inputs – being small and landlocked presents challenges for Botswana. Agglomeration (or clustering) of firms and industries enables firms to keep up with market information about new products and techniques, and share capital inputs. Moreover, these areas tend to have a larger and more dependable pool of specialised labour. Investment decisions are also determined by close proximity to economically dense regions, economically and physically contiguous markets and the availability of abundant supplies of inputs such as labour, capital and intermediate goods (World Bank, 2009). As industry is concentrated in Gauteng, it tends to be a more favourable destination of investment than Botswana. Therefore being small interacts with being landlocked to create substantial disadvantages for those firms considering operations in Botswana.

With regard to being landlocked, The United Nations Conference on Trade and Development (UNCTAD, 2009) highlighted the following consequences. The first is that adverse effects of transport costs are especially acute for landlocked countries since such costs are 50% higher and trade volumes of landlocked countries 60% lower than coastal economies. An earlier report, UNCTAD (2007) found freight costs for landlocked countries equivalent to between 10 and 25% of the total value of their imports while the global average stood at 5.4%. The second aspect is that the negative impact of being landlocked on trade is not necessarily a result of a geographical location but rather stems from the fact that landlocked countries also often tend to trade with distant countries. Trading with distant partners makes landlocked countries dependent on other countries' transit routes to access distant markets. According to Faye et al. (2004) the dependence on transit countries can be in the form of dependence on: transit infrastructure; political relations with transit neighbouring countries; peace and stability within transit neighbours; and administrative processes in transit. As a result of their dependence on transit countries, landlocked countries tend to bear the costs of their neighbours' poor infrastructure in addition to their own costs.

The third aspect highlighted by UNCTAD (2009) is that being landlocked need not be a constraint to trade. The report used the example of Switzerland which is a landlocked country, but has minimised the disadvantage of being landlocked by engaging in significant trade with its neighbours (France, Germany and Italy) rather than using the neighbours' coasts to trade with distant partners. The fourth issue is that being landlocked not only raises trading costs but also increases uncertainty. UNCTAD (2009) indicated that as the shipping time to market increases, importers and exporters lose control over market indicators such as price and exchange rate movements. The report further indicates that the loss of control makes it difficult for importers and exporters in landlocked countries to accurately estimate their trade costs and therefore profitability. In addition, the fear of interruptions in supply due to transport uncertainty and distance forces producers in landlocked countries to invest in large stocks of inputs. Stock piling increases production costs and has an adverse effect on competitiveness as presented in the box below.

Contrary to the experience in Switzerland, where a significant percentage of total trade is done with neighbours, Botswana's major trading partners have traditionally been in Europe. The most important export market for diamonds is the United Kingdom. However diamonds, which account for over 84% of the value of total export in Botswana, are ferried to their market by air transport and this tends to overcome constraints associated with being landlocked, especially the dependence on transit neighbours' infrastructure. A significant proportion of copper/nickel (80.72% in 2010), the second most significant product in Botswana, is exported to Norway. Within the region, Zimbabwe is the most important destination of Botswana's copper exports (12.3%), followed by South Africa (7%).

While in the case of diamond exports Botswana overcomes constraints associated with being landlocked, copper exports to distant markets expose Botswana to dependence on its neighbours' transit routes and is therefore susceptible to transit infrastructure concerns and other forms of dependence on transit countries discussed above.

While Botswana's exports of diamonds and copper/nickel are destined for distant overseas markets, it also trades with its neighbours. A significant proportion of Botswana's non-mineral exports went to SACU, in particular, South Africa. For example, in 2010, Botswana exported 88% of textile and clothing, 55.15% of meat and meat products; 95% of plastic and plastic products, and 57% of its salt and soda ash exports to South Africa. The significance of South Africa as a destination for Botswana's non-diamond and copper exports has not changed significantly over the years. To some degree, the relative success of non-mining export growth from Botswana stems from having a large and prosperous neighbour. Botswana has taken advantage of being a neighbour to South Africa and made South Africa a major destination of non-mineral exports. This has helped Botswana overcome some of the constraints associated with being landlocked. Outside SACU, Zambia and Zimbabwe are also Botswana's trading partners. Apart from copper, Botswana's main export products to Zimbabwe included soda ash, machinery and electrical equipment, and vehicles and parts. According to CSO (2010), in 2010, Botswana's main exports to Zambia were vehicles and parts followed by salt and soda ash.

2.3.3.2 Transport costs

Despite the significance of Botswana's neighbours as an actual and potential destination for the country's non-diamond exports, manufacturing still constitutes a relatively small share of Botswana's export basket. The disadvantage of being landlocked and the resulting transport costs is still a major constraint to trade in Botswana. A 2006 BIDPA and World Bank study concluded that transport costs in Botswana were amongst the highest in the region. The nature and magnitude of the country's trade imbalance also contributed to high transport costs. Botswana's major exports include diamonds and base metals and these are transported to their markets in either special suitcases, in the case of the former, and specialised rail cars in the case of the latter. As manufactured exports constitute a small share of Botswana's export basket, containers transporting imports into Botswana generally leave empty. As a result, firms that import inputs for production of manufactured goods pay for both the cost of transporting intermediate goods and raw materials as well as the cost of the return journey. Smallness therefore interacts with being landlocked to create substantial transport and logistics cost disadvantage of operating in Botswana. High transport costs raise production costs and this in turn has adverse effects on the profitability of firms in Botswana.

To overcome the disadvantages associated with being landlocked, studies have recommended a number of options. UNCTAD (2009) suggests that landlocked countries should actively promote regional integration initiatives. The establishment of regional negotiation structures can be beneficial to landlocked countries if they (landlocked countries) effectively use these structures to influence transit neighbours' policies. Secondly, landlocked countries should consider the development of trade in services as merchandise exports are bulky and dependent on transport infrastructure. Services, on the other hand, are less affected by transport costs. Technological developments in telecommunications technology have increased the opportunities for trade in services.

The third policy option is, as discussed earlier, for Botswana to take advantage of being a neighbour of South Africa, the regional economic powerhouse, to expand exports to South Africa beyond current levels. This is indeed the policy approach taken in NDP 10. At present, with the exception of South Africa, Botswana does very little trade with the SADC region. The limited trade between Botswana and the SADC region is in large measure explained by the lack of trade complementarity in SADC since many countries export a similar range of mineral products. However, it is also partly explained by cumbersome trade procedures, high transport costs which are exacerbated by being landlocked, along with, poor infrastructure in the SADC region. If trade facilitation and infrastructure in SADC is improved, the region offers a potential export market opportunity for Botswana.

2.3.3.3 The cost of utilities

BIDPA and World Bank (2006) partly attribute the high costs of fixed-line telecommunications, water supply and sewerage services and electricity supply to the monopoly in their provision and possible managerial inefficiencies. The report argues that there could be scope for efficiency gains and a reduction of costs of these utilities through privatisation but it is not clear whether privatisation of these services would indeed lower their costs. The data used in many of the reports are based on international comparisons from the beginning of the last decade and are now very dated and do not reflect the situation on the ground; as will be seen in subsequent chapters of this report and in Annex II. Botswana is no longer a high-cost country in terms of water and electricity prices and the cost of telecommunications is also decreasing in line with the experience throughout much of Africa. The current water and electricity prices in Botswana are in large measure a result of government's pricing policy which may not prove to be sustainable as it does not cover the long-run marginal cost. Pricing of basic inputs such as water and electricity is discussed at length in Chapters 6 and 7.

2.3.3.4 Entrepreneurship

The lack of entrepreneurial skills and talent has consistently been identified as one of the major constraints to industrial and private sector development in Botswana. Small firms in Botswana tended to have inadequate managerial and business skills (Bank of Botswana, 1997), poor technical skills (Bank of Botswana, 1997; Mpabanga, 1997) and used simple and often inefficient technologies (Mpabanga, 1997). According to De Jager (2004), a weak entrepreneurial base should not necessarily be an impediment to industrial development since foreign physical and human capital can be substituted for factors that are not available locally. As a result foreign direct investment can facilitate local production to reach world-class standards. The use of foreign direct investment to compensate for a weak local entrepreneurial base seems to have been successful elsewhere. Singapore relied heavily on foreign direct investment to compensate for a weak domestic entrepreneurial base (Lall, 2004) and achieved impressive industrial and export growth.

2.4 SACU and industrial development in Botswana

Although SACU has solved the issue of small market size for goods, this has come at a cost. The most obvious issue is that Botswana needs to compete as a venue for SACU-bound investment. This in turn exacerbates the problem of being landlocked which constitutes a fundamental barrier to investment as it raises the cost of production in Botswana relative to other more proximate locations such as Gauteng.

According to the study by Kvaran (2011), Botswana's commitment to SACU has created incentives that inhibit diversification. The study argues that the government's development ideology has put too much emphasis on market access and private sector-led growth but has not committed to significant government involvement and a phased approach to trade liberalisation. Being a member of SACU has exposed Botswana to cheaper imports and domestic industries, particularly less efficient ones, which have not been able to compete with cheap imports from South Africa. Cheap imports from the customs union have come at a price in the sense that the trade balance with South Africa is both negative and very significant.

The Secret Memorandum of SACU (1969) and the Closure of Hyundai (2000)

Two quite separate developments, before and after the end of the apartheid era, have come to epitomize the nature of the commercial relationship between Botswana and South Africa. The first is the secret Protocol of SACU (1969) that was signed between the BLS states and South Africa and the second the 'voluntary export restraints' imposed on Botswana-made automobiles that lead to the closure of the Hyundai assembly plant in Gaborone in 2000.

The Secret Memorandum: Immediately following the independence of Botswana, Lesotho and Swaziland the three requested a renegotiation of the 1910 SACU customs union agreement which at the time was widely seen as unfavourable to the BLS. There was a secret memorandum agreed by the parties whereby a member could not seek infant industry protection through the external tariff to protect a local industry if it was not capable of supplying 60% of the SACU market. This in effect precluded the BLS from ever using infant industry policy instruments within the context of the customs union external tariff to develop local production as no facility based in a BLS country, could at that time, have possibly supplied such a large portion of the SACU market. This in turn led to an inward looking policy with the use of NTBs and intra-SACU tariffs with the resulting development of inefficient import substituting industries focusing on small domestic markets. The BLS, whose revenue at the time was tied to declining UK transfers, substituted revenue from the UK for SACU transfers. The price was an inefficient inward looking policy which still continues despite the renegotiation of the SACU arrangement in 2002.

The Hyundai Plant Closure: In 1993 Botswana started to produce Hyundai vehicles under licence. The facility used imports on a semi-knock-down basis. Exports rose rapidly to the point that the facility was exporting some 3,000 vehicles per month by 1998. Motor vehicles soon became Botswana's second largest export after diamonds. In 1998 Volvo signed an agreement with MCB, the owner of the Hyundai franchise to produce motor vehicles for export to the Australian and South African market. The rate of growth of exports from Botswana threatened the South African motor vehicle industry which argued that there was insufficient value addition. South Africa argued that 'the product failed the rules of origin requirement as originating from Botswana. South Africa used SACU Article 25(5) to oblige Botswana to cooperate in the fulfilment of economic objectives of its import legislation for the auto sector. Botswana reportedly agreed to a quota of exports of 1,000 units per month which was half the minimum efficient scale (BIDPA & World Bank 2006, p.xii). The company closed in 2000 as a result of a combination of barriers to entry and poor management.

Interviews with political leaders in Botswana by Kvaran (2011) support the view that South Africa has initiated deliberate efforts to thwart industrial development in Botswana. According to interviews in Kvaran (2011), SACU revenues were perceived to have compensated for the loss of industrial development but the compensation was perceived as only partial.

2.5 National Industrial Policy

One of the factors that can explain the failure of diversification is in the nature and implementation of commercial and industrial policy in Botswana. The application of policy can be roughly divided into three distinct phases in Botswana's economic history. The first is the period from 1982–2000, which corresponds to the period of the Financial Assistance Programme, which was a clear, if in retrospect unsustainable attempt to develop both import substituting as well as export-oriented enterprises in the country. The second phase in the nation's history is from the period from the end of the FAP in 2000 until the introduction of the Economic Diversification Programme in 2011 where the country developed a series of policies, many of which were export oriented. These policies have not been followed by appropriate implementation programmes and the outward-looking policy, along with the development of new institutions such as the Citizen Entrepreneurial Development Agency (CEDA), produced few results. In 2012 there appears to have been abandonment, at least temporarily, of earlier export-oriented policies in favour of an 'import replacement' or 'import substitution' programme called phase 1 of the Economic Diversification Drive.

2.5.1 Financial Assistance Policy (FAP)

The Industrial Development Act of 1968 was the main instrument for regulating and promoting industrial development in Botswana prior to 1984. The Industrial Development Policy was revised in 1984. The main thrust of the IDP in the 1980s was to promote import substitution which, although popular in the 1950s was by this time widely viewed as a failure (Pack, 2000). The IDP was revised again in 1998 and its focus shifted from import substitution to export-oriented industrial development. Other objectives of the revised policy included the promotion of productive employment creation for citizens, training of new workers for high-productivity jobs, and industrial development in rural areas. The policy shift towards export orientation was in response to increased competitive pressure in international markets (Bank of Botswana, 1999). Until 1998 export promotion was not an explicit industrial policy objective. This lack of explicit focus on export promotion was in stark contrast with the East Asian economies where industrial policy has largely emphasised export promotion (e.g. Pack, 2000; Lall, 2004; Noland and Pack, 2005). Since IDP had never had a particular focus on SMMEs, an SMME policy was introduced in 1998 to promote SMME development. A revised industrial development policy was drafted in 2010 and is being reviewed by the Ministry of Trade and Industry. As in the 1998 industrial development policy, the 2010 draft industrial policy thrust emphasises export orientation. However, contrary to the previous policy document, the 2010 draft policy has a deliberate bias towards the promotion of exports of services and emphasises the reduction of the costs of doing business.

The first major policy initiative to support industrial development in Botswana was FAP. Introduced in 1982, FAP provided capital and labour grants for a period of five years to new firms and those wishing to expand production. Grants were based on size and location of new business (rural or urban area), the number of unskilled employees and training costs. Financial assistance was provided to entrepreneurs in manufacturing, small-scale mining, mineral processing, agriculture (except beef production) and tourism. Incentives to small-scale businesses i.e. those with investment in fixed assets not exceeding P75 000 were limited to citizens. Incentives for medium and large businesses on the other hand, were available to eligible firms regardless of the nationality of the entrepreneurs.

According to IMF (1999), the government considered FAP a success in creating jobs, especially unskilled ones. Since manufacturing and agriculture were the main beneficiaries of FAP grants, employment figures in the manufacturing sector seem to support the view that FAP made a positive contribution to employment growth in manufacturing.

Rodrik (2004) argues that, the ideal criteria for measuring success or failure of a subsidy is not output or employment but the level and the growth rate of productivity as well as performance in international markets. The focus on employment as the principal measure of success of the FAP subsidy is also inconsistent with experience in East Asia where Noland and Pack (2005) found that industrial policy emphasised performance in international markets. Although FAP increased employment growth, this was not accompanied by productivity increases. Using the ratio of GDP divided by employment as a proxy for productivity, Mandlebe (1997) concluded that between 1974/75 and 1993/94, labour productivity in manufacturing in Botswana declined by 3.5% per annum.

Rodrik (2005) proposed some design principles for economic diversification policies. One of the principles is that incentives and subsidies should be provided for new activities only. The second is that the criteria for success and failure of subsidised projects must be established prior to implementation of the policy. Third, an automatic sunset clause for subsidies must be built into the policy. Fourth, policy should target economic activities (e.g. technology transfer, training, etc) and not industrial sectors. Fifth, subsidies should be directed to activities with a clear potential for spill-over and demonstration effects. The sixth principle is that the implementation of industrial policies should be vested with agencies that have demonstrated competence. Seventh, implementing agencies should maintain channels of communication with the private sector.

The Ministry of Finance and Development planning (MFDP, 2000) identified two main problems during the fourth FAP evaluation. The first was that there was more emphasis on the distribution of available funds rather than the survival rates of projects that received grants. Second, although one of objectives of FAP was sustainable employment, it was difficult to measure the effectiveness of FAP because of the difficulty in measuring sustainable employment. The evaluation also highlighted that in view of the challenges associated with measuring sustainable employment, the administrative structures involved in the implementation of FAP did not have the capacity to measure its effectiveness. Monitoring of FAP therefore focused more on grants distributed rather than on sustainability of employment or productivity growth.

Based on the problems highlighted by the fourth FAP evaluation, FAP did not meet most of the design principles proposed by Rodrik (2005) above. For example, given that it was difficult to measure sustainable employment, it is most likely that the criteria for the success and failure of FAP were not established prior to implementation. In addition, it is not clear whether spill-over effects of FAP were established before implementation. Further, the evaluation report indicates that the department responsible for monitoring emphasised proper procedures of the disbursement of grants rather than the sustainability of projects and employment. Moreover, the capacity of the agency responsible for monitoring the effectiveness of FAP seems to have been inadequate.

IMF (1999) argued that labour input subsidies offered under FAP may have encouraged manufacturing firms to employ labour above optimal level and adversely affected productivity and profitability of firms. In addition to low manufacturing productivity concerns, low survival rates, of small firms in particular, raised concerns about the effectiveness of FAP. Following a review in 1999, FAP was terminated and in 2001 replaced by the CEDA which supports the development of citizen businesses through funding, training and mentoring. It provides citizen-owned businesses with interest-subsidised loans of 5% (for small projects) and 7.5% (for large projects).

The implementation of FAP provides some important policy lessons. The first is that it is important to design incentives carefully with very clear objectives and measurement criteria. In the absence of clear measurement criteria for policy success or failure, it is difficult to measure the effectiveness of policy initiatives. The second is that it is important to have a competent administration to effectively monitor incentive schemes. A well-designed policy with clear measurement and evaluation criteria may still be ineffective if the agency responsible for monitoring and implementation the policy initiative does not have the requisite skills. The third lesson is that while incentives can be created with employment creation as a major policy objective this can be achieved at the expense of important indicators such as productivity growth. Rodrik (2004) suggests that the level and rate of productivity growth and performance in international markets are the ideal criteria for measuring success or failure of a subsidy and not output or employment. The success of industrial policy in East Asia was measured by performance in international markets. Export performance and productivity growth are relative to employment and output, and are therefore better measurement criteria for incentive schemes.

2.5.2 Post 2000 Industrial and Commercial Policy

As discussed earlier, there are other institutions, apart from CEDA, that support export promotion and private sector development in Botswana. These include Botswana Investment and Trade Centre (BITC) formed from a merger of the Botswana Export Development and Investment Authority (BEDIA) and the International Financial Services Centre (IFSC), the Botswana Development Corporation (BDC), the Ministry of Trade and Industry and the Botswana Confederation of Commerce, Industry and Manpower. Other institutions include the Exporters Association of Botswana and the Botswana Bureau of Standards (BOBS). BITC's mandate is to identify and research new markets to facilitate targeted export promotion.

BDC is a development finance semi-government organisation which, together with BITC, develops facilities for industrial and commercial lease for both exporting and non-exporting firms. BOCCIM is a private sector organisation charged with representing the interests of the private sector. The Exporters Association of Botswana provides specialised export services to existing and potential exporters through the identification of export markets and the representation of exporters. BOBS formulates local standards and coordinates quality assurance activities.

In addition to subsidies under FAP, the government of Botswana used tax concessions to promote industrial development. Since July 2011, the tax regime changed from a standard corporate tax rate of 25% (15% company tax and 10% additional company tax) to a corporate tax of 22% (with no additional company tax). The corporate tax in Botswana was lower than that of South Africa (28%) but higher than that of Mauritius (15%) (Jefferis, 2011). Botswana provided specific capital allowance rates to different types of assets as follows: an initial 25% capital allowance and an annual allowance at 2.5%. Annual capital allowances were provided for the following assets: furniture, fixtures, office machinery and fittings, 2.5%; general plant and machinery, 10%; other self-propelled plant and machinery used directly in manufacturing and production, 25%; plant and machinery (heavy engineering), 25%; aircraft and motor vehicles, 25%, and computer hardware, 25%. Botswana has also introduced tax concessions. These include tax agreements and development approval orders. The latter offer manufacturing companies tax relief on a case-by-case basis and subject to approval by the Minister of Finance and Development Planning.

Despite the relatively low tax rates, the 2006 World Bank investment climate survey (hereafter World Bank survey) indicated that firms ranked tax rates the sixth most serious constraint to investment. During the 2010 investment survey, firms still considered tax rates one of the main constraints to investment. Although, firms considered tax rates to be one of the top ten constraints to investment, only a small proportion of firms, (3.9%) viewed tax rates as a serious concern. According to the 2010 investment climate survey, small firms (21.9%) found taxes to be an impediment to development compared to medium (13.0%) and large (3.7%) firms.

A reservation policy was introduced in 1982 to promote the participation of local entrepreneurs in economic activity through entry restrictions on limited small-scale activities (cement and brick-making and some small-scale agro-processing such as sorghum milling). It was later modified to include joint ventures between citizen and foreign investors. The Selibe Phikwe Regional Development Programme (SRDP) was introduced in 1988 to stimulate investment in non-mining activities in Selibe-Phikwe, a mining town totally dependent on copper mining. Firms which qualified for the programme were granted a tax rate of 15% rather than the normal corporate tax rate of 25% for up to 20 years. Since 2001, all citizen entrepreneurship development is the responsibility of CEDA.

In addition to the initiatives discussed above, government has put in place other strategies to address economic diversification efforts. These include the Botswana Excellence Strategy; National Export Strategy; Botswana Investment Strategy; Private Sector Development Strategy; special economic zones; and hub projects. Coordinated by the National Strategy Office (NSO), the Botswana Excellence Strategy was introduced in 2008 to address economic diversification. The main focus of the strategy is on promoting international competitiveness, openness and integration of Botswana with the global economy. Although the excellence strategy targets all sectors of the economy, specific initiatives include commercialisation and restructuring of the agricultural sector; diversification of tourism away from over-reliance on high-cost low-volume tourism activities; development of the transport hub; establishment of free zones for activities such as information technology, communications, biotechnology, specialist medical activities, diamond polishing and jewellery; incentives (infrastructure, space, etc) for innovativeness; diamond beneficiation including cutting, polishing, trading and finance; banking and financial services; and mining diversification.

In 2010, the government of Botswana adopted the National Export Strategy (NES). One of the main objectives of the NES is to shift Botswana from competitiveness based on natural resources to efficiency and innovation-based competitiveness. At the initial stage of implementation, the NES proposes a deliberate but not exclusive focus on some goods and services priority sectors. In the goods sector, these include arts and crafts; garments and textiles; jewellery, diamonds and other mineral beneficiation; glass and glass products; leather and leather products; and meat and meat products. With regard to the services sector, the initial implementation of the NES focuses primarily on tourism, financial services, information and communication technology (ICT), business process outsourcing, transport, medical services, and mining engineering services. The proposal in the NES is that a National Export Strategy Implementation Council (NESIC) and three committees (products, services, and strategic activities) be established to coordinate implementation of the strategy.

The Botswana Investment Strategy was also approved by cabinet in 2010. The objective of the strategy was to make Botswana an attractive investment destination for both domestic and foreign investors through an investor-friendly business environment. The strategy proposes, among other initiatives, the removal of all obstacles and impediments to business development, a review of investment incentive package, better access to finance credit and a streamlined tax system. The objective of the private sector development strategy is to promote the development and growth of the private sector. The strategy is private sector driven with government support and focuses on trade expansion, labour productivity, trade support and business climate. The Government of Botswana also approved a Special Economic Zones (SEZs) Policy in 2010. Details of how the zones will operate and the kind of incentives to be provided are still to be decided. Government has also established special structures referred to as hubs to achieve economic diversification and growth. The government has identified relevant ministries to lead the implementation of the hub projects. These structures or hubs are in agriculture, diamonds, education, health, innovation and transport. The hubs were identified on the basis of resources and capacity, exploitation of regional opportunities, the potential to enhance the efficient utilisation of existing advantages and the development of niche areas.

2.5.3 The Economic Diversification Drive (EDD)

The Government of Botswana has introduced other incentives to promote industrial development. These included the Local Procurement Programme (LPP) and, more recently, the Economic Diversification Drive (EDD).

The current EDD strategy is now the cornerstone of Botswana's economic diversification initiatives and has been initially described as a policy of import substitution. Phase one is the short-term strategy and its main emphasis is on local procurement of products and services for central and local government and parastatal organisations with preference margins for local firms. The EDD is in effect an extension of the local preference rules that have been in existence since the 1980s.

Phase two of the EDD is based on seven thematic areas: sectoral development and business linkages; export development and promotion; investment and finance; quality control, standards and production; technology development, innovation and transfer; research and development; and enterprise development. Its focus is on a medium- to long-term strategy that is aimed at diversification of the Botswana economy through the development of capabilities for entrepreneurs that are able to compete in global markets with limited support and protection from government. A new body, the National Economic Diversification Council, will be responsible for the coordination of the implementation of Phase 2 of the EDD.

To date, 506 enterprises have registered and been issued with EDD certificates and government procurement under EDD was expected to reach P2.5 billion during the 2013 financial year. EDD is a recent initiative and therefore it is still too early to assess its effectiveness. However, it is important that EDD takes into consideration the principles proposed by Rodrik (2005) at design and implementation stage to ensure its effectiveness.

In summary, the success of FAP and other investment incentives in stimulating manufacturing growth seems to have been limited in the 1990s when export growth slowed. Some investment incentives that Botswana introduced tended to deter rather than promote export growth. BIDPA and World Bank (2006) argued that the local procurement programme and the reservation policy have created a bias against exports, tending to divert resources and entrepreneurial activity towards the domestic market. This inward-looking approach to industrial development in Botswana is inconsistent with policy in the East Asian countries where export orientation and performance in international markets was an integral feature of industrial development strategies.

The increase in institutions and initiatives in recent years geared towards economic diversification demonstrates Botswana's commitment to diversifying the economy. However, the mandates of some institutions seem to overlap. For example, part of the responsibility of the BES is to drive the restructuring of the agricultural sector. The agriculture hub is tasked with investment, promotion and regulatory reforms in agriculture. It is important to ensure that there is clarity of roles to avoid duplication in economic diversification initiatives. As discussed earlier, there are proposals of design principles for economic diversification initiatives to ensure such initiatives are successful. Although some of the economic diversification initiatives discussed above are recent and therefore it is too early to assess, a monitoring and evaluation programme, based on clear criteria to assess success or failure of these programmes along with in-built sunset clauses for subsidies including an independent assessment of potential spill-over effects of these activities, should be an integral part of the design of policies and programmes.

2.6 Conclusion

This chapter makes the following conclusions. The first is that economic diversification indices depict a quite limited diversification in Botswana since the Botswana economy is still dependent on diamond mining as the main source of export earnings, even if the structure of GDP has become more diversified. Two periods of industrial export growth were observed – one during the period of automobile exports in the mid-1990s and the second post 2008 with the development of diamond beneficiation. The only organic diversification of exports appears to have been in the tourism sector and this stems largely from the country's natural resource endowment, which has provided at least until the onset of the international economic crisis in 2008, a foundation for development. Unfortunately the data on exports of services are not reliable enough to reach a firm conclusion as to the impact of services on export diversification.

Second, views of economists as to whether Botswana's economic diversification has failed as a result of Dutch disease are widely divergent. Some studies suggest that Botswana is in a natural resources trap and Botswana's diversification efforts will prove difficult as long as diamonds are the most important economic activity. Being landlocked has exacerbated Botswana's economic disadvantage and created the perception of the country as being a relatively unattractive destination for foreign direct investment. Although being a member of SACU overcomes Botswana's smallness to some extent, the agglomeration of industry in Gauteng has made it extremely difficult to attract investment to Botswana, which is on the periphery. This is compounded, as we shall discuss later, by the use of fiscal incentives by some SACU members.

The FAP was one of the most important policy initiatives for industrial development. Although the government considered the FAP a success because it created jobs, these were created at the expense of productivity growth. In addition, in view of the difficulty of measuring sustainable employment creation, assessment of the effectiveness of FAP was very limited. The key policy lesson on the implementation of FAP is that it is important to design incentives carefully with very clear objectives and measurable criteria. In addition, it is crucial to have a competent administration to effectively monitor incentive schemes and their impact. A clear measurement criterion is inadequate without effective monitoring capacity. Experience in East Asia suggests employment creation and growth in output may not be adequate measures of performance on an industrial policy initiative. Based on the East Asian experience, the emphasis on export performance and productivity growth as measures of the success of industrial policy and therefore on incentives for exporting firms resulted in economy-wide benefits. Following FAP, government has introduced a number of initiatives aimed at economic diversification. While it is too early to assess their effectiveness, the literature suggests that success of these policies and programmes is likely to depend on very clear criteria to assess success or failure, with appropriate measurement criteria such as export performance and productivity growth; a built-in sunset clause on subsidies; and an assessment of potential spill-over of activities and programmes; and appointment of a competent agency to monitor implementation of such initiatives.

While policy discussion around economic diversification has been occurring since the end of FAP in 2001, the private sector has been moving in an entirely different direction. With new mining and energy projects Botswana's diversification is within the mining sector. This diversification within the mining sector is geologically rather than policy determined. It is important that the policy dialogue on economic diversification catches up with the momentum of the private sector in terms of diversification within the mining sector. It is important that a coherent export-oriented policy be developed which focuses upon the reality of Botswana's future development rather than policy statements not backed by either resources or industries.

The cases of Namibia, Mozambique and Mauritius

This chapter considers the development of industrial policy in several neighbouring SADC countries. All have had their successes and failures. In this chapter we attempt to synthesise what can be learned, both positively and otherwise, from the conduct of industrial and commercial policies in countries in the SADC region. Those countries with the real income profile closest to that of Botswana include Namibia and Mauritius. Both cases offer very important lessons in the conduct of commercial policy. As we shall see, all three countries are handicapped by small populations, remoteness from large developed markets and, in the case of Botswana and Mauritius, inherent characteristics such as being landlocked or island states respectively. Yet, for vastly different reasons, the three have succeeded in achieving high rates of economic growth and, in the case of Mauritius, an important measure of diversification of the export base away from reliance on preference-dependent exports to the EU, which has been a common feature in the development of the three countries. Namibia has also succeeded in no small measure because it has relied on its natural resource base to diversify away from diamond exports. Unfortunately, Botswana's natural resource base is not as broad as that of Namibia.

The third country selected for the purpose of comparison is Mozambique, which is the only country in the SADC region that has implemented policies that resulted in a transformation of its export base from agricultural to industrial exports.[6] This stemmed in large part from the implementation of one mega project, the Mozal aluminium smelter. The costs, benefits and lessons to be learned from these experiences will be considered in some detail.

[6] Although the Lesotho clothing industry expanded under the liberal African Growth and Opportunity Act (AGOA) rules of origin for lesser developed countries and associated tariff preferences, it has not yet lead to a sustained transformed export base. Without these trade preferences the future of the garment industry is very bleak, as Lesotho would be unable to trade into the US in the absence of these preferences.

Export Diversification – Lessons for Botswana from Selected SADC Countries

3

3.1 Mauritius – economic transformation with a great deal of help

There exists an extensive economic literature on what is now commonly referred to as the 'Mauritian Miracle' (see Subramanim, 2009; Subramanian, A., and D. Roy, 2001; Lall, S., and G. Wignaraja, 1998; Romer, 1993, Sachs, J., and A. Warner, 1995; Sobhee, 2009; Zafar, 2011). The literature has to a greater or lesser degree either explained Mauritius's successful transformation from a sugar economy at independence to a middle-income country in the space of 40 years as a result of either the application of good orthodox policies of trade openness (see Subranium, 2001; Sachs and Warner, 1997), heterodox economic policies (Rodrick) or the importation of ideas through its highly successful EPZ (Romer, 1993), ethnic stability and democracy (Subranium). Most observers of the so-called 'Mauritian Miracle' almost universally point to policy making by an elite that was dedicated to economic transformation and was willing to take full advantage of those opportunities that were offered a small remote island in the middle of the Indian Ocean. This is perhaps the single most important lesson of Mauritius and much else that was responsible for the transformation from agricultural preference dependent country to industrial exporter to service exporter as depicted in the Table 1.

Table 1: GDP by industry group (1990–2010) in current local units (percentage)

Industri group	1990	1995	2000	2005	2010[a]
Agriculture, hunting, forestry, and fishing	12.9	10.4	7.0	6.0	4.3
sugarcane	8.0	5.7	3.6	3.2	1.6
Other	4.8	4.6	3.4	2.8	2.7
Mining and quarrying	0.2	0.2	0.2	0.1	00
Manufacturing	24.4	23.0	23.5	19.8	19.1
Sugar	3.4	1.6	0.8	1.0	0.5
Food, excluding sugar	0.0	-	4.1	5.1	6.6
Textiles	0.0	-	12.0	6.7	5.2
Other	0.0	-	6.6	7.0	6.8
Electricity, gas and water supply	1.5	2.4	1.7	2.1	2.5
Construction	6.7	6.4	5.6	5.6	7.1
Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods	13.0	12.8	12.2	12.1	11.9
Wholesale and retail trade	12.6	12.3	11.7	11.4	11.1
Other	0.4	0.5	0.5	0.7	0.8
Hotel and restuarants	3.9	5.1	6.5	7.7	7.5
Transport, storage, and communications	10.4	11.4	13.0	12.6	10.8
Finacial intermediation	4.9	6.5	9.7	10.3	12.3
Insuarance	1.5	2.1	2.3	2.9	2.9
Banks[b]	0.0	4.4	6.6	6.2	8.0
Other	0.0	-	0.8	1.2	1.4
Real estate, renting, and business activities	8.9	8.5	8.9	10.2	11.9
Owner-occupied dwellings	6.4	5.3	4.5	5.0	5.0
Other	2.5	3.2	4.4	5.2	6.9
Public administration and defence; compulsory social security	6.4	6.7	6.7	7.1	6.5
Education	4.1	4.4	4.5	4.8	4.6
Health and social work	2.5	2.8	3.0	3.4	3.8
Other community, social, and personal service activities and private households with employed persons	2.0	2.8	3.3	3.7	4.7
Finacial intermediation services indirectly measured(FISIM)	-1.8	-3.3	-5.7	-5.5	-7.0
GDP at basic prices	100.0	100.0	100.0	100.0	100.0
Manufacturing industries previously operating with an EPZ certificate	11.9	11.4	11.9	7.4	6.7

Source: *Zafar (2009), Central Statistics Office, Government of Mauritius*

Table 1 shows a gradual shift away from agricultural production to manufacturing and eventually the development of a service export economy beyond tourism. The figures demonstrate an almost text book case study of a successful economic transformation of the country within the space of one generation. It is this fact that is the basis for why so many commentators point to Mauritius as a miracle. However, what frequently goes completely unrecorded and under-appreciated is that in a thirty-year process of transformation in Mauritius the country had fortuitously benefited from a range of preferential arrangements at all stages of its development. While the role of the Lomé Convention, the Sugar Protocol and the African Growth and Opportunity Act (AGOA) are well understood, it is argued that the provisions of the Double Taxation Avoidance Agreement with India, which spawned the development of the non-tourism service sector, is neither well documented nor well understood.

While almost all commentators recognise the importance of institutional and historical factors in the 'Mauritian Miracle', at least peripherally, none with the possible exception of Subranium (2009) have looked in detail at the factors that made the transformation possible. These include three factors that make Mauritius unique and the lessons from Mauritius of limited value to the rest of Africa. The oft-quoted pessimistic and incorrect prognosis for the future of Mauritius made by James Meade (1966) gave rise to a number of important responses by the former colonial powers. The first and most important factor in explaining the relative success of Mauritius was the unprecedented generosity of the former colonial powers at the time of the Lomé Convention in granting Mauritius what was by far the largest quota of sugar exports to the EU.[7] Over a period of forty year Mauritius exported 500,000 tonnes of processed but not refined sugar to the EU at prices that were normally three times the world price. The rents generated by the Sugar Protocol were very substantial and amounted to an estimated 5.4% of GDP by Subramanium (2009). What is not normally mentioned is that much of this benefit was concentrated in a very small segment of the population, the so-called 'Grands Blancs' or 'Sugar Barons' who were the main owners of the sugar plantations and who were to play a very significant role in the development of the tourism and EPZ sectors. This contrasts sharply with other countries that were beneficiaries of the Sugar Protocol such as Fiji, Jamaica and Guyana where the benefits were not as concentrated as in Mauritius and hence there was less investable surplus.[8] Ironically it is the inequity of land holding that facilitated capital accumulation. However, inequitable land holdings were a central part of many Latin American economies in the 1970s and this did not necessarily facilitate investment because rural elites shifted investable surpluses abroad. This was not the case in post-1980 Mauritius.

What was genuinely unique about Mauritius' early experience under the Sugar Protocol was that, unlike other African countries, it neither nationalised the land nor taxed the Sugar Barons' rents to the point where incentives for production were removed. Indeed, the policies of nationalisation and high export taxation were common post-independence policy instruments used by African governments and they often removed the incentive of the private sector to invest. This difference in policy stems from the history of Mauritius whereby the Sugar Barons were European and hence ethnically different from the Indian political and bureaucratic elite. Moreover, the non-Indian section of the population had opposed independence from the UK and this meant that the post-independence government moved with great caution in dealing with sugar interests.

The surpluses generated in the hands of the Sugar Barons were sufficient to provide the capital for the next stage of Mauritius's development as it moved away from agricultural dependence to industrial production in its Export Processing Zones (Srebrnik, 2002). Mauritius did not introduce a liberal economic policy until the very late 1990s and maintained high levels of domestic protection (Subramaniam, 2009) and hence in order not to tax its exports it developed an EPZ policy where its labour market rules did not apply. The development of exports from the EPZ depended largely on preferences for garments and textiles that

[7] The apparent generosity of the Sugar Protocol was a direct result of UK accession to the EEC in 1973–5 which coincided with the negotiations of the Lomé Convention and the sugar price spike that occurred with the Cuban crop failure of 1973. The UK insisted that as a condition of accession to the then-EEC it continue to have access to sugar from its former colonies. This was to assure that the then refineries of Tate Lyle on the Tyne and the Thames would have sufficient sugar. There were some 20,000 jobs at stake in the trade.

[8] It can be argued that Botswana was also the beneficiary of the UK and EU largesse through the Beef and Veal Protocol of the Lomé Convention. It is often argued that whereas Mauritius was always seeking ways to increase its sugar quota, Botswana was never able to fulfil the 16,500 tonne quota up until the time it was finally abolished in 2008. Sugar is of course a weed that requires relatively little effort on such fertile soil found in Mauritius. Raising cattle and exporting beef requires a much higher level of commercial sophistication, far greater than that needed for sugar farming. Moreover in a large arid country like Botswana the cattle industry is faced with unique challenges. The beef industry in Botswana never produced the economic rents available to Mauritian sugar farmers and moreover this rent was widely dispersed.

were both substantial and available under the terms of the MFA and the EU's trade preference arrangements and subsequently under the terms of AGOA. The shift in Mauritian policy that saw the creation of the EPZ was supported by an economic elite that was in a position to take advantage of the commercial opportunities that the EPZ created. This situation did not exist in other African countries after independence. In Botswana, for example, there was no equivalent indigenous entrepreneurial elite that could accumulate wealth in the way that Mauritius had done.

The existence of substantial economic rents concentrated in a small number of hands may have been vital but the creation of the EPZs in the 1980s allowed Mauritius to take advantage of the liberalisation of the MFA arrangements, the creation of AGOA and the Lomé preferences for garments, fish and other exports. Importantly, the decolonisation of Hong Kong in 1997 created both push and pull factors which saw Chinese investors move to Mauritius to take advantage of the market access arrangements under Lomé/Cotonou and MFA as well as hedge against the risk of control of Hong Kong by Beijing.

Since the turn of the century Mauritius's traditional dependence has shifted to service exports beyond the tourism sector. This has been spawned by the signing in 1983 of the Double Tax Avoidance Agreement (DTAA) with India.[9] This agreement was of no particular commercial relevance to Mauritius until such time as India liberalised its capital market and permitted foreign portfolio investment in the Indian stock market in 1993. Following the liberalisation of access to the Mumbai Stock Exchange it became possible for Mauritian companies to trade in shares using the Mauritius tax provisions for capital gains tax[10] which exempted resident companies from such taxes. The Indian Supreme Court in the case of *Union of India v AzadiBachao* (2003-TIOL-13-SC-IT) ruled that the government of India, in the absence of tax provisions could not prevent 'treaty shopping'. The company had merely to demonstrate to the Mauritian authorities proof of its residence in Mauritius.

As a direct result of this treaty it is now estimated that approximately 42% of all foreign investment in India is from Mauritius.[11] The government of India has tried since at least 2005 to renegotiate the treaty and there have been reported to have been seven rounds of negotiations but Mauritius has not agreed and hence the negotiations are essentially stalled. The common public assessment found in the media is that the arrangement with Mauritius costs the Indian fiscus in the vicinity of US$600 million per annum.[12]

The importance of this treaty is that in order for companies to benefit from these provisions it is essential for a company to have a Mauritius Tax Residency Certificate (TRC) issued by the relevant authorities. It is the terms of receipt of this certificate that help explain the importance of the treaty to the early development of the business sector. It is the explicit recognition by the Indian Supreme Court of the Mauritian authorities in issuing TRCs that has had a transformative function in services provision. In order to obtain the TRC the company undertook that management and control would be exercised in Mauritius.[13] The list is highly significant as it provides in effect a subvention to service providers including banks, accountants, auditors and lawyers. The fact that the board must meet in Mauritius also constitutes a support measure for the tourism sector. This subvention is from Indian fiscus. What evidence exists that the growth of the service sector is a direct result of the Mauritius-India DTAA? The data in Table 1 also indicates that the shift was primarily in the development of Financial Intermediation, which went from less than 5% of GDP in 1990 to 12.3% in 2010. The number of firms registered in the off-shore sector is in vicinity of 27,000 in 2009, up from 5,000 in 1995 (Mistry 2009). While Mauritius has developed a number of service sector exports (education and health), the main growth has occurred directly in the area of off-shore financial services. There appears to be some

[9] *The treaty, it is frequently quipped, was signed on 1st April 1983.*

[10] *Article 13(2) Mauritius-India, DTAA, 1983.*

[11] *FDI Statistics by the Department of Industrial Policy and Promotion. http://dipp.nic.in/fdi.statistics/India.FDIApril 2011, pdf downloaded May 2012. See also Ernst and Young.*

[12] *It should be noted that without detailed knowledge of the transactions and the capital gains such an estimate must be seen as a very broad figure.*

[13] *http://www.gov.mu/portal/goc/mof/indomauritiustaxavoidanceconvention.pdf, downloaded March 2012.*

Other conditions include:

1. *The company shall at all times have at least two directors resident in Mauritius of appropriate calibre to exercise independence of mind and judgment.*
2. *All meetings of the Board of Directors shall be held, chaired and minuted in Mauritius.*
3. *The company shall at all times keep all its accounting records at its registered office in Mauritius.*
4. *The company shall ensure that all its banking transactions are channelled through a bank account in Mauritius.*
5. *All statutory records, such as minutes and members' register, must be kept at the registered office.*
6. *The company secretary must be a resident of Mauritius.*
7. *The registered office must be in Mauritius.*
8. *Auditors must be Mauritian residents.*

recognition from those who have studied the growth of the Mauritius export sector that it is the prime driving force of that particular segment of the service export sector (see Mistry, 2009, p.60).

> ...while Mauritius IFS exports have grown over the years, they have not diversified vertically into different IFS domains (although there has been some geographic diversification). The bulk of IFS exports are still attributable (directly or indirectly) to low value-added, passive administration of foreign accounts established to benefit from double taxation treaties and agreements (DTT/ DTAs) with a number of countries. Most such accounts are related to tax benefits conferred by the DTT with India.

There also appears to be evidence from senior government ministers that the treaty itself is responsible for a substantial portion of GDP. In an interview the former Mauritian Deputy Prime Minister, Rama Krishna Sithanen said:[14]

> This global business (financial intermediation) accounts for six percent of our GDP and 25% of tax collections and employs 3% of the population.

It should be noted that India has moved to implement measures through the 2012– 2013 budget that may remove automaticity tax benefits being based solely upon the issue of a TRC by the Mauritian authorities. It has been noted that a large section of the investment in India is of third country origin and may be using Mauritius as an intermediary for its investments.[15]

This experience of Mauritius also provides important lessons for Botswana even though its circumstances are radically different. The commonly held view that the experience of Mauritius, i.e. a relatively smooth transformation from the exports of agricultural goods to industrial goods to services exports in one generation, can be readily transferred to Africa is questionable given the unique and extraordinary circumstances regarding the preferences received by Mauritius from the former colonial power. This preference provided the possibility for the creation of sufficient surplus for the local elite which reinvested it in the development of industry and tourism. The development of services exports, it has been argued, is linked to the 'tax-preference' granted to Mauritius through the DTAA with India.

Without the assistance that was provided to Mauritius, first by Europe, and then by the US and finally by India through the various treaty arrangements, the transformation would not have been possible without surpluses being generated in other sectors. In effect what Mauritius did was to externalise the economic costs of the transformation of its economy which may not otherwise have been possible in so small or remote a country. However, to simply dismiss the Mauritian experience as being a result of preferences is to fail to recognise the crucial role played by the political and bureaucratic elite that has taken advantage of the opportunities offered by the country. It would also undermine the importance that a competent national, as opposed to simply the foreign business elite, play in the process of transformation.

3.2 Mozambique – the Mozal Project

Mozambique, a large least developed country which has only recently emerged from a generation of internal conflict, is so completely different from Botswana, a middle-income country that has lived in relative peace since independence in 1966, that it would appear that little can be learned from its experience. Yet, from the perspective of the conduct of industrial policy and the diversification of exports, Mozambique offers the rarest of insights in Africa, that of a country that has successfully transformed and diversified its export base from that of mono-crop agricultural producer of cashew nuts to an exporter of manufactured products. It is that experience that is highly significant and points to the price that countries pay to make the transformation and the range of ancillary measures necessary to assure that the diversification is both meaningful and

[14] *Business Standard 'Review the Indo-Mauritius treaty, but business must be allowed to continue: Ram Krishna Sithanen', 30th March 2012. www.business-standard.com/india/.../reviewindo-mauritius-treatybusiness-must-be-allowed-to-continue-rama-krishna-sithanen/469454/downloaded May 2012*

[15] *Memorandum to Finance Bill 2012 states that (16 March 2012):'It is noticed that in many instances the taxpayers who are not tax resident of a contracting country do claim benefit under the DTAA entered into by the Government with that country. Thereby, even third party residents claim unintended treaty benefits… Therefore, it is proposed to amend Section 90 and Section 90A of the Act to make submission of Tax Residency Certificate containing prescribed particulars, as a necessary but not sufficient condition for availing benefits of the agreements referred to in these Sections.' http://www.taxsutra.com/node/276 downloaded 9 May 2012.*

integrated with the rest of the economy. As we shall see Mozambique paid a very high price to change the base of its exports, and while the shift is sustainable the aluminium sector remains largely disconnected from the rest of the economy.

There has been an extensive academic discussion of Mozambique's transformation from agricultural producer to exporter of aluminium (Altenburg, 2011; Krause and Kaufman 2011; Antonio M., 2011; Sonne-Schmidt C., et al. 2009). Some 42% of Mozambique's total exports are now aluminium. The total investment in the Mozal project was approximately US$2.4 billion and the smelter employs 1,100 workers. The investments included not only the facility but the up-grading of infrastructure. Mozal is owned by BHP Billiton (66%), the South African Industrial Development Corporation (20%), Mitsubishi (12%) and the GOM (2%).

No other country in the SADC region, apart from South Africa, can claim to have such a high level of exports of processed products. Thus, nominally at least, the country which, following the end of the civil war in 1993 was principally an exporter of cashew nuts, has shifted its export base towards manufactured aluminium and mining and energy exports. This record should make it a showcase for diversification in Africa and yet the Mozal project remains amongst the most controversial industrial projects in Africa.

In 1997 the government of Mozambique negotiated an agreement for the establishment of an aluminium smelter. The agreement involved not only BHP Billiton but other companies including Mitsubishi and IDC, South Africa and the IFC. There were a number of reasons that BHP had in particular sought to develop a smelter near Maputo. Kraus and Kaufman (2011, p.53) argue:

> ...the investors had a high preference for building the aluminium smelter near Maputo – not because of any comparative advantages or tax incentives that Mozambique had to offer, but rather due to the South African mineral-energy-complex's strategic interests: first, BHP-Billiton wanted to avoid having a competitor – Kaiser had first approached the GOM with plans to build an aluminium smelter – succeed in expanding its production, so BHP-Billiton pursued an aggressive investment strategy; second, the South African electricity utility, Eskom, was very keen to provide the energy for the smelter and, by interlinking its grid with the Mozambican grid, to establish itself as a player in the Mozambican electricity market. The Government of South Africa supported this strategy by offering an attractive incentive package to MOZAL that included cheap electricity tariffs through Eskom, which is Government-owned.

The concessions that were offered by the Mozambique government included a 50-year tax holiday whereby BHP would pay only 1% turnover tax. The other motivation, as indicated above, was the price of electricity. Eskom wheeled in DC electricity from Cahora Bassa dam and then resold AC electricity to Mozal. Mozambique remains a net exporter of electricity principally to South Africa and it is reported that the price of electricity paid by BHP at Mozal was set at US$0.02/kWh until the renegotiation in 2010. Some 60% of the cost of aluminium is the cost of electricity used in its refining and the choice of location for refining is ultimately dependent upon the availability of cheap reliable energy. Thus while the contractual arrangement is between BHP and Eskom, the supply of electricity is on net from Mozambique. As noted above the Mozal project integrated the Mozambique hydro generating capacity into the South African grid and created a lower cost of production as hydro remains the cheapest form of electricity in the region.[16]

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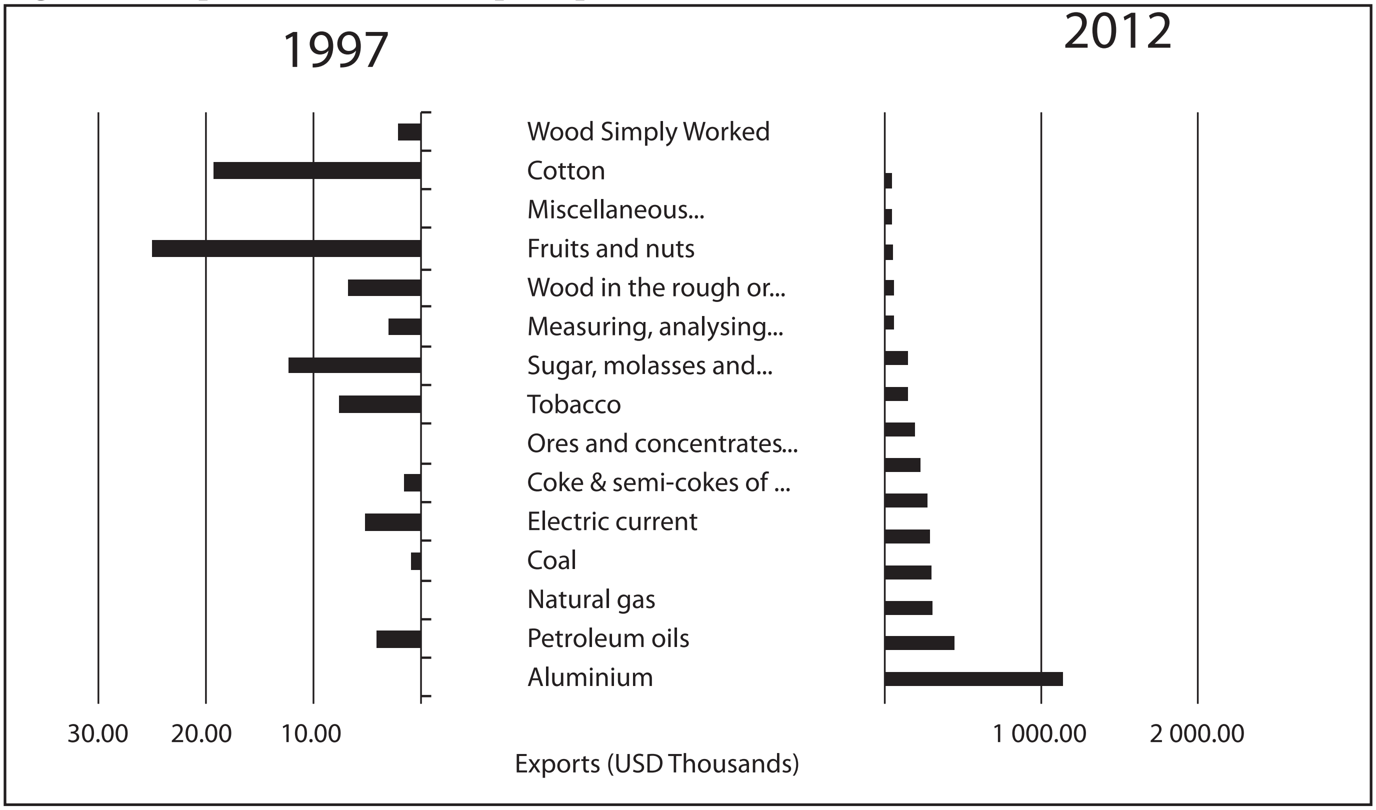
[16] *At the time the Mozal Agreement was signed between Mozambique and South Africa both countries had substantial excess generating capacity. This has certainly not been the case in the post-2008 era.*

Figure 7: Composition of Mozambique exports 1997 and 2012



Source: *Comtrade*

The analysis above and in a number of comprehensive studies demonstrate that first, Mozambique has diversified its exports and second, that Mozambique paid a heavy price in terms of revenues foregone in order to obtain agreement with BHP Billiton. Mozambique has certainly considered options for increasing its revenues from Mozal (Bucuane, A. and Mulder, P., 2007). However, from an industrial policy standpoint the most interesting lesson is not the development of the Mozal refinery per se but rather, what followed its construction and establishment in the attempts by the government of Mozambique and the donor community, which had driven the project, to develop linkages to the economy. In the final analysis it was the International Finance Corporation (IFC) that provided the advice to the government of Mozambique on the terms of the agreement. These terms have been severely criticised by many economists (Castel Blanco, 2003, 2008; Sonne-Schmidt, C. et. al., 2009) as being unnecessary in order to close the deal with BHP Billiton. This was to prove far more difficult and the ultimate judgment on the project will rest on whether the diversification of the Mozambique's export base was a psychic transformation or whether it had any significant effect on the rest of the economy.

To their credit, the proponents of Mozal and the international community attempted a long programme of trying to develop SME capacity to supply Mozal. There were three separate donor-driven attempts to develop linkages between SMEs and Mozal, all of which were more or less unsuccessful.[17]

i) SME Linkage Programme (SMELP) 2001

This programme was initially developed by the government of Mozambique and implemented by Mozal, the Centre for Public Integrity (CIP) and the IFC. The aim was to help local firms develop the capacity to win contracts during the construction phase of Mozal II. Significantly, in a scoping study prior to the commencement of the linkages work, it was found that of the 370 firms screened to participate in the programme '99% had serious problems with product quality, 95% did not have the required profile,

[17] The description of the programmes developed to establish linkages with Mozal draws heavily on the description in Krause and Kaufman (2011).

experience and portfolio of projects, 92% operated with old worn-out and out-dated equipment, 90% suffered from serious management deficiencies and inadequate financial structure and capabilities' (Castel Branco and Goldin, 2004). Contracts offered by Mozal were simply too large for local firms to handle. All these problems are familiar to the private sector in least developed countries, especially ones that had experienced a generation of armed conflict.

SMELP was essentially involved with unbundling of the large Mozal construction contracts so they could be absorbed by local firms. There was a reformulation of standards in order to allow local firms to compete and the facilitation of access to information about firms. Under SMELP 16 SMEs were trained and awarded 28 contracts worth a total of over US$5 million (USAID, 2009). It should be noted that the construction of Mozal cost US$2.4 billion.

ii) Mozlink I

The Mozlink I project was established to replicate the work of SMELP but based on supplying the smelter's operations rather than during its construction stage. The programme not only developed the capacity of SMEs directly as the SMELP programme but also addressed the other related concerns of firms trying to supply the company as well as developing consulting capacity to assist SMEs. Under Mozlink I 'annual local purchasing from Mozlink affiliated companies rose from US5 million in 2001 to $13 million in 2005' (Jaspers/Mehta, 2007). It should be noted that Mozal has total annual local purchases of US$180 million of which US$96 million is electricity and water (Macamo, 2009). Total exports of aluminium were US$1.45 billion in 2008.

iii) Mozlink II

Mozlink II continued the work of Mozlink I but included large transnational firms such as Coca Cola, Sasol (gas) and Cerverjas de Mocambique. Including such firms which are already capable of supplying large firms such as Mozal certainly improved the results of the programme. In the end the SMEs that have benefited from the various linkages programmes have been confined to a limited range of services which include metallurgical services, transport, auto mechanical services, construction, electrical products, catering, security and laundry (Jaspers/ Mehta, p.63).

At the end of the programme in 2005, a 660-hectare industrial park enjoying tax-free-zone status was established on the edge of the Mozal facility to help create a cluster associated with the smelter. Perhaps the most obvious criticism of the project is that there was no attempt to develop forward linkages. The argument has been made that Mozambican firms had no experience in working with aluminium, and as a result down-stream processing had no technological base. While this is an important factor these are skills that can be developed and the advantages of being located in close proximity to an aluminium refinery could potentially create commercial benefits for aluminium processors. Botswana exports aluminium boats to Mozambique from Maun, on the northern edge of the Kalahari, but has no capacity to produce aluminium and imports, at very high cost, from South Africa.

The donor community generally remained opposed to down-stream processing and did not attempt a further development of the Mozal model by establishing links with large aluminium processing companies that could potentially be enticed to establish in Mozambique. Such a development could have resulted in major forward linkages.

In the final analysis what Mozambique had was a US$2.4 billion investment which transformed and diversified the economy. The Mozal project created approximately 1,100 jobs directly, but despite several years of attempts to develop linkages beyond those expected of most large producers, relatively little eventuated. An additional 2,500 jobs were created through the linkages that have been established. Only 10% of Mozal's revenues stay in Mozambique. Reviewing the experience of Mozal (Castel Branco, 2004) concludes that 'while Mozal's contribution to Mozambique's economy is important and it makes an important contribution to Mozambique's GDP, its impact is limited. The result is an isolated economic enclave that uses large quantities of scarce resources without returning revenue or jobs to the economy.'

Mozambique, along with Mauritius, are the only countries in the SADC that have, since independence, radically transformed their export base to industrial and service exports. In the case of Mozambique, there were some costs, the cost of revenue foregone to the state through concessions to BHP Billiton. Whether it is correct to say these costs extend to the sale of electricity to South Africa and its resale to Mozal must be tempered by the absence of alternative markets for Mozambique hydro-electric power at the time. Moreover, Mozal has weak backward links to the economy and no forward linkages.

What was not attempted at Mozal was the systematic development of forward linkages beyond refining. Realistically, given the low technological base of the private sector, this could only be achieved by the invitation of yet other trans-national companies. However, considering the unique economics of aluminium refining, depending as it does on electricity prices, which was one of the main draw cards for BHP Billiton, the experience cannot be readily replicated in down-stream processing as, given its resource base, Mozambique holds no commercial advantage for such a processor. This could only be achieved once again at considerable cost to the Government of Mozambique.

3.3 Namibia

Namibia and Botswana share in common not only a long border and a history that stretches back to pre-colonial times but their modern economies have developed in remarkably similar ways, being based initially on both agricultural trade preferences but more significantly on diamond and other mineral exports. The factor endowments of both countries still largely determine the trade and development path of both. Both Botswana and Namibia remain in effect captives of their geology and geography.

Namibia, for historical reasons, is closely integrated with the South African economy. In 2010 it recorded sound real GDP growth of 4.2% which was slightly lower than that of Botswana at an estimated 6.1% in the same year. Both countries were very adversely affected by the decline in diamond and other commodity prices and exports that followed the international economic crisis that began in 2008. The growth rates in 2010 were thus rebound growth occurring in the wake of the recovery in mineral and diamond prices as well as export volumes.

The fundamental difference between Namibia's economy and that of Botswana is the extent of reliance on unprocessed diamond exports which constituted approximately 20% of Namibia's total exports in 2010. This compares to approximately 68% of total exports from Botswana in 2010. Namibia is far less dependent not only on diamonds but also on mining, and has a more economically significant agriculture and fisheries export sector than does Botswana. However, if Botswana's diamond wealth has resulted in lower levels of economic diversification, it has resulted in a much higher GDP/capita than Namibia.

Table 2: Composition of exports by commodity since independence (billions N$)

	1990	2000	2010
Minerals			
• Diamonds	0.85	4.25	6.1
• Uranium			5.0
• Other Minerals2/	0.8	1.3	1.8
• Agricultural Products including live animals and fisheries products	0.78	1.4	3.6
• Industrial Products1/	0.26	0.8	6.1
Total Exports	**2.85**	**7.9**	**29.6 (21)**

Source: *Bank of Namibia Annual Reports 2010, 2001 NB 1/ in 2010 exports of industrial products included polished diamonds, beer, and refined zinc. The exports of the processed diamonds and beer were minimal in 2000. 2/ the figures for uranium are included in 'other minerals' for 1990 and 2000.*

Namibia has decreased its dependence on diamonds and now has a more diversified economy though one still highly dependent upon mining and the processing of minerals.[18] This is a diversification that is likely to be followed by Botswana in the coming years. It should be noted that the rise of uranium as a source of mineral exports is an important source of diversification within the Namibian mining sector. The industrial exports have also expanded, constituting 22% of total estimated exports in 2010.

The experience of diversification into industrial products as well as the development of agricultural exports such as table grapes has provided some important

[18] *It should be noted that approximately 23% of Namibia's 2010 exports are what the bank of Namibia calls 'other commodities'. This appears to be an error term and hence the rate of dependence on diamonds is larger than that suggested by the ratio of diamonds to total exports.*

lessons from Namibia for all of its neighbours. Four important areas of diversification are worthy of further detailed consideration. These include:

1) Diamond Cutting and Polishing
2) Beer Exports
3) Copper and Zinc Refining
4) Table Grapes

Traditionally, Namibia's exports after independence have been dependent upon a limited range of products which have either preferential access to the EU market, e.g. beef and fish, or to the South African market, e.g. live cattle or high-rent basic commodities such as diamonds and uranium.

However, over the last two decades Namibia has seen important developments in new sectors of production. The section below considers the efforts that the government has made to develop these new sectors. The measures have involved granting tax-free EPZ status to both the zinc and copper refining and smelting facilities as well as to the diamond cutting and polishing firms all of which operate within the Namibian EPZ framework. The government has also assisted the export marketing by Namibia Breweries, which has grown to become a relatively significant exporter. In the area of table grapes the government was instrumental in negotiating improved market access to the EU market, which has been the main, direct and indirect market for Namibia's table grapes.

i) Diamond beneficiation

The cutting and polishing industry in Namibia, like that in Botswana, is the product of government mineral and industrial policy. Under the provisions of the Diamond Act No 13 of 1999 diamond mining companies pay an income tax of 55% of taxable income. The act also provides for a royalty of 10% on the value of mined diamonds.[19] This royalty provision is now replaced by an export duty at the rate of 10%. However, exports of polished diamonds are exempt from export tax, and sales of rough diamonds to domestic cutters (processors) are also exempt from any royalty payment by the producer (Even-Zohar, C., 2009, p.409-410). The export duty on exports of unprocessed diamonds is a clear violation of the provisions of the Interim Economic Partnership Agreement and was one of the reasons cited by Namibia for its unwillingness to sign the Interim EPA in 2008.[20]

The 2009 WTO Trade Policy Review for Namibia states that:[21]

> The Namibia Diamond Trading Company, a 50:50 joint venture between De Beers and the Government and operated by De Beers, markets all of Namibia's diamonds. Through the Namdeb Diamond Corporation (also a 50:50 joint venture between Namibia and De Beers) some diamond production is made available for sorting and sale in Namibia and 15% of production of cuttable diamonds are sold for local processing (Chapter IV(4)).

Therefore by imposing an export tax on unprocessed diamonds and providing rough diamonds to firms in the EPZ, the government of Namibia has provided considerable incentives for the expansion of domestic diamond processing. Moreover, diamond-producing firms in Namibia also import diamonds at a very high value for the purposes of cutting. As is evident below, Namibia, like other countries in the SADC region which are committed to down-stream processing, imports high-value diamonds for the purposes of processing. Thus, despite popular belief, Namibia and Botswana do not necessarily process their own diamonds as some are imported. Moreover those diamonds that are imported are consistently amongst the highest unit cost in Southern Africa.

[19] *WTO Trade Policy Review of SACU-Namibia 2010, SACU-Namibia WT/TPR/S/222/NAM, para 190-191.*

[20] *Article 24.2, SADC Interim EPA, 2007: In exceptional circumstances, where the SADC EPA States, with the exception of South Africa, can justify specific revenue needs, protection of infant industries, or protection of the environment, these SADC EPA States may introduce, after consultation with the EC Party, temporary export taxes or charges having equivalent effect on a limited number of additional products.*

[21] *WTO Trade Policy Review of SACU-Namibia 2009, SACU-Namibia WT/TPR/S/222/NAM, p.40.*

Table 3: Imports of rough diamonds, 2010

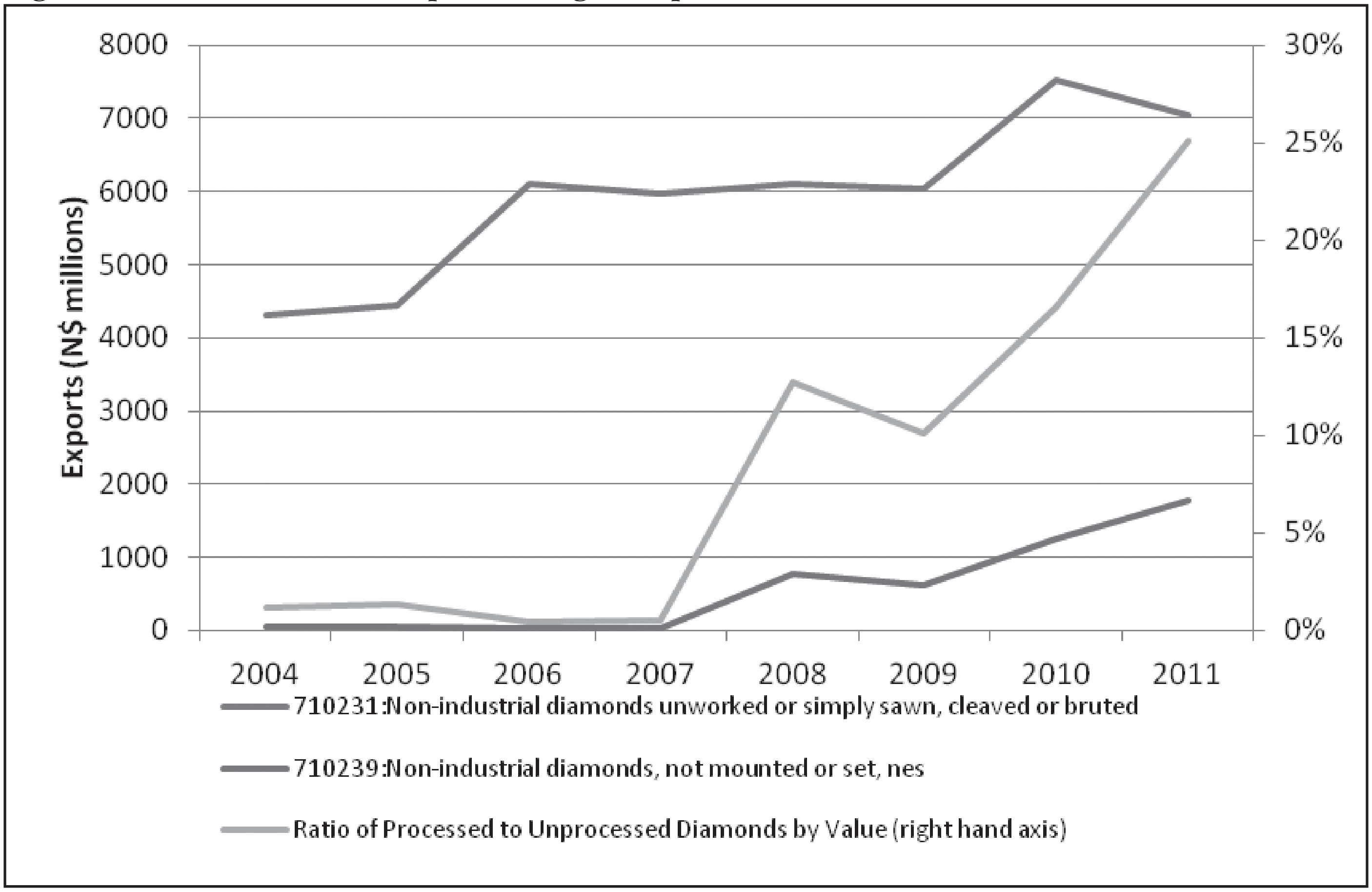
	Volume, cts	Value, US$ millions	US$/ cts
Botswana	663646	617	930
Namibia	179980	192	1064
South Africa	400056	314	785

Source: *Kimberley Process. https://kimberleyprocessstatistics.org/public_statistics*

In any particular sight or bundle received by diamond processors from DTC in London there will be diamonds of different quality and value. Some will be small low-value stones that cannot be processed in a relatively high-cost location like Namibia and will have to be exported to India or other Asian processing centres for cutting and polishing. The normal rule of thumb in cutting and polishing is that this should not cost more than 10% of the value of the rough. That Namibia is importing such high-value rough for processing indicates that processing costs must be relatively high. Whether a sustainable cutting and processing industry is commercially viable in Namibia in the longer term once diamond supplies cease to exist is highly questionable especially in light of the failure over many years of South Africa, with a much more significant resource, to develop a sustainable cutting industry.

This importation of diamonds is common to other diamond-processing countries such as Botswana and South Africa and results from the fact that diamond sorting and sales continued through Diamond Trading Company (DTC) in London until 2012. The process has now been localised in Botswana. This local processing of diamonds allows firms to be Diamond Trading Company Botswana (DTCB) sight holders and therefore have access to local rough, a portion of which is cut and processed locally and much of which is still exported as rough. High-value rough can be processed locally but a significant proportion of the allocation is processed in third countries. The profitability of the diamond cutting and polishing industry requires consistent long-run access to rough from the primary diamond market i.e. directly from producers.

Figure 8: Namibian diamond exports – rough and polished



Source: *CSO Windhoek, and authors' calculations*

The chart above indicates that, based on Namibian trade statistics, Namibia has been very successful in the last few years in terms of developing the cutting and processing industry. As can be seen, Namibia has moved from cutting and polishing a negligible percentage of the value of diamonds mined to a substantial proportion of total production. It should be noted that diamond trade statistics are notoriously inaccurate. Based on Kimberley statistics Namibia imported N$1.4 billion in rough diamonds in 2010 all for processing. Based on Namibia Central Statistics Office (CSO) statistics it exported N$ 1.2 billion in processed diamonds.

Namibia faces even more daunting sustainability issues with regard to diamond beneficiation than is faced by Botswana because, based on present knowledge of its geology, it has a much smaller resource base than Botswana and hence the economies of scale and agglomeration and time that a competitive diamond-cutting industry requires to develop are even more limited there than in the case of Botswana. Moreover, the time required for the development of these economies may be quite limited and will ultimately depend on the access to rough diamonds that is provided to the local firms. Whether the cutting and polishing industry will prove to be sustainable beyond the expiry of existing diamond deposits is a question that must be posited by both Botswana and Namibia. It is argued by some observers that the solution lies in a greater access to rough diamonds than the 15-16% of annual production[22] currently available to local firms. This may not even increase production in the short term as firms with high production costs will be unable to commercially process low-cost diamonds locally. Moreover, there is no guarantee that this will create a sustainable industry that will continue to exist beyond the life of the diamond mines.

[22] *AC Gwanab (2010), 'The Need for Beneficiation of Namibian Diamond Exports and its Impact on Economic Performance', research report for MBA, Stellenbosch, March 2010. https://scholar.sun.ac.za/handle/10019.1/8582 downloaded 22 March 2012.*

ii) NBL – the limits of National Industrial Policy in a global market

One of the most interesting and instructive cases of export diversification and the expansion of industrial production in Namibia has been the growth of Namibian Breweries Limited (NBL) and its development of a large and expanding international market for Namibian beer i.e. Windhoek Lager and its associated brands. In the domestic market the company is estimated to control some 73% of the market.[23] The growth in exports began by the company itself in the 1980s when it saw that its domestic market was inadequate for a sustainable growth path for the company. NBL's initial strategic partner, Interbrew and Becks, which held interests in the company for a period of five years, sold its interests in NBL in 2003 to Heineken/Diageo.[24] Heineken/Diageo were relative newcomers into the African market, especially in comparison to the continent's dominant market player, SAB-Miller. As a result, they had no choice but to implement an aggressive model of market penetration, which served to expand NBL exports to its current level of 27 countries in Africa and in Europe. For the Government of Namibia the exports provided employment, much-needed revenue, export earnings and a 'national brand' of international significance.

Namibian beers have been brewed according to the requirements of the German Purity Law 'Reinheitsgebot', using imported raw materials for over 100 years.25 This is now advertised as the oldest existing food standard dating back to the 16th century, and it stipulates that only barley, hops and water may be used in the brewing of high-quality beers. Namibian beers are therefore free of additives, colorants and preservatives and this has been one of the most important marketing advantages that the product has had over time. These qualities have facilitated the 'premiumisation' of Windhoek Lager, which has proved far more difficult and costly with brands that are less distinctive.

Windhoek Lager and related products have most notably made significant inroads into neighbouring SADC markets such as SA,26 Botswana and Angola. This export-oriented strategy has meant that NBL in 2011 derived some 60% of its sales from the export sector which is uncommon for a relatively small brewery on the African continent. Approximately 41% of total sales by volume are for the domestic market. 47% of sales are into SA and the remainder amongst other markets. While the volume of exports is predominant in total sales, earnings are lower per unit in the export market and hence a disproportionate share of earnings is generated domestically.

In 2008 NBL, together with its partners Heineken and Diageo, invested a total ZAR6 billion in a production facility in Sedibeng (Diageo and Heineken each own 42.25% and NBL own 15.5%), near Johannesburg where Windhoek products are produced under licence. A further ZAR1.7 billion was invested in a three-tier marketing arrangement (DHN Ltd). The three partners are now trying to combine the two structures.

Originally Heineken, when it had purchased its shares in NBL, was considering the construction of a brewery in Namibia to service the SA market after it had terminated its own marketing arrangements with SAB-Miller in South Africa. However, beer is a low value-to-weight item and therefore transporting beer across the Kalahari from Namibia to South Africa and Botswana, the company's two main export markets, made little commercial sense. As a result, given the nature of its business model it was commercially rational to shift production outside of Namibia to gain advantage of the economics of location and agglomeration. This off-shore transfer of production is a common development in the trans-national brewing industry. However, the factors that moved production from Namibia to South

[23] *http://www.ide.go.jp/English/Data/Africa_file/Company/namibia06.html#anchor9 downloaded 15 May 2012.*

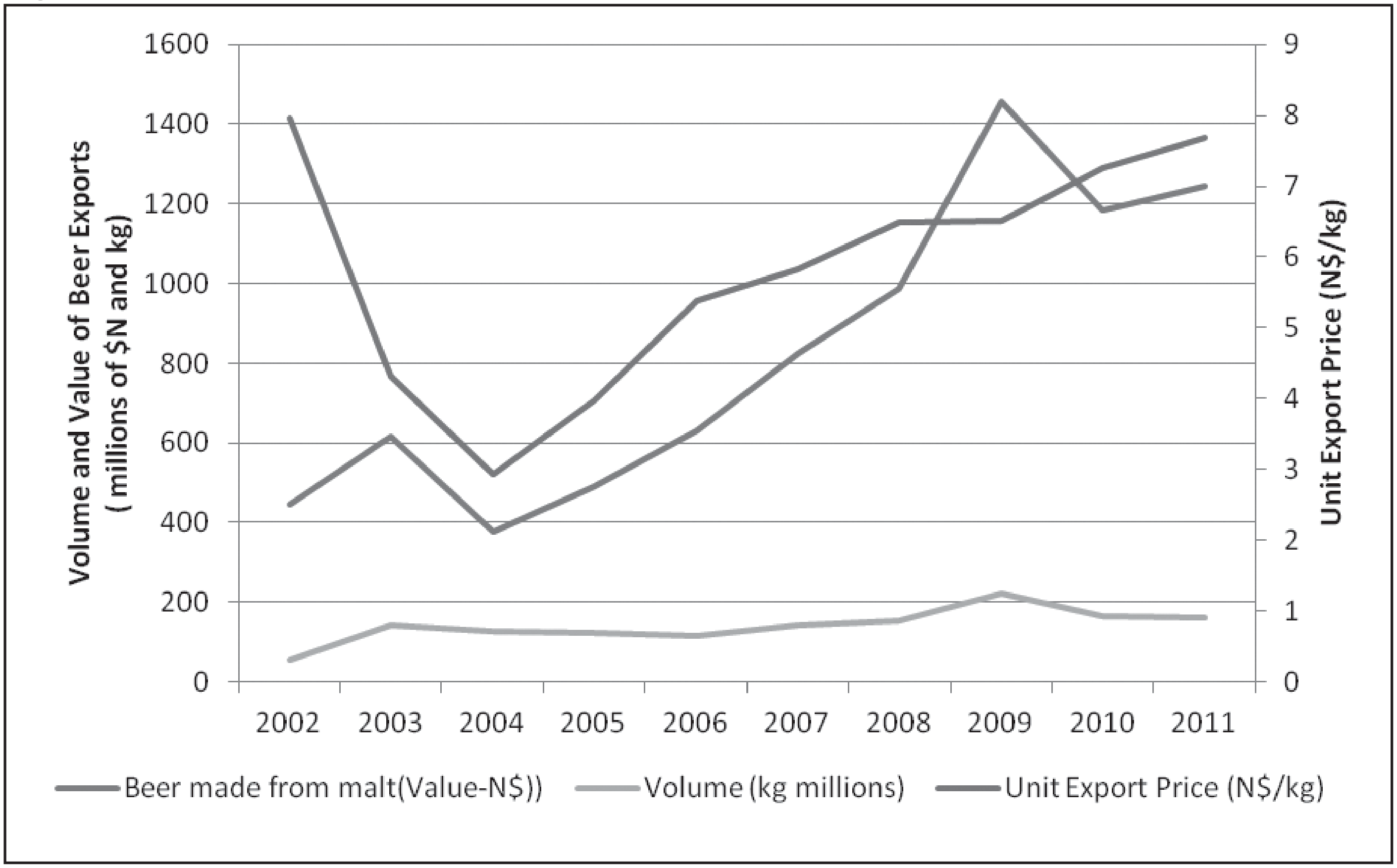
[24] *'Heineken and Diageo announced today that they have agreed to acquire Interbrew's current shareholding (held through Brauerei Beck's) of 44% in NBL Investment Holdings Limited. This company holds a 50.1% stake in Namibia Breweries Limited. In addition, the companies acquired a direct stake of 6.8% in Namibia Breweries. As a result, Heineken and Diageo now have an effective 28.9 % stake in Namibia Breweries. This stake will be held by a 50/50 joint venture of Heineken and Diageo. For Heineken, the total amount of the transaction is EUR 15.5 million. The transaction is subject to relevant regulatory approvals. Amsterdam, 15 April 2003, Heineken and Diageo acquire stake in Namibia Breweries. www.thefreelibrary.com/Heineken+and+Diageo+Acquire+Stake+in+Namibia+Breweries.-a0100039721, downloaded April 2012.*

[25] *NBL has moved to establish backward linkages with the agricultural sector in Namibia Company. It has also embarked on a project to expand the production of barley in Namibia.*

[26] *A Thomas Hochreiter, NBL's Export/Global Partnership Manager NBL Exports: 'Taking pure Namibian beer to the world', 14.11.2011. http://www.republikein.com.na/die-mark/nbl-exports-taking-pure-namibian-beer-to-the-world.137837.php downloaded 22.3.2012*

Africa were not simply a matter of transport cost minimisation or the economics of agglomeration as the Government of South Africa also provided incentives for the establishment of the ZAR6 billion brewery in Sedibeng, an area of Gauteng Province suffering from considerable unemployment. The Government of South Africa provided financial assistance in the form of tax relief for the establishment of the Sedibeng brewery though the precise terms remain unknown. Heineken-Diageo also spoke publicly at the time of the opening of the brewery that the decision over location was very much a matter of preference of the Government of South Africa.[27]

Figure 9: Volume value and unit price of exports of beer from Namibia (HS 220300)



Source: *CSO Namibia and authors' calculations. It should be noted that Namibia measures volumes of beer by weight which includes the container.*

[27] 'Heineken to build local brewery', 4 April 2008. 'The location of the brewery was *a difficult decision based on far more than just geology, geography and infrastructure,'* Heineken regional president for Africa and Middle East Tom de Man said in a statement this week. 'We are also very aware that southern Johannesburg is an area that *will benefit enormously from new commercial investment, which will in turn assist and* enable social and economic progress in the whole area.' The choice in location has also enabled the company to gain strong support from the government, various development agencies and the Department of Trade and Industry. http://www.southafrica.info/business/investing/heineken-270308.htm#ixzz1vUz27tT3 downloaded 20 May 2012; see also address by the Minister of Trade and Industry, Mandisi Mpahlwa to the National Council of Provinces on the Trade and Industry Budget Vote 2008/09. In his address to the National Council of Provinces then Minister of Trade industry Mandisi Mpahlwa said: 'I am also glad to be able to report that our trade and investment division have had great success working hand in hand with provincial investment agencies *leading to the very significant R7,7 billion Heineken brewery investment in Sedibeng.'* http://www.polity.org.za/article/sa-mpahlwa-trade-and-industry-dept-budget-debate-vote-200809-ncop-29052008-2008-05-29 downloaded 20 May 2012. *The specific* programme of assistance provided to Heineken is unknown and stemmed in part from commitments to Black Economic Empowerment programmes. 'The DTI is pleased to announce that Heineken will establish a R7.7 billion brewery in Sedibeng, Gauteng. Heineken International is committed to partnering Black Economic Empowerment (BEE) companies to set up new glass bottling and canning plants. The company has also committed to create opportunities by procuring various services including construction, distribution, warehousing, transport, marketing and adverting from South *African companies.' Budget vote, Media briefing 29 May 2008. http://www.info.gov.*za/speeches/2008/08053015451003.htm downloaded 19 June 2012.

Thus several factors combined to both pull and push production out of Namibia. The factors include economies of scale of the brewery business, the transport economics, the business model and market position of Heineken-Diageo, and the tax incentives by the Government of South Africa. However, the establishment of the Sedibeng brewery is a natural product of export success that is found in many brands in the brewing industry. It needs to be understood that the development of the NBL export market was heavily supported by the Namibian government. It is therefore an important case study of the limits of national trade policy in a competitive globalised market.

The Namibian government had provided considerable support to NBL in the expansion of its exports. A Jetro market report on NBL concluded:[28,29]

> In the 1990s the Namibian Government provided significant support for NBL rejecting an offer by South Africa Breweries to build a brewery in Namibia. In 1996 the government of SA proposed a 60% tax on light beer which also covered the popular Windhoek Light which was contesting the South African market. The Namibian government backed NBL and instructed the company not to pay. The matter was ultimately resolved by the Finance Ministers of the two countries.
>
> The government (of Namibia) expects the industry to create employment, as well as add value to raw materials produced in Namibia. Measures to assist manufacturing development are as follows: Market access developed for exporters; Quality assurance and standards provided by the Namibia Standards Institute; Export promotion assistance provided by the Ministry of Trade & Industry (MTI) as well as the provision of Industrial infrastructure, also by the MTI.

Equally, without the assistance of the beverage transnational companies' international market, penetration and expansion into EU markets would have proven far more difficult. However, this relationship with Heineken-Diageo is not without consequence for the development of industrial policy in Namibia. NBL now exports Windhoek Lager to 27 countries and is in joint venture with Heineken-Diageo to help facilitate those exports. The objective of the national industrial policy was the creation of direct employment in Namibia, and the globalisation of production of a low-value item such as beer will result in the shifting of employment off-shore. As is evident from the figure above, recorded exports of beer from Namibia have been flat since the commencement of operations in Sedibeng in 2008/9. Indeed, it was clearly at the time of the Sedibeng expansions that the intention of NBL was to rationalise its production between Namibia and South Africa by entering into the joint venture with Heineken-Diageo:[30]

> This joint venture may benefit further from efficiencies created in future by shifting volumes to Heineken's and Diageo's 3 million hectolitre Sedibeng Brewery near Johannesburg which is scheduled to be operational towards the end of 2009. Efficiency will also be maximised through allocation of certain production volumes to Namibia Breweries in Windhoek.

NBL and KBL

The one obvious commercial difference between the main beer brand manufactured in Botswana which is St Louis Lager is that unlike Windhoek Lager, it is not now and has never been exported in significant commercial quantities from Botswana. On the contrary SAB-Miller uses its Botswana subsidiary as a means of distributing not only the locally produced beer, produced by Kalahari Breweries Limited (KBL) but a range of other SAB-Miller products which are largely produced in Botswana. This means that the potential for diversification of the export sector that initially occurred in Namibia has not occurred in Botswana. In part this is necessarily because Heineken-Diageo were not the first firm to own NBL. Prior to both the strategic partnerships with Interbrew and Heineken-Diageo, NBL was owned by independent Namibian owners who first developed the export market because of the small size of the domestic Namibian market. NBL was not sold to SAB-Miller and the Namibian interests in NBL always formed strategic alliances with companies that did not have a significant

[28] *http://www.ide.go.jp/English/Data/Africa_file/Company/namibia06.html#anchor9 downloaded 15 May 2012.*

[29] *The official spokesperson of NBL Mr Gideon Shilongo (pers com 18 July 2012) said that NBL has paid all taxes due to the government of South Africa and had received assistance from the Government of Namibia but not industrial infrastructure.*

[30] *Namibian Breweries, Annual Report 2009, pp17-19. http://www.namibiabreweries.com/documents/investor_relations/46e_nbl09_final20oct.pdf downloaded 4 July 2012.*

African market share to protect. Therefore an export-oriented strategy was a key to the growth of the NBL and its strategic partners Heineken-Diageo.

The export success of NBL stems from the significant marketing and commercial advantage in exporting a beer using the 'Reinheitsgebot' standard that does not exist with, for example, St Louis but nonetheless many beers which do not have this commercial advantage are exported by their parent company as 'exotic beers' and have become global brands. One of the compelling reasons explaining why St Louis is not exported is that the parent company, SAB-Miller has subsidiaries and associate companies in virtually every one of Botswana's neighbours, with the exception of Namibia and is unlikely to encourage exports into those markets. It is important to note that the Namibian government rejected in the 1990s an attempt by SAB-Miller to establish a brewery in the country and this simply may be the reason Namibia exports beer and Botswana does not. However, since the establishment of the Sedibeng facility the government of Namibia has welcomed a SAB-Miller proposal to establish a brewery in the country.[31]

A trans-national corporation with numerous branches and with a traditional inward-looking business model which dominates food and beverage producing sectors will make it impossible to develop exports in that sector. Exports by one of the SAB-Miller subsidiaries which exist in many SADC countries would necessarily mean a decrease in overall profits for the SAB-Miller group as exports, with their high transport cost and generally lower profit margins in comparison with domestic supply. It is improbable that Namibia would be exporting over N$1.3 billion of beer per annum if NBL had been acquired by SAB-Miller in the 1990s. This is especially so in light of the experience of Kalahari Breweries Limited (KBL) in Botswana. However, as we have seen in the case of Namibia, eventually the joint venture between NBL and trans-national producers means production of a successful export shifts to a destination closer to the main market. A similar counterfactual can be posited regarding foreign ownership of NBL. If NBL had remained solely Namibian owned it is improbable that it would have been able to penetrate 27 markets. Moreover, even if it had, how long would it have been before a solely nationally owned NBL would have decided to shift its production to Gauteng to lower transport costs and increase profitability?

[31] *4 April 2012 Namibia: SABMiller's $34m Okahandja brewery delayed' http://www.ventures-africa.com/2012/04/namibia-sabmillers-34m-okahandja-brewery-delayed/ downloaded 11 June 2012.*

iii) Base metal beneficiation – developing a source of commercial advantage

Many countries in the SADC region that produce base minerals seek to assure some measure of down-stream processing or beneficiation of base metals. One of the most important areas of economic diversification in Namibia has been the refining of zinc and the smelting of copper to the stage of blister i.e. just prior to refined copper cathode. As in other countries base metal beneficiation in Namibia is very much a product of government policy to create local employment and domestic value addition. Namibia has two base metal smelters/refiners, one at the Skorpion mine – Namzinc which smelts and refines zinc and lead from the Skorpion mine and the other in the North West of Namibia which is the Namibian Custom Smelter (NCS) at Tsumeb which smelts both local and imported copper concentrate.

a) Namibian Custom Smelter – Tsumeb

This production facility smelts, but does not refine, copper from mines locally but also imports large volumes of concentrate from Bulgaria. According to its Canadian owner, Dundee Precious Metals, the smelter is meant ultimately to process up to 240,000 tonnes of 'complex' copper concentrate when expansion is complete. It is estimated by the US Geological Survey that in 2010 Dundee processed 30,000 tonnes of copper blister (98.5% Cu). This blister was then shipped to Europe for refining to cathode. The facility employs approximately 800 workers and is accorded EPZ status which means it pays no taxes. Tsumeb is located some 700 km from the port at Walvis Bay. The concentrate is thus shipped from Bulgaria to the middle of the Namib Desert for smelting.

The smelter was originally built by Newmont Mining in 1961–2 when Namibia was still a South African territory. The facility was established to process local 'complex' copper. The smelter had an integrated facility to produce refined copper and lead from similarly 'complex' copper concentrate found in the area. It also had smaller facilities that produced arsenic and cadmium. It went through several owners including Goldfields, which went bankrupt in 1998, and then the company was ultimately taken over by Weatherly Mining International in 2006. In December 2008 Weatherly suspended all mining operations because of a major decline in the world copper price associated with the global economic crisis and only kept the Tsumeb Smelter going. The Tsumeb smelter was converted to a toll smelter at the beginning of 2009. In March 2010, Weatherly sold the Smelter to Dundee Precious Metals Inc. for N$33 million in cash and shares, with Weatherly retaining all mining assets.

The plant is very old and was taken over by Dundee during the international economic crisis in order to assure that it had access to a smelter able to deal with its 'complex' concentrate from Bulgaria. The smelter is one of the few in the world that is able to treat arsenic and lead-bearing concentrates. For Dundee the Chelopech mine in Bulgaria is one the largest parts of its investment portfolio and therefore the acquisition of the Namibian smelter was essential to assure off-take from the Bulgarian deposit. The need for acquisition stems from the decision of the government of Bulgaria to halt the processing of the copper, which was felt to have serious health impacts on the local workforce and population:[32]

> Prior to 1990, the Pirdop smelter, located seven kilometers east of Chelopech, accepted the sulphide-rich concentrates from Chelopech and blended them with cupriferous concentrates from the nearby Elatsite Med and Assarel Medet mines. The relatively high content of arsenic in the Chelopech copper concentrates led to the Bulgarian Government decreeing on April 1, 1990 that Chelopech concentrate could no longer be treated at the Pirdop smelter.

The Government of Namibia agreed to EPZ or tax-free status for Dundee as well as a legal limitation of historic liability from the tailings and smelter waste. The smelter transfers an industrial process to Namibia which is no longer acceptable for health reasons in Europe with all the attendant risks to workers and public health that this entails. In 2011 the concerns regarding the health impacts on workers and residents in the Tsumeb area of both arsenic and sulphur dioxide emissions from the smelting process resulted in the government commissioning a report into the health and environmental consequences of the facility. The report is not in the public domain but following the report NCS reported in a press release that:[33]

> The Namibian Minister of Environment and Tourism ('MET') has issued a letter to the Company relating to the operation of its Tsumeb smelter, owned and operated by its subsidiary, Namibia Custom Smelters (Pty) Limited ('NCS')... Effective May 1, 2012, the MET has instructed NCS to reduce feed to the smelter by approximately half until the projects designed to capture fugitive emissions have been completed. These projects, which form part of NCS' Project 2012 currently underway, will be completed in the second half of the year. ...In the interim, NCS will work to bring forward the particular components of Project 2012 that specifically address fugitive emissions ...In addition, the Minister has advised NCS to advance the installation of the sulphuric acid plant from 2014 to 2013. On its own initiative, NCS has started work on expediting the acid plant and determined that the fastest schedule possible, from the start of engineering to construction completion, is 26 months.

The plant at Tsumeb was originally built in 1961–63 and is a product of the colonial period when health impacts on African workers and the local population were not a major policy consideration of the South African administration. However, the Government of Namibia knew that the high arsenic copper concentrate was banned from further processing in Bulgaria and that Dundee could not readily conclude an off-take agreement for the concentrate given the attendant health risks. It granted Dundee EPZ status and in effect subsidised the company to renovate and expand operations at the NCS smelter at Tsumeb. In light of

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32 *http://www.dundeeprecious.com/English/operations/producing-mines/Chelopech/overview/default.aspx downloaded 22/3/2012.*

33 *http://www.dundeeprecious.com/Theme/Dundee/files/Analysts%20Presentation%20NCS%20Nov10_web.pdf downloaded 22/3/2012.*

34Dundee Precious Metals Receives First Contact from Namibian Government on Tsumeb Smelter Audit Toronto, Ontario, 30 April 2012, http://www.dundeeprecious.com/English/news-and-events/news-releases/NewsDetails/2012/Dundee-Precious-Metals-Receives-First-Contact-from-Namibian-Government-on-Tsumeb-Smelter-Audit1129195/default.aspx downloaded 15/6/2012.

the health risks taken by Namibia a tax-free status was perhaps unnecessary.[34] However, the negotiations occurred when Weatherly was on the verge of closure at the height of the global economic crisis and hence the government of Namibia was deeply concerned about the loss of employment in the Tsumeb area.

b) Namzinc Refinery

A less contentious example of the use of industrial policy in Namibia in the mineral beneficiation sectors has been refined zinc production at Vedanta Resources PLC's, Skorpion mine and Namzinc refinery in the southwest Namibia. This is Namibia's third-most valuable mineral export after diamonds and uranium. Production was 151,688t of 99.9% purity zinc metal in 2010, slightly below the previous year's 153,815t. This decrease in production was a result of load-shedding and equipment failures.[35] The Skorpion zinc refinery was originally developed by Anglo American which sold the facilities to Vedanta.[36] The smelting and refining of zinc is, like aluminium, very energy intensive and it is estimated that energy costs make up approximately 50% of total costs.[37] A not insignificant portion of Namibia's zinc production also came from the nearby Rosh Pinah mine which was previously owned by Xstrata which sent zinc concentrate for processing to facilities in South Africa.

The government provided assistance for the establishment of the zinc refinery when it was originally started in 2004. The refinery is one of the Export Processing Zone facilities operating in Namibia which means that it pays no company tax. There were also other unspecified industrial supports from the government for the financing of the refinery. One important benefit has been that Skorpion has also been able to purchase electricity from Eskom in South Africa directly. Electricity (and coking coal) costs are estimated to be roughly 50% of the cost of producing zinc and therefore having direct access to the Eskom grid helped the company by giving it access to what was the cheapest electricity for processing in the world.[38] Skorpion benefited from the same genre of pricing agreement as was available from Eskom to the Mozal facility in Mozambique whereby prices were set at approximately US$0.02 per kWh.[39] The Eskom tariff was renegotiated in 2011.

[34] *Dundee Precious Metals Receives First Contact from Namibian Government on Tsumeb Smelter Audit Toronto, Ontario, 30 April 2012, http://www.dundeeprecious.com/English/news-and-events/news-releases/NewsDetails/2012/Dundee-Precious-Metals-Receives-First-Contact-from-Namibian-Government-on-Tsumeb-Smelter-Audit1129195/default.aspx downloaded 15/6/2012.*

[35] *'Namibia: A mineral cornucopia' in Mining Journal, 30 September 2011, http://www.mining-journal.com/reports/namibia-a-mineral-cornucopia?SQ_DESIGN_NAME=print_friendly downloaded 20/3/2012.*

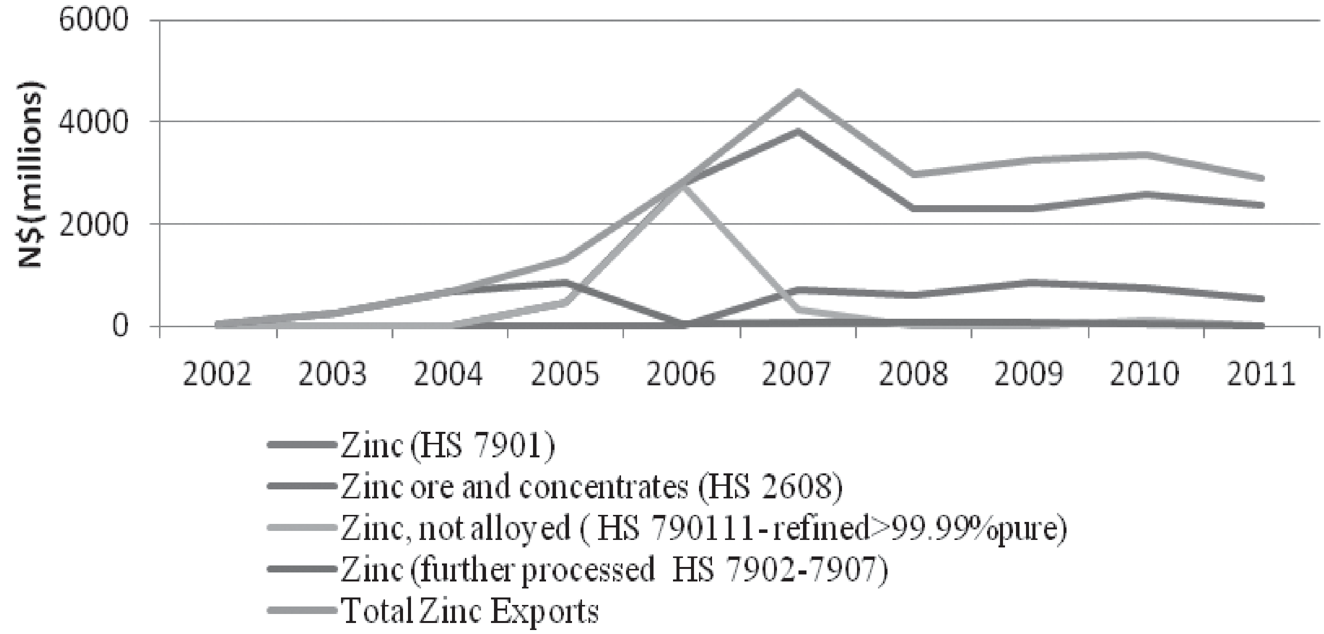
[36] *http://www.mining-technology.com/projects/skorpion/ downloaded 24/3/2012.*

[37] *Dr John Anderson, Senior Analyst, Wood Mackenzie presentation 'The Economic Challenges of Zinc Smelting' http://www.woodmacresearch.com/content/portal/energy/highlights/wk2__11/Zinc%20Smelting%20%20Economics%20for%20ILZSG.pdf downloaded 23/3/2012. At inauguration the project was reported to have an installed electricity capacity of 120MVA which raised the total energy consumption of Namibia by 25%.*

[38] *USGS estimates a range of 3,000 to 5,000 kWh/t of zinc metal recovered using the electro-refining process. The electrolytic zinc process is used for approximately 90 percent of the world's primary zinc production from concentrate. Zinc refining in Africa requires about 3,000-3,500 kWh/t of concentrate. Bleiwas (2011) p. 99.*

[39] *Metal bulletin 'Eskom will renegotiate power deal with Skorpion zinc mine', 3 June 2010. 'Skorpion directly imports 90MW of electricity from Eskom, or 0.2% of its total power generation. This equates to around 25% of the entire generation capacity of Namibian power utility Nampower. Eskom has been supplying Skorpion at a tariff below the cost of production after being locked into long-term contracts, MB understands. Skorpion, which has a supply agreement that expires in 2017, has benefited from rates of 43-50% lower than ordinary South African customers over the past decade.' http://www.metalbulletin.com/Article/2584133/Eskom-will-renegotiate-power-deal-with-Skorpion-zinc-mine.html downloaded 4 May 2012.*

Figure 10: Zinc and further processed zinc exports from Namibia



Source: *CSO and authors' calculations* NB: *No data was available for Zinc ore and concentrate (HS 2608) exports from 2002-2004*

The evidence and reports that are publicly available suggest that the Namzinc Refinery has been highly profitable as the ore is very high grade at 11.6% head grade zinc.[40] The project was sold to Vedanta for what was reported as US$707 million in 2010. The initial capital cost outlay on establishing the mine was slightly over US$450 million. However from the figure above, if the objective of the government of Namibia was to increase further processing of zinc products, then the CSO data suggests that the process of beneficiation has not been successful with further processed zinc products constituting (i.e. HS 7905) 97% of exports in the period between 2002–2004 were further processed products i.e. zinc plates, bars and foil and lower purity zinc. By 2011 however the situation had been reversed and concentrate exports together with zinc of lower purity (i.e. <99.9%) constituted 99.3% of Namibia's total zinc exports.

A vital lesson for Botswana on economic diversification from the two refineries is that there is a need for considerable prudence in project selection when it comes to down-stream processing. Diversification from unprocessed base metal production to that of refining must ultimately depend on the development of a source of commercial advantage for the company given that Namibia is by no means an obvious choice of location for such activities. However, it is not necessarily obvious that diversification through down-stream processing is commercially impossible as down-stream processing rests on removing waste that would otherwise be transported to a distant location. Certainly the host country cannot expect that they will be chosen as a location for that processing if there is not a source of commercial advantage provided. Both Tsumeb and Namzinc were provided with the normal range of commercial advantage i.e. tax-free status in the Namibian Export Processing zone scheme. Namzinc was provided with a further advantage, electricity at prices close to those paid by Mozal (see section 3.2), and Tsumeb was permitted to undertake processing that was prohibited in Europe for health reasons. It is these extra benefits that tip the balance in favour of what are otherwise unfavourable locations for such activities.

The first conclusion is that there exists a possible market niche for processing high-risk ores and concentrates. However, it is doubtful that any government would wish to publicly move in this direction but the Government of the People's Republic of China will, over the coming decades, start to move

[40] *bid*

highly polluting industries out of China and will almost certainly be seeking jurisdictions willing to accept such risks. This is a potential source of commercial advantage for an otherwise remote location unable to attract investment. Namzinc offers a more prudent direction for the development of a commercial advantage for Botswana. A price for electricity that would give investors in high-energy down-stream processing of base metals a commercial advantage is central to the development of the industry.

iv) Table grapes – an increasingly crowded niche

While table grapes are not a new export for Namibia and date back to the early 1990s their life cycle follows that of a classic niche product which was developed with considerable government support and provides important lessons for Botswana in the development of new niche products. In small, remote or landlocked economies niche products are an important area for export development and because of the quasi rents normally in the price of such products it makes production profitable in countries like Namibia and Botswana.

Over time Namibia has moved to expand table grape exports to the EU. Unlike other exports this was not a result of the preferential access that was provided by the EU to African Caribbean and Pacific (ACP) states but rather stemmed from the inherent ability of Namibia to deliver seedless table grapes to the EU market one month prior to other southern suppliers which have traditionally supplied the EU market. The peak season for this trade was in the months of December to January when other southern producers were unable to export. When Namibia entered the then Lomé IV Convention after independence in 1992 it negotiated a good initial concessional seasonal quota for table grapes of initially 600 tonnes duty free for the entire ACP.[41] The tariff was only available to ACP countries in the months of December and January to assure that it would not compete with EU producers. In the case of table grapes it was the preferences that followed the market interest by the private sector and not vice versa as is normally the case.

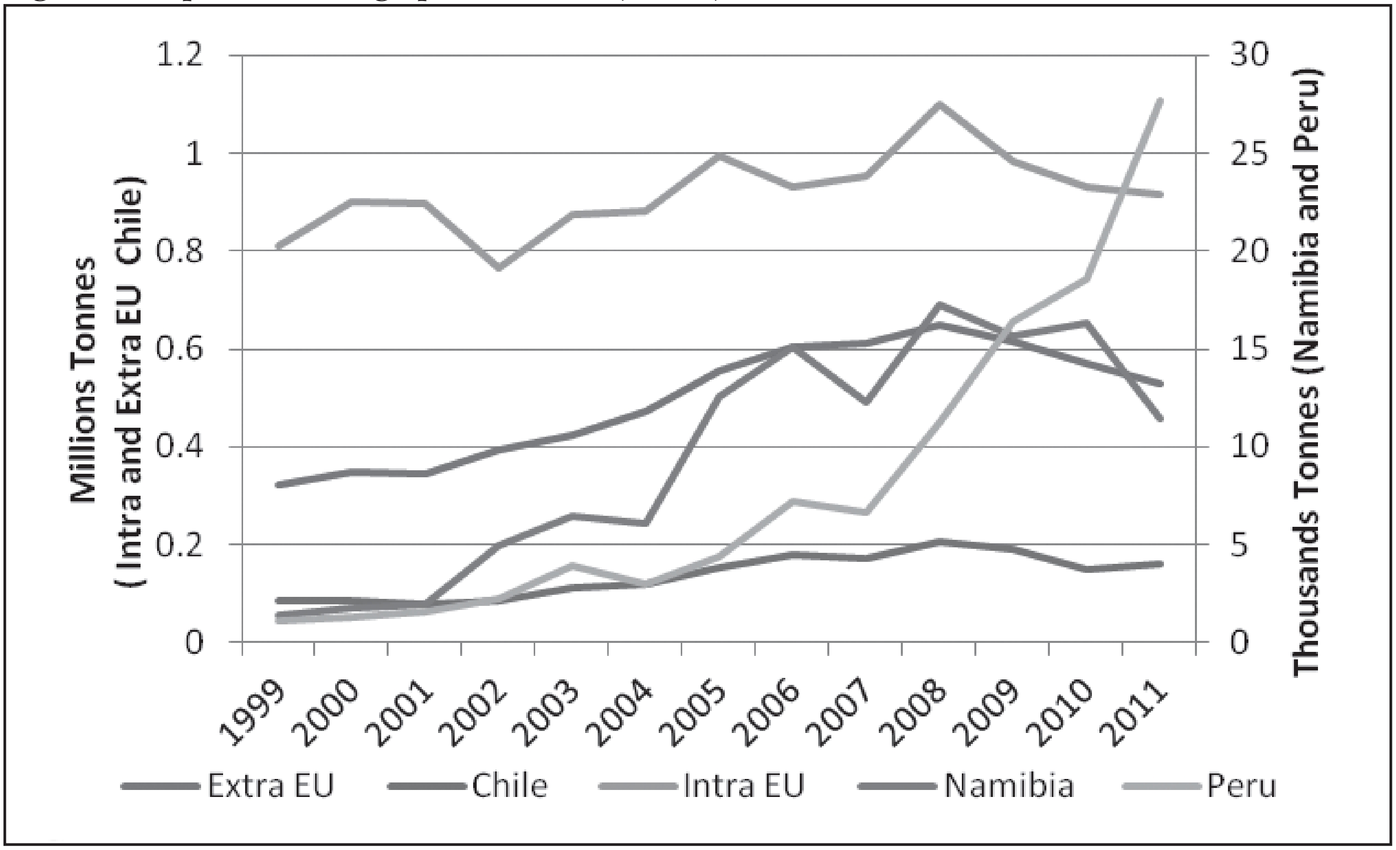
Eventually Namibia managed to increase this in-quota volume to some 800 tonnes in 1996. In 2002 Namibia negotiated a further 2.5% margin of preference over other producers for out-of-tariff quota production and by 2008 Namibia ceased to pay import duties following its initialling of the interim EPA. The tariff quota that was offered to Namibia for table grapes into the EU market under the Lomé IV Convention was not particularly substantial but it was enough to allow the then single producer that was the pioneer of the industry to penetrate the market. This margin of preference allowed the producer in the industry to export to Tesco in the UK and he was able to maintain a consistent supply. According to Hoffman (2003):[42]

Roughly 3,500 new permanent employment opportunities have been created by the table grape industry with another 7,000 workers employed as part-time harvesters for three to four months a year. The industry is the largest employer in the impoverished, underdeveloped Karas Region where Aussenkehr (the original producer) is situated. For every 1,000 tonnes of table grapes Namibia has produced and exported, an estimated 300 new permanent and 600 part-time jobs were created, and these workers earn a total of about N$6,000,000 (about $967,000).

[41] *The table grape section relies heavily on a paper by* Jürgen Hoffmann, *'Greening the Namibian Desert: An African Success Story', http://www.saiia.org.za/archive-eafrica/greening-the-namibian-desert-an-african-success-story.html downloaded 22/3/2012.*

[42] *Ibid.*

Figure 11: Imports of table grapes to the EU (tonnes)

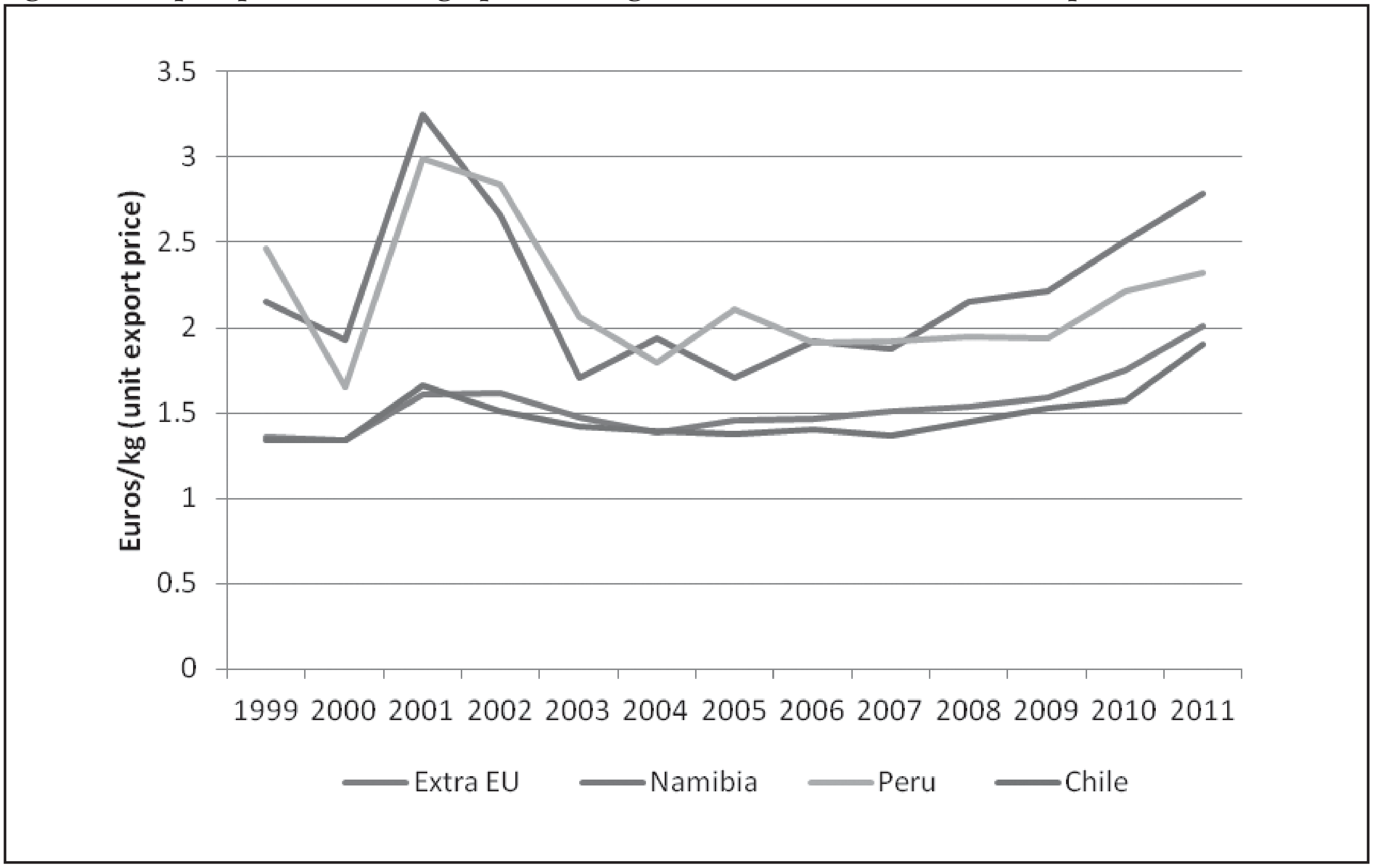


Source: *Eurostat*

While early records suggest very substantial growth of exports to the niche EU market the volumes exported have stagnated since 2008 while other producers such as Peru have seen exports grow very rapidly over the period for which EU mirror data is available. Namibia was unable to maintain its margin of trade preference over other southern hemisphere grape-producing countries and by 2010 whatever preferential margin had been made available to it as an ACP state was completely eroded as other Latin American countries such as Chile and Peru had negotiated Free Trade Agreements (FTAs) with the EU. What is also significant but unsurprising is that extra-EU trade grew as the EU liberalised its markets. As can be seen from Figure 12, Namibia's exports to the EU grew in the middle part of the decade but those of Peru and Chile have expanded very rapidly and by 2011 Peru was exporting significantly larger quantities than Namibia. Traded table grapes also grew to take a larger portion of the EU market, growing from 29% at the beginning of the period to 37% of total EU imports in 2011.

What is also evident from the figure below is that while table grapes were initially extremely lucrative for Namibia's producers as well as for all the other southern producers, the unit price received for these grapes stagnated in the middle of the last decade and has of late experienced a price recovery. New producers, which have recently had negotiated duty-free access under bilateral free trade agreements, have begun to export to the EU market. Chile and Peru have adjusted production to be able to supply the peak price months of December–January in the EU market.

Figure 12: Import prices of table grapes entering the EU from selected southern producers



Source: *Eurostat.*

Peru, which is a close competitor with Namibia, has overtaken the country in terms of volumes exported to the EU. However, what is significant is that all the exporting countries which aim for the December niche have seen the spread between the average price for extra-EU export unit prices and their own unit export prices decrease over time. This means that, in common with all niches, the relative market value of the December table grape niche has diminished over time as new suppliers have entered the market. At the beginning of the period in 1999 the premium over the extra EU average import price was 58% for Namibian table grapes and by 2011 this had decreased to 38%. This compression of margins is a normal tendency found in most niche markets where entry cannot be controlled by either the market power of the incumbent or climatic supply constraints. Perhaps the single most important lesson for Botswana from Namibia's export experience in this sector is that close collaboration between the private sector and trade negotiators is vital for assuring market acess. This is even true in quite new and emerging sectors that are often not obvious as export sectors as was the case with table grapes from as remote a location as Namibia. However, equally, the lesson from any niche market – and this is certainly true of Namibia – is that unless supply can be constrained then the niche will eventually disappear as new suppliers enter. Thus a continual marketing effort is necessary in order to discover new niches or, alternatively, finding an entirely new range of products.

Chile and Malaysia

This chapter considers the international experience of export diversification of countries richly endowed with natural resources. It focuses on the processes and policies that have fostered production and export diversification. Malaysia, Chile and Botswana are middle-income countries[43] with abundant natural resources, a

[43] *World Bank (2012) classifies Botswana, Chile and Malaysia as upper middle income countries and Indonesia as a lower middle income country.* Income groups are calculated as follows: *Economies are divided according to 2011 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, $1,025 or less; lower middle income, $1,026– $4,035; upper middle income, $4,036–$12,475; and high income, $12,476 or more. Retrieved on 9 December 2012 from the following*

relatively well-trained labour force[44] and high levels of urbanisation. These features make a compelling case for carrying out a comparative analysis of their export-oriented development.

Malaysia has been the most successful, having experienced considerable forward integration. It has partially utilised horizontal and vertical policies in its pursuit of a diversified exports base. Unlike Malaysia, Chile did not pursue an explicit industrial diversification strategy but instead focused on agro-industrial products such as horticulture, wine and salmon. Chile is fortunate to have a resource base and a climate that have permitted this type of diversification. Moreover, the production costs and investment incentives given to industry by both these countries gave firms a commercial competitive advantage to their counterparts.

links: http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS; http://data.worldbank.org/about/country-classifications.

[44] The Human Development Index (HDI) in 2011 for these countries ranges from 0.617 to 0.805. Retrieved from the following link: http://hdrstats.undp.org/en/countries/profiles/MYS.html

Export Diversification Experiences in Resource-rich Countries

4

4.1 Malaysia

Malaysia is an example of an economy endowed with both natural resources and, at the commencement of its industrialisation, labour abundance that has been successful in diversifying its economy over the past five decades since its independence. The economy has shifted from being one dominated by agricultural-sector exports and tin in the 1960s to an economy that is now largely industrialised. Within the agriculture sector there has been diversification, with palm oil surpassing rubber products. Manufactured exports now form a sizable share of total exports. Diversification and rapid economic growth have also contributed to the very substantial reduction in absolute poverty.

4.1.1 Export structure

Malaysia's export structure has changed dramatically over the past five decades. Exports of commodities such as tin, rubber and later palm oil dominated its exports in the 1950s and 1960s. The share of tin and rubber in total exports fell from more than 50% in 1970 to less than 2% in 2010 (Table 1). The export-led industrialisation drive from the 1970s raised the share of manufactured exports to approximately 74% of total exports by 2010. Exports of electronics and electrical products accounted for a sizable share of total manufactured exports. Among factors that influence compositional shift in export structure is the greater focus on higher value-added downstream manufacturing activities (Bank Negara).

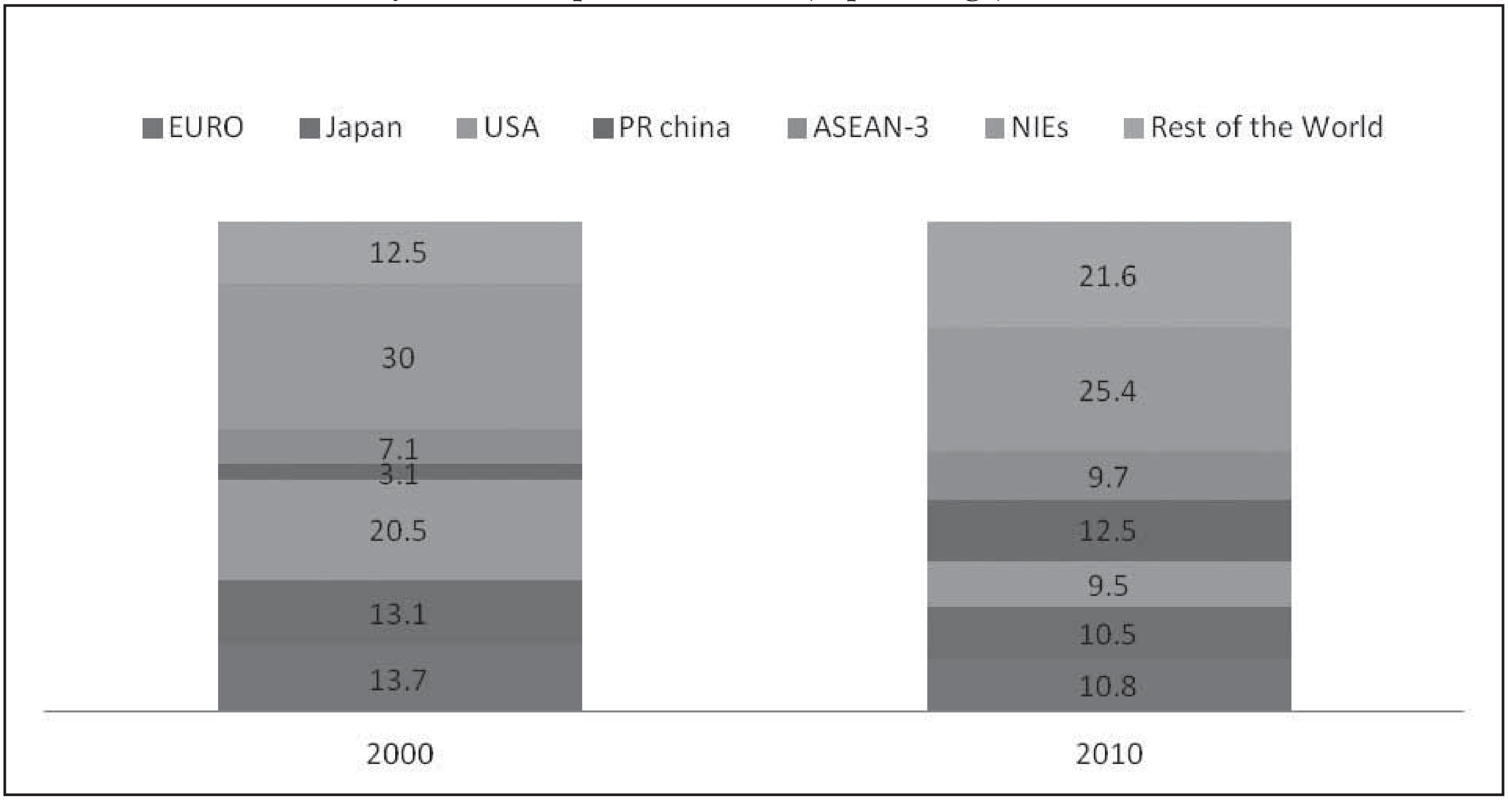
Table 4: Shares of exports in percentage, 1970–2010P

Exports	1970	2005	2010P
Rubber	33.4	1.1	1.4
Tin	19.6	0.2	0.3
Oil and gas	3.9	9.2	10.4
Manufactures	11.9	80.5	73.4
Palm oil	5.1	3.6	6.9
Others	26.1	5.4	7.6
Total Exports	**RM5,163 million**	**RM533,790 million**	**RM663,014 million**

Source: *Department of Statistics, Malaysia and Bank of Negara, Malaysia P =Preliminary*

Another key emerging trend is the greater diversification in the destination of Malaysia's exports. While the share of Malaysian exports to traditional markets (USA, Japan and European Union) remains high, demand from the regional economies, particularly East Asia, has risen substantially since 2000. The Association of Southeast Asian Nations (ASEAN) remains the key export market. Malaysia is also deepening trade linkages with other Asian countries such as People's Republic of China (Table 5). It has also increased trade growth with Australia and New Zealand, as well as new markets such as those in the Middle East and Latin America.

Table 5: Destination of Malaysia's total exports, 2000–2010 (in percentage)

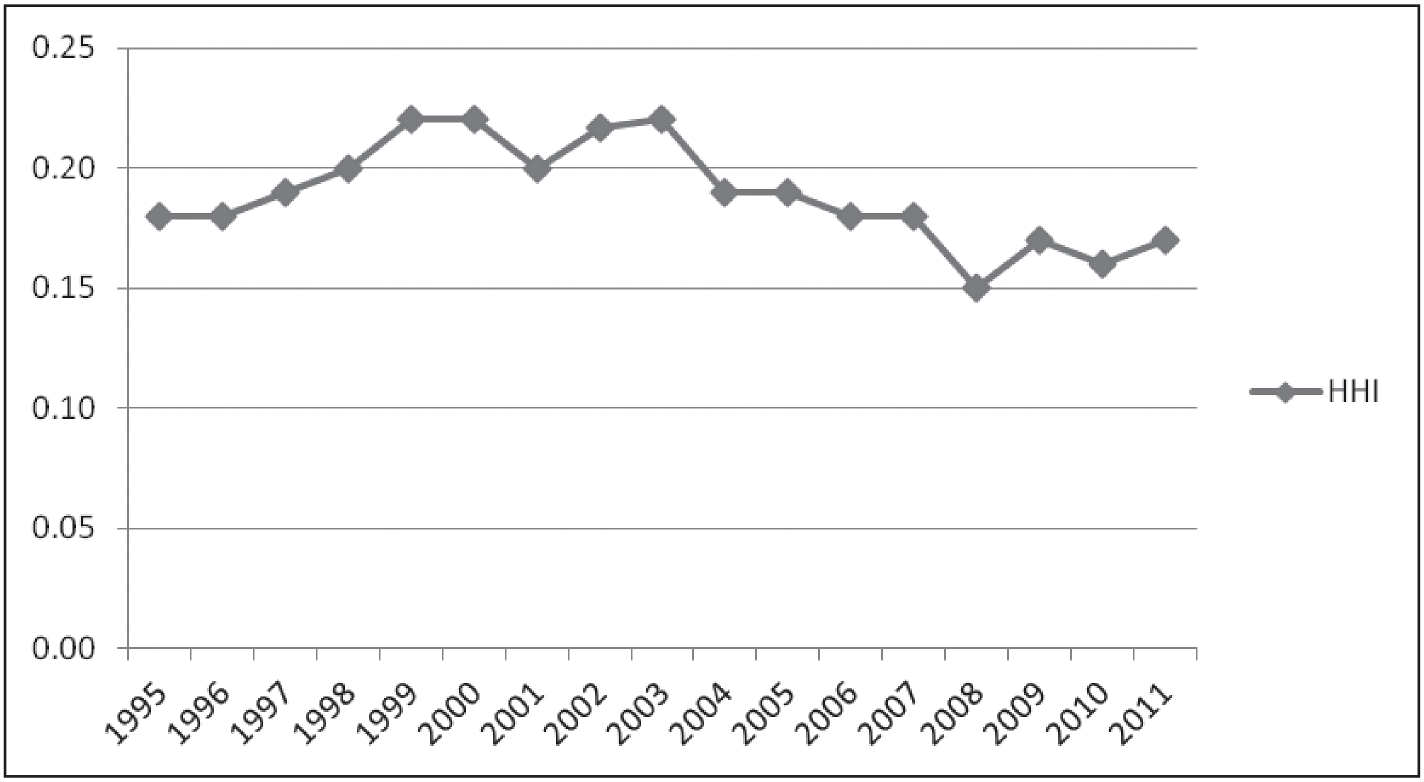


Source: *Department of Statistics, Malaysia,*Asean-3 – refers to Thailand, Indonesia and Philippines*
**NIEs refers to Singapore, Hong Kong SAR, Chinese Taipei and Korea*

Export concentration, as measured by the Herfindahl-Hirschman Index (HHI)[45], has been changing over the years. It remained relatively stable and more evenly distributed from the late 1980s to the late 1990s. It then increased up to 2000 and began declining afterward. It reached 0.18 by 2010, a little higher than the level in 1970s. Part of the explanation for this is due to the continuing rise in the growth of exported electronics and electrical industries which have grown to dominate the country's export basket. The index, at such a broad level of aggregation, does not capture the changes in the detailed composition of production of these products. Malaysia's exports of electrical and electronics have been undergoing basic structural changes as the country has continually moved up the value chain in this sector.

[45] *UNCTAD Statistical Office defines the Herfindahl-Hirschmann Index as measures of the degree of export concentration within a country. It takes a value between 0 and 1, with 1 indicating that only a single product is exported . Higher values indicate that exports are concentrated in fewer sectors. Note that this type of concentration indicator tends to be quite vulnerable to cyclical fluctuations in relative prices, in a way that commodity price rises make commodity exporters look more concentrated.*

Figure 13: Malaysia's Herfindhal-Hirschman Index (HHI), 1995–2011



Source: *UNCTAD (2012)*

4.1.2 Revenue from Commodities, Oil and Gas

The main sources of revenue to the Malaysian government to support export diversification has been evolving since the beginning of Malaysia's efforts to diversify. However, it has maintained a high and relatively stable savings rate to development expenditure. Firstly, export commodities and the export duties imposed on primary commodities were one of the main sources of revenue. The revenue was mainly utilized in land development and replanting schemes, technology infrastructure, especially in the area of energy, communication and transport. However, the revenue derived from export duties dwindled and fluctuated over time in other export commodities.

The oil and gas sector revenue emerged in the 1980's as the main source of revenue for government to fund its industrial policy. The oil and gas revenue to the government increased tremendously especially in recent years. The largest portion of energy revenue has been utilized to finance development expenditure. In 2007, the revenue from oil and gas helped finance about 30% of development expenditure of US$48 billion. It has also been used to subsidize the price of gas to industries and restructure the economy away from agriculture and towards industry. The use of these oil and gas revenue is not limited to the development of other sectors, but also the same sector, the petrochemical industry. The state owned Oil Company PETRONAS has played a key role in generating revenue for the government and facilitating development and commercial investment in the energy sector.

As mentioned earlier, part of the revenue from the oil and gas sector is used to subsidize the price of gas to industries. The subsidies were provided to keep the market prices down, below international market prices, in a number of important domestic commodities, in particular, energy-intensive industries, sugar, rice and flour industries. Recent estimates show that the Malaysia government spent RM73 billion on subsidies, making Malaysia one of the countries with the highest per capita spending on subsidies[46].

[46] *Yudken, J.S. (2011). 'Energy Pricing and Manufacturing Competitiveness in Malaysia', a report prepared for the Comprehensive National Development Planning Workshop (with emphasis on energy and trade).*

Energy subsidies have been an important and obviously popular economic policy, enhancing the nation's ability to attract and grow new business. However with rising global petroleum prices, energy subsidies as a proportion of total subsidies rose sharply from 1998 to 2009 (Figure 14). According to the Tenth Malaysia Plan (TMP), the provision of reliable and quality energy at competitive rates has helped contain the cost of doing business in Malaysia. Malaysia's electricity sector and many other industrial users, in particular, rely on heavily subsidized natural gas. Many industries have switched from diesel, which receives fewer subsidies, to natural gas to power their manufacturing processes, making it preferred fuel among manufacturers[47]. Table 6 below provides a comparison of subsidised and unsubsidised prices from natural gas for major consumers. For example, it shows that subsidised gas price for the electric power sector is 74% lower than the actual market price. This translates into lower electric power prices for industrial facilities as well as commercial and residential electricity consumers.

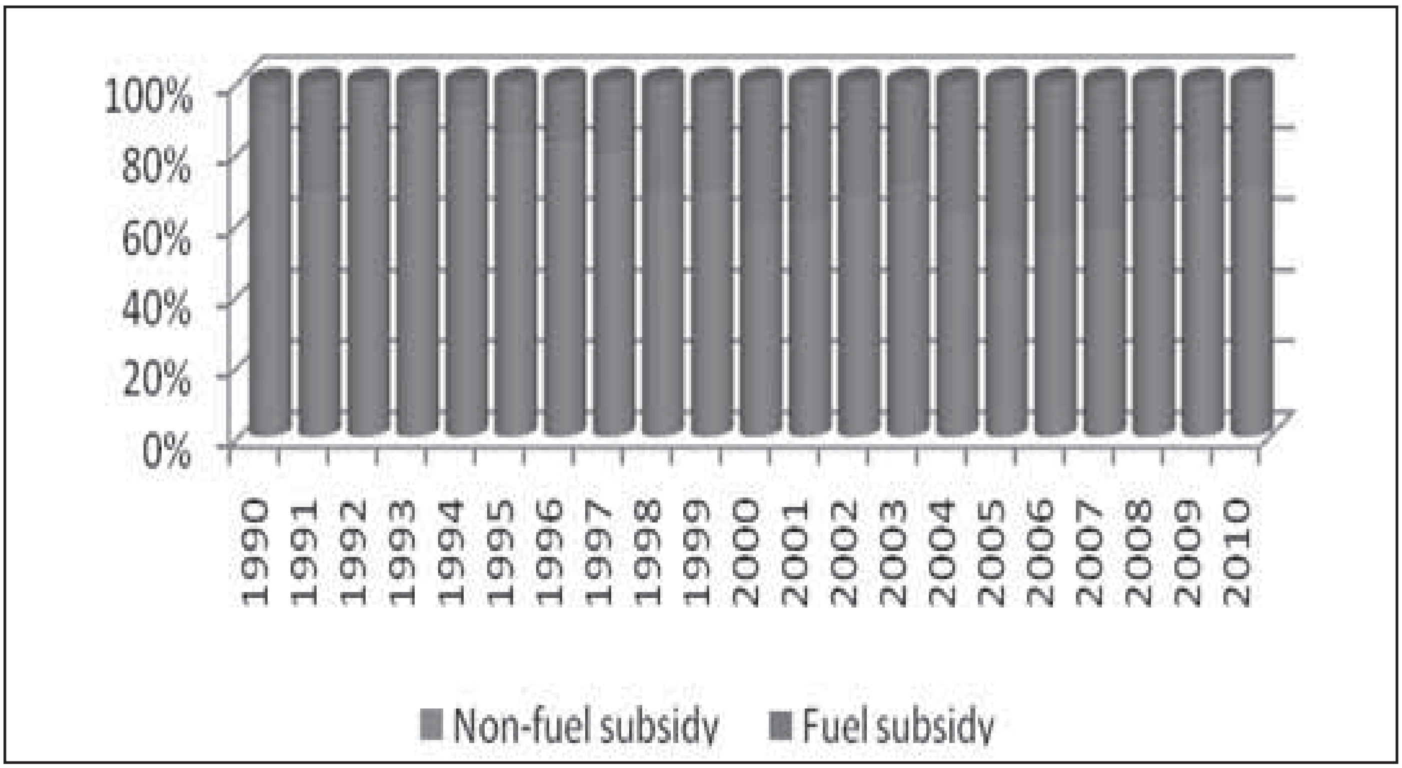
Table 6: Subsidised natural gas in Malaysia (2009)

Natural Gas consumer	Subsidised Price (per MMBTU)	Unsubsidised Price (per MMBTU)
Electric Power Sector	RM10.70	RM41.16
Large Power Consumers	RM15.35	RM56.20
Gas Malaysia	RM11.05	RM42.35

Source: *Zuraimi Abdullah. 'Hidden cost to subsidies'*

[47] *Abdullah, Z. (2010). Hidden Cost to Subsidies.*

Figure 14: Fuel subsidy over total subsidy by percentage, 1990–2010



Source: *Ministry of Finance, Malaysia (2010/2011)*

4.1.3 Policy Development and Strategies

The Malaysian Government has actively promoted export diversification and industrialisation through significant State sector investment in the economy, along with close alliances between the government and the private business community. The government, where it has proven useful to its development process, actively pursued privatisation of state enterprises and the formulation and implementation of policies and programmes to bolster its economic growth. The government of Malaysia has invariably provided the right combination of price and fiscal measures to incentivise exporters and manufacturers. Malaysia continually worked on its trade policy in order for its industries to move up the chain. For the palm oil industry, the government invested intensively in research and development in order to move up the value chain. For the manufacturing industry, Malaysia has taken advantage of the trend amongst companies in developed countries to relocate their production lines to lower-cost areas, using moderately advanced technology. Malaysia's well-developed infrastructure and administration and its semi-skilled workforce have attracted foreign direct investment (FDI), which reduced the country's need to borrow overseas or to generate domestic funds in order to finance investment. Malaysia partly utilised revenue generated from its commodities exports to finance its efforts towards export diversification[48].

The palm oil and the electronics industry are the key industries that have lead to export growth in Malaysia. The section below considers in more detail the major policies and strategies in these industries.

a. The palm oil value chain

The Malaysian government focused on palm oil production in the 1980s to reduce the negative effects of poor terms in rubber and tin, and also to contribute to the government programme of economic redistribution and eradicating poverty through land schemes. However, the government had always focused on efficiency rather than employment creation. Today, Malaysia holds a considerable lead in global markets as the main producer of palm oil. It controls the value chain from raw materials to final consumer goods and the engine for new-product development in the industry. The development of the palm oil industry has been crucial as it took Malaysia to a new technological frontier.

The first government support programme solely for palm oil cultivation was in the mid 1970s through the launch of the Palm Oil Registration and Licensing Authority (PORLA)[49]. In 1976, the palm oil switched from crude palm oil (CPO) production to processed palm oil (PPO). The key factor behind Malaysia's export shift from CPO to PPO was the assessment of export duties on CPO simultaneously with export duty exemptions on PPO. Exemptions from export duties for PPO reduced government revenue to the extent that palm oil manufacturers shifted from CPO exports to PPO exports. The exemption represented a duty difference of 7.5% in 1968, which was sufficient to stimulate first-stage processing (Gopal ,2001). The exemptions offered to PPO producers did not entail a transfer of government revenue from non-oil-related products. They meant only that the differential export duty increased the cost of producing CPO over PPO.

In imposing the duties, the government had four goals: (i) to make palm oil processing attractive; (ii) to avoid overloading CPO producers; (iii) to protect duty revenue as much as possible; and (iv) to forego financial support from other sources, even when the industry was not profitable (Gopal, 2001). Although the differentials caused problems[50], the duties did have their intended effect of stimulating a transition from CPO exports to PPO exports—so much so that the learning involved in the transition helped Malaysian producers to lower costs below world prices by the mid-1980s. The new PPO producers initially acquired knowledge from equipment suppliers or purchased it through arm's-length transactions. Subsequently, the machinery and equipment of foreign companies were bought by Malaysian companies.

The incentives and export allowances used by Malaysia to support the palm oil industry included the early financial incentives that fell in the import substitution, export allowances stipulated in the export-oriented investment act of 1968[51] and the Investment

[48] *The role of commodities revenue in promoting export diversification will be discussed in subsequent chapters.*

[49] *The programme encouraged pooling practices involving collaboration between palm growers and producers.*

[50] *Producers took advantage of a faulty customs mechanism that led to leakage.*

[51] *It was regarded as the first major incentive upon which palm oil firms relied in making investment decisions. It was very generous as an investment abatement allowance conferred a 40 percent abatement of corporate income tax for two years, which could*

Act of 1986[52]. The Export Credit Refinancing scheme that offered export-oriented firms loans with preferential interest rates was more widely taken up than the export allowance by PPO firms. Three major explanations account for the success of some of the incentives offered to PPO firms. First, the firms were big and coordinated easily with Ministry of International Trade and Industry MITI, the authority offering the incentives. Second, because the major firms were also involved in palm oil cultivation and CPO, they were glad to expand into a higher-value-added segment because of the rent they enjoyed from processing downstream in relation to exporting CPO. Third, firms received strong support from MITI, the Standards & Industrial Research Institute of Malaysia (SIRIM), the Malaysia Palm Oil Promotion Council (MPOPC) and the Palm Oil Research Institute of Malaysia (PORIM) to expand into PPO activities. Support included technical and marketing know-how (including promotional exhibitions abroad) and privileged consideration for incentives.

In addition to the incentives that palm oil firms enjoyed, Research and Development (R&D) investments under two industrial master plans (IMPs) were imperative for the sector's movement down the value chain. Firms had access to R&D carried out in the Palm Oil Research Institute of Malaysia (PORIM), the Malaysian Agricultural Research and Development Institute (MARDI), as well as the universities. Personnel in those institutions, and in MARDI, the Malaysian Palm Oil Board (MPOB) and universities strove for product diversification, new-product development, and higher value-added in the palm oil chain. MARDI, MPOB and the universities had access to RM1 billion set aside by the government under the Intensification of Research in Priority Areas (IRPA) programme, which was part of the Eighth Malaysia Plan (Malaysia, 1991). Sustained financial support made it possible to introduce new products in markets (such as biodiesel, specialty fats, and vitamin A). PORIM had played a critical role in training and market prospecting to encourage upgrading and new-product development in firms. Although PORIM is owned and operated by the government, its activities, including training, are strongly influenced by private member firms.

Cohesive relations among firms, institutions, and policy instruments have created systemic efficiency and promoted the development of product technology in the palm oil industry. Firms have developed ever-closer ties with universities where R&D is undertaken, with MARDI's specialised agricultural research institution, and with associations of planters and manufacturers. On the other hand, a close coordination between the government and the associations of planters, processors, and manufacturers led to the formulation of contingency strategies to regulate supply in response to prices. Because Malaysia dominates the global palm oil industry, accounting for more than half of all global exports of many palm oil products, the regulation of production has kept prices fairly stable. Unlike the situation in the early 1970s, when the government began to intervene in the industry, relations among the players are no longer asymmetrical. A smooth flow of information has led to the effective implementation of government policy.

The government strengthened the palm oil cluster by creating three vital institutions: the Palm Oil Regulatory and Licensing Association (PORLA), PORIM, and the Malaysian Palm Oil Promotion Council (MPOPC). The first two remain under government ownership and control, while the third is a privately registered company owned by the government. While PORLA played an administrative role, PORIM helped resolve collective action problems by deepening and broadening R&D in palm oil activities. MPOPC has also played a major role in promoting market expansion. PORLA and PORIM merged in the 1990s to form MPOB, dedicated to developing the palm oil value-added chain. A constant flow of information and discussion improved institutional support services to firms.

The private sector has developed and advocated policies for government in the palm oil sector. Private companies were also responsible for several important organisational innovations in the sector. Pooling, or bulking, of marketing and sales which involved collaboration by four foreign-owned private plantations also helped to achieve important scale economies in the sector. The organisational technology was subsequently adopted throughout the country and later abroad. The private sector was also instrumental in lobbying the government to coordinate overseas promotional efforts.

be extended, and of excess profit and development taxes over eight years (Gopal 2001: 254). Palm oil refineries that obtained 'pioneer status' enjoyed a tax holiday for seven years. Nine palm oil refineries obtained pioneer status between 1969 and 1974. After 1974 palm oil refineries were no longer eligible for the pioneer status. The investment tax credit (later the investment tax allowance) allowed firms to obtain tax exemptions through capital spending. In the period 1969–78, one firm obtained a 100 percent tax exemption, 22 firms a 50 percent exemption, 1 firm a 30 percent exemption, and 19 firms a 25 percent exemption under the investment tax credit instrument.

[52] *Gopal (2001) argues that it was redundant since only 29 percent of refineries used the incentive.*

Importantly, the industry associations did a good job of representing the interests of private firms and avoiding potential problems. Discussions between the industry and government officials, fostered by the associations, formed the basis of several policy directives that shaped the industry.

The critical drivers of palm oil export expansion were (i) efforts to adapt technology so as to move up the value chain; (ii) network cohesion or institutional arrangements between government agencies, firms, universities, and other organizations; and (iii) governmental initiatives and incentives to diversify exports.

b. Electronics

For the past two and half decades, the electronics industry has been the leading export sector of the Malaysian economy. It accounts for more than 80% of the manufacturing industry. The entrance of Japanese-owned Matsushita Electric marked the birth of the electronics industry in Malaysia in the early 1970s. The firm assembled household consumer electronics to supply the domestic market. This occurred during the period when the Malaysian policies were inward oriented. Major developments in the industry occurred in 1972, mainly due to the opening of free trade zones (FTZs) in Penang and the Klang Valley. The growth of the electronics and electrical manufacturing industries in Penang Island was a strategic turning point, and the commencement of the push to industrialisation in Malaysia.

The entrance of Trans-national Corporations (TNCs) in the industry heightened employment and increased value addition in the industry. At the early stage, the electronics industry included almost no local firms except for a few small ones such as Penang Electronics. The OPEC-induced crises of 1973 and the Industrial Coordination Act (which implemented the ethnic restructuring provisions of the National Economic Policy of 1971 (NEP; Malaysia 1976)) affected industry negatively. However, the NEP did not affect export-oriented firms located in export-processing zones which were not required to introduce ethnically-based equity conditions. This is an important lesson for those wishing to develop EPZs in Botswana. One of the main drivers of foreign direct investment (FDI) was the abundance of potentially trainable labour in the country. The government developed the infrastructure such as the airport and created free trade zones (FTZs), licensed manufacturing warehouses (LMWs) and security to counteract the risks associated with relocating to a new and potentially dangerous site.

In the early 1980s, the commodities windfalls encouraged the government to shift incentives to domestic heavy industries. However, this lead to a sluggish growth, which in turn contributed to the economic crash of 1985. In response to the fall in industrial growth, the government reconsidered its export-oriented strategies by formulating a very generous Industrial Master Plan (IMP) to retain foreign firms. Incentives were renewed even for labour-intensive firms whose pioneer status and investment tax credits had expired. Initiatives were launched to increase linkages and technological deepening, among them allowance of double deductions of approved expenses to promote human resource development and investment in R&D activities. A subcontract exchange programme and a vendor development programme were introduced to encourage large firms to support local suppliers.

The programme had an impact in areas such as Penang, where there were efficient network cohesion and strong institutional support for upgrading. Other factors that lead to the rebound of the industry include the semi-skilled labour force and relocation of giant consumer electronics to Malaysia. The firms relocated because production costs in Asian Tigers had risen sharply. The agglomeration of firms stimulated the development of local supplier firms. Despite its achievements, Malaysia began to lose its competitive edge, especially to China and other emerging countries.

The critical drivers of manufacturing expansion were (i) a formal industrial clustering policy – designed to develop greater linkages and complementarities for local industries. The clustering approach combined excellent basic infrastructure with superior provision of social services and schools to make Export Processing Zones (EPZs) attractive to foreign investors, taxation incentives, skilled workers and managers; (ii) institutional reforms which improved the performance of security and customs services within the EPZs; (iii) low labour costs.

Summary

Over the past five decades, the Malaysian economy has shifted from being one dominated by exports of agricultural commodities to an economy that is now industrialised. Within the agricultural sector there has also been considerable diversification, with palm oil surpassing rubber as the main agricultural export. Manufactured exports now form a sizable share of total exports. Diversification and economic growth has also contributed to the reduction in absolute poverty.[53] Malaysia continues to promote resource- and non-resource-based manufacturing industries such as electronics that require more skilled labour and integration into the global production network. In the palm oil industry, for, example, there is a continuing emphasis on developing oleo chemicals and alternative fuels whereas in the electronics industry the emphasis is on moving up the value-added chain to manufacture more knowledge-intensive products.

The key elements that fostered export diversification include:

- Malaysia had a capable, visionary and committed leadership and administration. Macroeconomic and strategic policy making were delegated to elite agencies. Their planning was embedded in processes that provide input and oversight from private sector firms through public-private councils. The agencies were de facto supra public service institutions.[54] It has also implemented national public service schools, such as INTAN, which has been in the forefront in rolling out the government agenda Vision 2020[55] for the past years. Arguably, Stiglitz (1996) attributes the fast growth of the Asian economies more to political governance than economics. Stiglitz noted that the Asians used incentives and organisational design to improve their countries' established institutional framework and structures to transform their economies and ensure sustainable growth.
- The provision by the government of the right combination of price and fiscal measures to incentivise exporters, including price subsidies to fuel and energy.
- The large investments in research and development (R&D) under the two industrial master plans (IMPs) were imperative, especially in the palm oil industry, in moving up the value chain. The firms had access to R&D, carried out in the Palm Oil Research Institute of Malaysia (PORIM), the Malaysian Agricultural Research and Development Institute (MARDI), and universities.
- The combination of horizontal and vertical diversification. Malaysia had clear policies that promoted the production of the existing export commodities and it also had policies geared at adding new value to the existing export product and the production of new products. In order to achieve part of the vertical diversification, with great difficulty, the government correctly sequenced the development, as well as estimated the length of each phase and what resources were needed for each.
- The gradual privatisation of state companies was influential in export diversification. The private sector conceived and advocated for government policies in the various sectors. Private companies were also responsible for several important organisational innovations. Pooling, or bulking, was begun by four foreign-owned private plantations to achieve scale economies. Cohesive relations among firms, institutions, and policy instruments were instrumental in creating systemic efficiency and promoting the development of product technology. The private sector was also instrumental in lobbying the government to coordinate overseas promotional efforts. The industry associations did a good job of representing the interests of private firms and avoiding potential problems. Discussions between the industry and government officials, fostered by the associations, formed the basis of several policy directives that shaped the industry.
- The successful implementation of the industrial clustering policy – designed to develop greater linkages and complementarities for local industries. The policy, combined with excellent basic infrastructure with superior provision of social services and schools, financial incentives and low labour costs, made

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[53] *Yusof.A. Z (2010) outlined that Malaysia's poverty level has reduced considerably over the last 50 years. Using the official poverty line income absolute poverty has fallen from about half in 1970 to 3.7% in 2007. Using the World Bank's US$1.25 per day (PPP) as the measurement for poverty showed that poverty was 3.2% in 1984 and fell to 2% in 2004.*

[54] *According to Adei (2007), the quality of staffing and leadership commitment of the bureaucracy set apart Asian economies from Africa National Development, though it is gradually improving.*

[55] *Vision 2020 was formulated under Dr Mohammed Mahathir, the minister, as the national strategic plan for Malaysia to become fully developed in 30 years time, and major economic policies have called for fundamental shifts and improvements in public governance.*

Export Processing Zones (EPZs) attractive to foreign investors. International procurement centres provided services to producers for exporting manufactured goods and purchasing intermediary inputs, including raw materials, and semi-finished and finished goods.

- An active trade openness policy by signing bilateral and regional (ASEAN) trade agreements increasing market access.

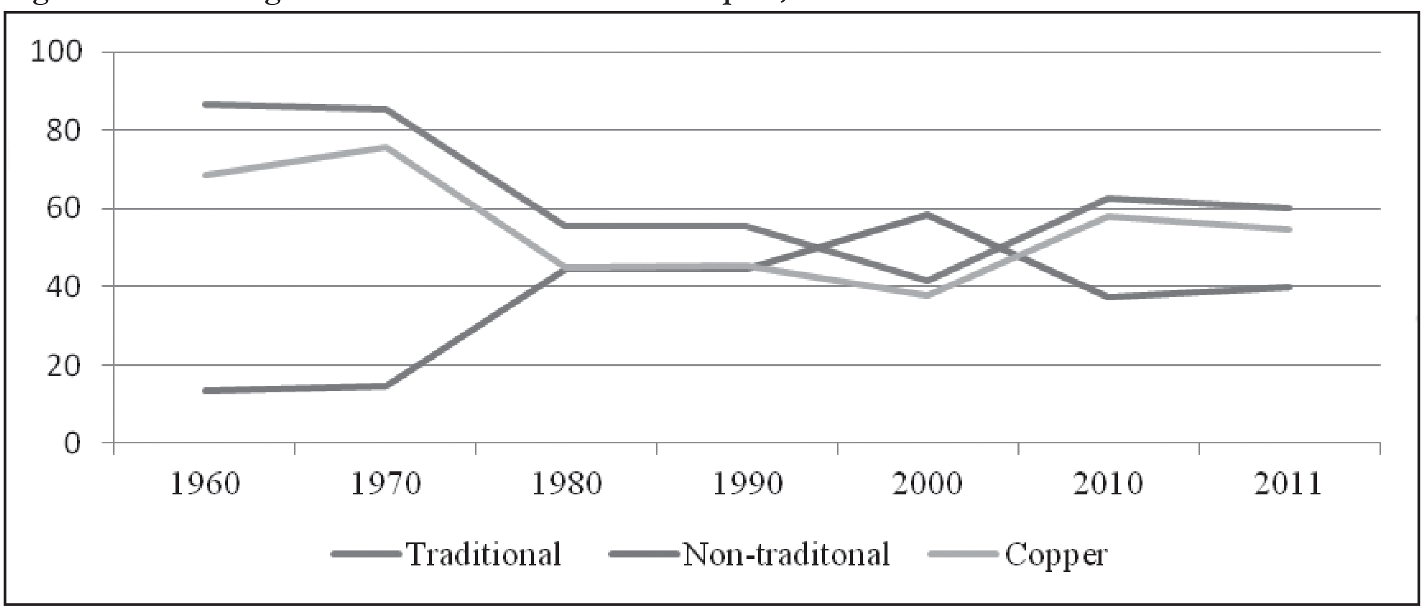
4.2 Chile

Unlike Malaysia, Chile did not pursue an explicit industrial diversification strategy but has emerged as a dynamic and more diversified commodity exporter with a greater emphasis on high-value primary-based products such as horticulture, wine and salmon. It has experienced a relatively slow improvement in terms of sophistication levels of the export basket. However it's worth discussing to show the transformation that Chile was able to achieve within its resource sector.

4.2.1 Export Structure

Although the minerals, especially copper, still represent the largest share of Chilean exports,[56] the non-copper exports have grown substantially during the past three decades. The main non-mineral exports include salmon and trout, grapes, wine, bleached and semi-pulp of coniferous, machinery and equipment. The non-copper exports have grown from US$4.563 billion in 1990 to US$36.973 billion in 2011. This constitutes an average annual compounded growth rate of 7.1%. The aggregate share of non-copper exports[57] to total exports grew from 13% in 1960s to 60% in 2000. Over the last decade, as commodity prices rose rapidly, the share of copper had dropped to 40% by 2011 (Figure 15). When considering the share of Chile's main non-mineral exports, the proportion had slowed down from the late 1990s until 2006. Since then, there has been a sluggish rise in the proportion of major non-mineral exports. This excludes the salmon industry which was hit by a virus in 2008.

Figure 15: Percentage distribution of total Chilean export, 1960–201

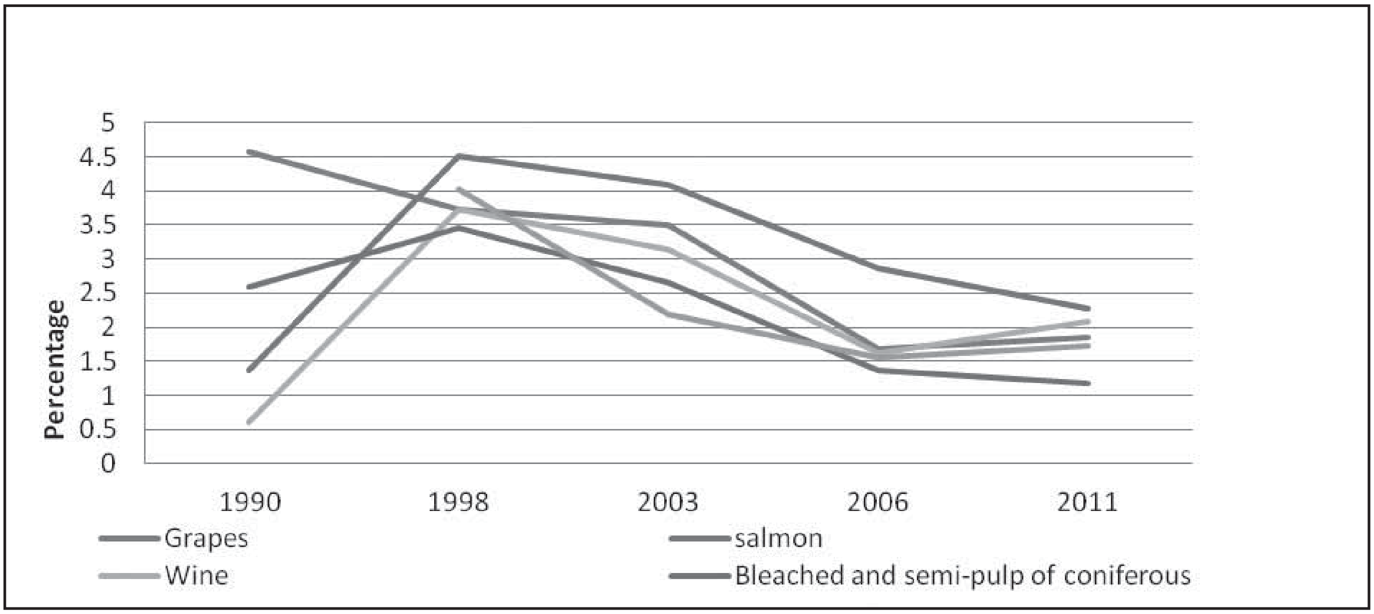


Source: *Banco de Chile Data*

[56] *The jump in copper exports' contribution in the past few years is attributed to the rising price of copper as well as the global economic recovery, which spurred demand for the national goods. In 2010, the value of copper exports increased 43.1%, earning 11.8 billion USD. Copper production only increased 0.5%, but the price of copper increased substantially from 2.34 USD per pound to 3.42 USD per pound. http://mercopreso.com/2011/02/08/chile-exports. Retrieved 27 March 2012.*

[57] *Over the years, the manufacturing industry has been growing and that contributes to a slightly high contribution of non-traditional exports. Among the manufacturing components are copper processed products.*

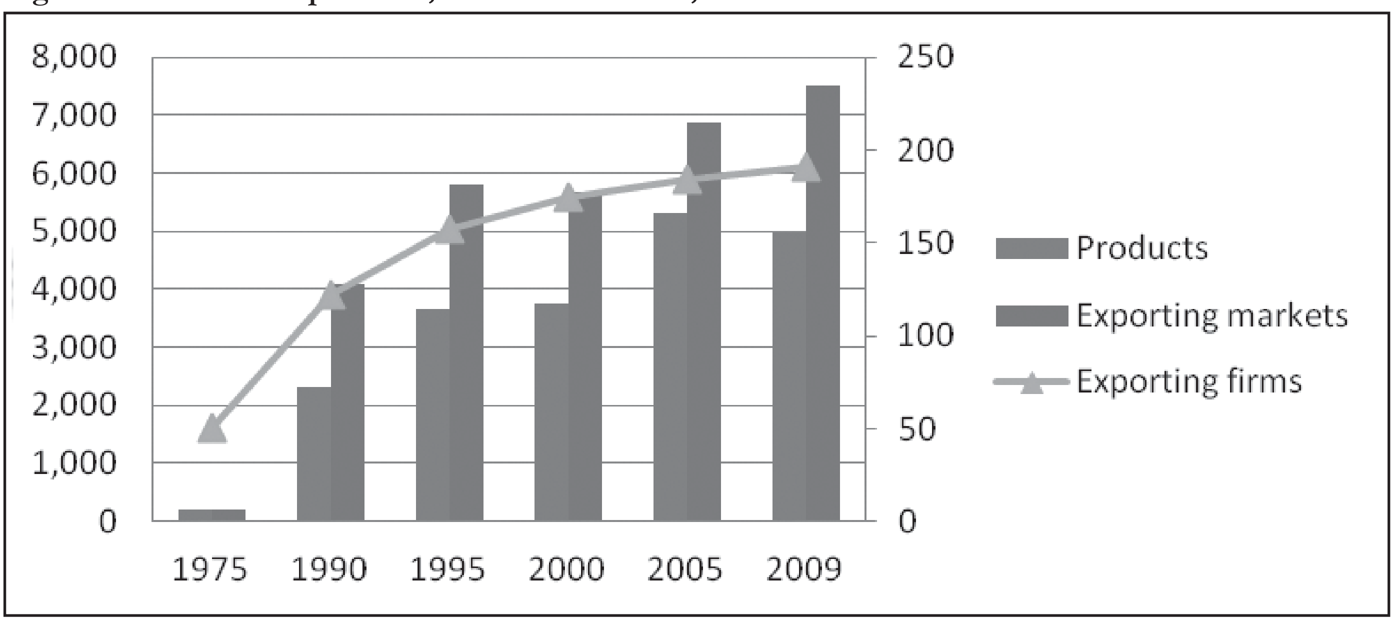
Figure 16: The share of Chile's main exports in total exports, 1990–2011



Source: *Banco de Chile Data*

Export growth is also reflected by an increasing number of exporting firms, products and market destinations. The number of products exported rose to 4,981 in 2009 from 2,300 in 1990. Exporting firms rose to 7, 517 in 2009 from 4,100 in 1990 whereas the exporting markets increased to 191 markets in 2009 from 122 in 1990. It is worth noting that in 2009 out of a total of 7,520 exporting companies, the 10 exporting the highest amounts accounted for 45.2% of all export values. Eight of these are in the mining sector, and the other two are in the forestry and cellulose industries. The companies that export goods worth up to $100,000 account for 55% of the remaining 7,510 companies and also account for only 0.2% of total export value.[58]

Figure 17: Number of products, markets and firms, 1975–2009

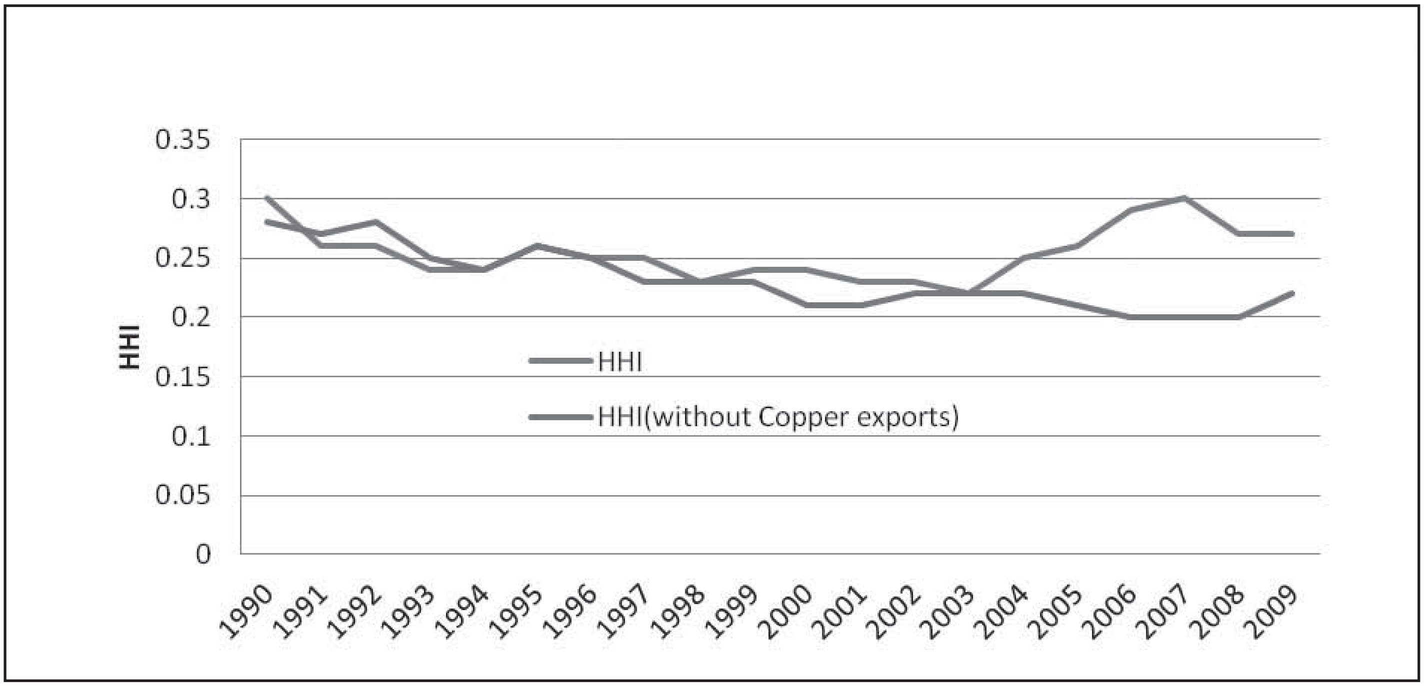


Source: *Pro Chile*

[58] *Pro Chile (2012)*

When considering the export concentration as measured by Herfindahl-Hirschman Index (HHI)[59], from 1990, Chile showed a trend of diversification through to 2004 except in 1995 and 1996. The trend then reverses. The gap from 1995 to 1997 and the trend observed since 2004 is explained by the increase in the price of copper. The index slightly decreases when copper exports are removed, showing that Chile is slowly moving toward a more diversified economy though one which is not dependent upon manufactured exports.

Figure 18: Chilean Herfindahl-Hirschman Index (HHI), 1990–2009



Sources: *UCTAD (2012) and Varas, M.E. (2010)*

Although Chile is moving towards a more diversified range of exports, a high proportion of its exports is based on agriculture and natural resource-related industries. Chile's difficulty in developing new exports has been linked to exchange-rate appreciation encouraged by higher copper prices, hence hindering incentives to move to other more sophisticated productive sectors. Hausmann and Rodrik (2005) suggest that development of new and more sophisticated products depends on the nature of exports and the extent to which the inputs are required. For Chile, the low levels of export sophistication can be attributed to maintaining an export basket that is mostly composed of products associated with low incomes, such as raw materials, forestry and agriculture.

4.2.2 Copper Revenues and the Role of CODELCO Company

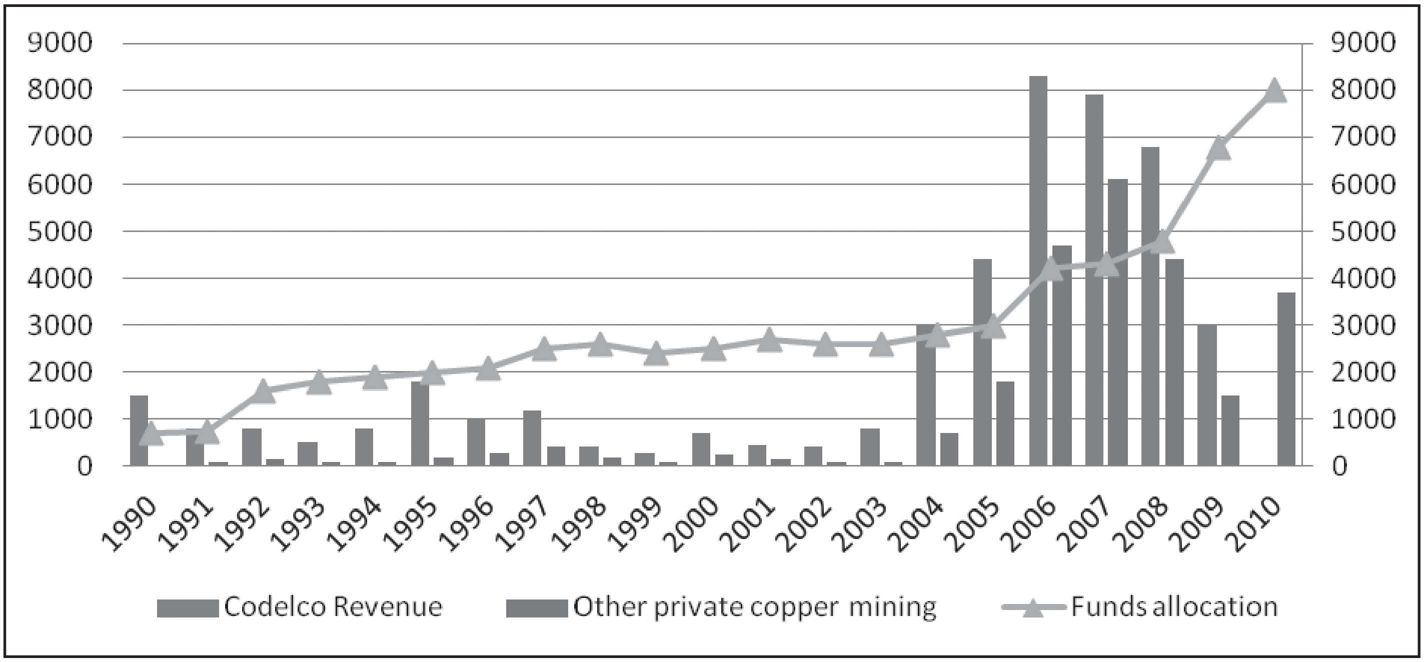
With the understanding that resource booms can be used for long-term economic development programmes, Chilean policy makers formulated policies to manage cyclical changes in the price of copper. The new reforms in the mining industry include the 2006 Royalty Law[60] which allows the government to take part in the

[59] UNCTAD Statistical Office defines the Herfindahl-Hirschman Index as measures of the degree of export concentration within a country. It takes a value between 0 and 1, with 1 indicating that only a single product is exported. Higher values indicate that exports are concentrated in fewer sectors. Note that this type of concentration indicator tends to be quite vulnerable to cyclical fluctuations in relative prices, in a way that commodity price rises make commodity exporters look more concentrated.

[60] The way the royalty law operates is through a progressive tax system applied according to annual sales according to three categories. In the first case, mine operators with sales of more than 50,000 MFT are taxed at 5 percent. Companies with sales volumes equal or less than 50,000 MFT and more than 12,000 MFT have variable tax rates according to a bracket system that varies from 0.5 percent to 4.5 percent. The third case of mine operators with annual sales equal or less than 12,000 MFT are not subject to tax at all. The law applied to all companies except to those with sales of more than $50 million that had a valid contract with the state under Decree Law 600 until 1 December 2004. These investors could apply to a tax invariability regime for a period of 15 years in exchange for submitting their yearly financial statements for external audit.

cyclical windfall, particularly of copper. A cautious fiscal management which is guided by budgetary structural balance rule that limits fiscal spending insulates public spending from short-term copper price fluctuations and the business cycle. Along with the instatement of other laws, the increase in state revenues allowed the creation of the Innovation for Competitiveness Fund (ICF).[61] The royalty law, alongside higher copper prices, has lead to fiscal revenues increasing considerably.

Figure 19: Contributions to fiscal copper revenue and funds allocation in research development, 1990–2010 (US$ million, nominal)



Source: *Budget office, Chile*

Since 1990 the state copper company, Codelco, has made the largest contribution to fiscal copper reserves compared to that of the private firms operating in the industry. Figure 19 shows the share of fiscal copper revenue from Codelco[62] Company, the ten largest copper mining companies and the total investment in the ICF,[63] technology and science programmes. The Codelco Company played an essential role in increasing fiscal revenue considerably and also in promoting linkages with local firms and supporting smaller mining companies. It has generated demand for local service providers and has formed qualified national professionals.[64]

[61] *The revenues collected through the royalty law were not previously allocated to the ICF but it is clear that it was made possible through the increased fiscal revenue that stems from the law. The ICF allocates funds to other government agencies such as CONICYT and CORFO's Innova Chile programme.*

[62] *The Codelco Company is considered the world's largest copper and molybdenum producer, and is engaged in the exploration, processing and marketing of copper ore resources, molybdenum and other by products such as gold doré and sulphuric acid.*

[63] *The ICF allocates funds to other government agencies, among which the most important are CONICYT and CORFO's Innova Chile programme. CONICYT manages funds for innovation and competitiveness, used to carry out different programmes for science and technology R & D. CORFO's Innova Chile programme implements vertical policies in support of innovation programmes with high technological components through seed capital, connecting with angel investors, providing technical assistance and other types of subsidies.*

[64] *UNCTAD (2012).*

4.2.3 Development policy

Along with many countries at the time, Chile's initial phase of industrial policy, productivity and growth were focused on import substitution,[65] high levels of government intervention and basic price controls. The country relied heavily on the extractive industries and agriculture. The first signs of government efforts to diversify began in the mid-1970s when Chile implemented market-friendly reforms and trade liberalisation policies to attract foreign direct investment. Tariffs were unilaterally reduced, reaching 10% in 1979 and restrictions on FDI were eased, credit constraints were removed, and price controls and subsidies were eliminated in an effort to liberalise the external and financial sectors. The policies supported projects that openly steered away from extractive industries – salmon, wine, and berry industries. While the policies returned ownership of many of the previously nationalised mining companies to the private sector, the state kept ownership of some mines by creating CODELCO in 1976.[66] The reforms were guided by the idea that, once market forces were given full reign, resources would be reallocated (costless) to export industries in which the country had a comparative advantage and this would lead to rapid growth not only of exports but also of aggregate output.

The lack of explicit protective market interventions and restrictions on foreign companies across industries created a platform where local companies are forced to be efficient and compete against international players on the basis of global benchmarks. The Chilean government also established linkages between mining companies and universities, especially with the creation of industry clusters. *Fundacion Chile* promoted innovation, transfer of management and technology, and supported the diversification of the local industries. The credibility and independence of these institutions, the good reputation of the civil service's efficiency, low levels of corruption and transparency are among Chile's strong assets that attracted long-term investments in the mining industry.

The section discusses the specific policy development in two important export industries to illustrate Chile's efforts towards diversification. Firstly, the section discusses policy development in the salmon industry which grew from a 200 base in 1986 to an export value of US$3 billion in 2011, and secondly, the winery industry, which rose to almost 1.8 billion USD in 2011 from 294 million USD in 1996.

4.2.4 Wine industry

Chile is the world's tenth-largest wine producer and fifth-largest wine exporter.[67] Its wine exports began to increase sharply after 1990, following the government's decision to abandon prohibitions (Alcohol law of 1938) against making wine from table grapes. These enabled production of new, more sophisticated types of wine, which were relatively well received in international markets. The Chilean wines sold abroad increased from 294 million USD in 1996 to almost 1.8 billion USD in 2011. The wine industry has achieved higher growth rates than salmon exports. The possible explanation is that it adds more processing to the raw products before exporting compared to the salmon industry. The annual growth of exports by value and unit volume is encouraging but the prices have remained relatively low.

[65] Import substitution stage roughly occurred between 1934 and 1973 and it was geared to its main productive sector, mining. It tried to supply its internal market without depending on foreign trade. Protection of the domestic industry came in form of high tariffs and heavy reliance on the state as the most entrepreneurs. New industries faced challenges as companies encountered high duties and were still highly dependent on manufactures from abroad. Agriculture did not fare well either. The policy was revised in 1973.

[66] The CODELCO Company will be discussed in subsequent chapters.

Table 7: Chilean wine exports by volume and by value, 1990–2010

Year	1990	1992	1994	1996	1998	2000	2002	2004	2006	2007	2008	2009	2010
Volume (million litres)	43	74	111	185	251	276	356	474	520	611	591	695	727
Exports (million US$)	52	119	143	294	540	585	610	845	965	1257	1384	1390	1528

Source: *Pro Chile. NB: The average compound rate of exports by value is 19.24%.*

The success in the wine export industry is commonly attributed to the investment-promotion policies that were initiated in mid-1980s. The government also initiated the technology-transfer programme for the agricultural sector. The programme was designed to create formal links between organisations such as the Agricultural and Farming Research Institute (INIA) and agro producers. The goal was to facilitate the dissemination of foreign knowledge to local farmers. The technology included production techniques to heighten quality, special grape-growing procedures, etc. The joint ventures between local companies and trans-national companies[68] aided the Chilean wine industry to acquire foreign technology since trans-national companies had invested heavily in modern technology to re-energise the plantation of vineyards.

Most of the industry's innovation arose from transfers rather than research and development (R&D). The foreign technology was absorbed through two main channels at firm and country level. The first channel is 'learning by looking' whereby Chilean oenologists[69] participated in technology-capture tours financed by the government. The second channel is international consultants,[70] who worked with their counterparts in Chile and shared their experiences. Practitioners were exposed to different practices with different varieties, allowing all participants to learn and apply what is most relevant to their situation. Domestic producers also updated their knowledge of recent developments in the grape and wine sector by visiting international wine fairs, publications, congresses, courses and seminars. To improve fruit quality, wine producers transferred newly acquired knowledge to small grape growers. Wine producers often provided free field technical assistance.

Secondly, the Chilean firms had access to long-term loans, offered at lower interest rates along with modest incentives for export development. Some of the incentives include: the simplified drawback scheme, which offered exporters a cash subsidy of 3.5 to 10% on their export value in lieu of a regular drawback,[71] and duties exemptions to exporters. The incentives designed for export development are mainly supported and administered by La Corporación de Fomento de la Produción (CORFO). Some of the small and medium-size wine firms, focusing on export development, created by CORFO include the Chile VID and Chilean Wine Corporation which are some examples of producers created with the support of CORFO.

Thirdly, the new wine producers who are producing new products for the export market and trying to position their wines at a higher price and quality end of the market have relied on new winemakers' associations to help market their exports. The smaller wine producers (that do not produce directly for foreign markets) depend on the marketing services of PRO CHILE. PRO CHILE financed about 50% of marketing costs of small and medium wine firms to promote wine abroad, including fairs, travel costs and marketing material. The openness of the economy also aided the process of importing new machinery for the sector.

4.2.5 Salmon industry

Today Chile is a leading competitor in the world markets for farmed salmon.[72] Chilean salmon farming developed within two decades. The total exports went from almost nothing in 1986 to almost US$3 billion in 2011. It has succeeded in exporting increasing volumes almost every year at an average annual compounded rate of 18%. The exporters were able to increase production when

[68] *Pro Chile website.*

[68] *International producers included Spain's Miguel Torres, France's Baron de Rothschild and Chateau Lafite, and America's Robert Mondavi.*

[69] *The Chilean oenologists were talented and experienced, and today they are constantly searching for new products.*

[70] *International consultants were less important than the 'learning by looking programme' channel.*

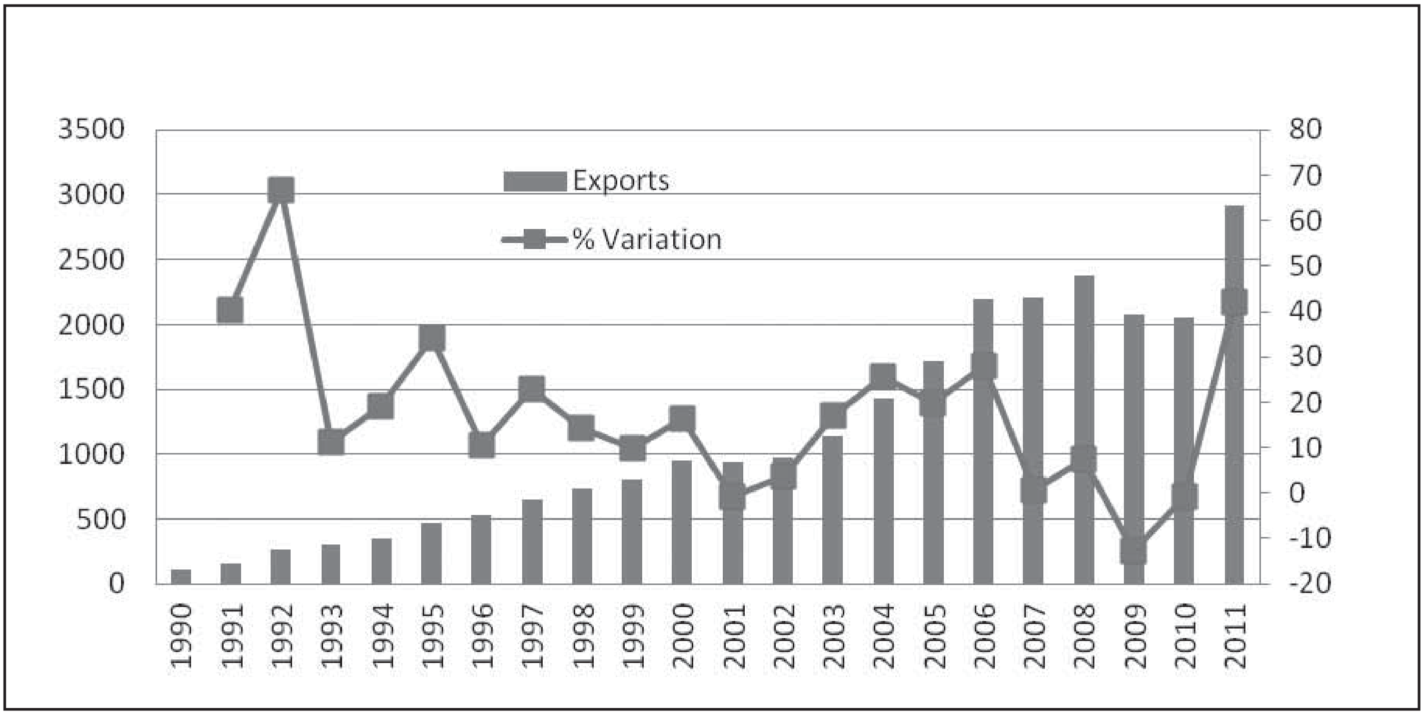
[71] *In 1994, the state paid a total of US$150 million on these subsidies.*

[72] *At present Chile holds about 25% of the world market for cultivated salmon and trout and is the second world exporter behind Norway.*

the main salmon-producing zone was hit with a fungus in 2008. Consequently, the salmon industry constitutes a real success story.

As in the wine industry the Chilean government acted as a catalyst, starting the first commercial salmon farming operation in the country with the help of CORFO, and Fundación Chile.[73] The latter resulted from a cooperative agreement between the Innovation and Technology Transfer (ITT) institute and the Chilean Government, and was created to facilitate innovation and technology transfer. In the foundation stage, the industry was dominated by public sector firms and foreign companies. Once the industry was established and became profitable, local firms started to gain a basic understanding of farming processes and entered the market. A large number of small- and medium-sized Chilean salmon farming operations, mostly family undertakings, emerged in the 1980s. They often pooled and coordinated their activities to benefit from economies of scale. They rapidly expanded their operations, some multiplying their capacities five or six fold, funded largely out of savings. The production costs were only one-third of international prices in the late 1970s and 1980s.[74]

Figure 20: Chilean salmon and trout total exports, 1990–2011



Source: *Bank Chile*

With the fall in world prices of salmon in the last decade, converging on long-term production costs, the structure of the industry changed significantly. Larger firms with technologically more complex operations emerged from mergers and integration. These firms were more capital intensive and sophisticated, and catered to niche markets. Many family-owned firms left the industry due to lack of resources and technology to compete globally. The number of firms in the industry declined, but the industry as a whole expanded during this period as leading salmon farming companies in the world came to control nearly half of the capacity in Chile. Beginning with sales through agents and some collective marketing, the industry graduated to direct sales to large international retailers such as Wal-Mart. Increased capital intensity in the industry reflected increased technological sophistication.

[73] *Fundación Chile is a semi-public institution whose objective is to develop new technologies and products for further exploitation by the private sector. The government has 50 percent ownership.*

[74] *It was during this period that Chile faced dumping charges from US producers. The efforts and cost of fighting the charges and lobbying in Washington, DC, united Chilean producers and promoted cohesion within the industry.*

The salmon industry had many positive backward linkages. It has spawned local industries for floating cages, nutrients, fishnets, packing materials and transport services. Through demand linkages, it has also had a positive impact on construction and retail trade in the region. Demand for the services of highly skilled professionals (biologists, aquaculture specialists) has grown. The growing supply of these skills in the economy has also supported the development of the sector.

Summary

Unlike Malaysia, Chile has not emerged as an industrial exporter but as a dynamic and more diversified commodity exporter with more emphasis on high-value primary-based products. Chile has based its economic transformation on the use of its existing comparative advantage, i.e., its resource endowment, unlike that of Malaysia. The slow achievements in terms of sophistication levels of the export basket suggest that the implementation of vertical polices have not been efficient enough. Although there are still challenges ahead, there are key elements that fostered current development levels. These include:

a. The Chilean state had considerable technical capacity in key ministries and an autonomous central bank.
b. The state successfully implemented the countercyclical fiscal policy by stabilising the economy by high saving during natural resource booms, especially copper windfalls period and dis-saving when prices began to fall. Proper management of profits stemming mainly from CODELCO allowed the creation of funds of strategic importance to foster economic stability, improve social welfare and encourage innovation for competitiveness.
c. The state had an understanding that innovation, science and technology are an integral step towards diversification. Of recent years, the government in collaboration with the private sector reached a consensus to move towards higher value-added production and there is a need to intensify the vertical policies which has not been done efficiently enough. These have lead to the creation of the Innovation for Competitiveness Fund (ICF) to allocate funds to other government agencies, among which the most important are CONICYT and CORFO's Innova Chile programme.

d. The provision of modest export incentives and publicly subsidised trade promotions activities lead to export development in the country. The production costs were low and in the same manner encouraged export development.

e. The public-private partnerships for development had a clear understanding of their role in achieving their goal. The state acted as a facilitator and the private sector as an engine of growth. These partnerships operate in several areas such as research and development, free trade negotiations and implementation of the NSIC. Other key associations include production support institutions and export agencies, and associations among firms.

f. Chile believed that establishing networks within international markets would play a crucial role in achieving higher levels of growth. Firstly, it had an effective two-fold strategy aimed at strengthening the small and medium enterprises (SMEs) development and facilitating their access to foreign markets. Secondly, it had a wide network of free trade agreements (FTA)[75] and had also proceeded through unilateral trade liberalisation. The FTAs networks facilitated market access through lowering tariffs. Today 90% of Chilean trade is conducted with these countries and blocs.

Perhaps the most significant contrast between the experience of Chile and that of Malaysia is that Chile's export development path remains a captive to its geography and geology. This is no longer the case for Malaysia which has a highly sophisticated industrial export sector. Both countries levered their non-renewable resources in a way that facilitated economic

[75] *Chile has signed bilateral free trade agreements with more than 51 countries representing 81 percent of world GDP.*

diversification by initially using them in a way that increased the stock of human capital and also helped to support and subsidise export-oriented industry. That Chile pursued a policy of diversification within the range of its natural resource advantage is unsurprising and has resulted in a transformation less dramatic than that of Malaysia. But the lesson for Botswana must be that an appropriate industrial policy can overcome disadvantages but making use of resource strengths to lever development is a vital lesson. The resource intensity of Botswana is profoundly different from either of these two countries yet the lessons stemming from dedicated elite willing to use a full range of policy instruments and determined to overcome their countries' commercial and economic disadvantages and to foster export diversification is a vital lesson. Both countries have also been quite welcoming of imported labour, whether of the unskilled variety as in Malaysia or entrepreneurs as in Chile.

Trade Agreements and Fiscal Incentives

5

5.1 Introduction

The purpose of this chapter is to first consider what legal restrictions exist in trading arrangements to the forms of subsidies and fiscal incentives that are found in many countries in Africa and Asia. The second section considers the reason for those incentives and then reviews in some detail the tax incentives, subsidies and financial incentives that are available in Botswana and in neighbouring countries that compete for investment in the SADC region. Two countries have been selected (besides Botswana), i.e. Namibia and South Africa, with the intention of determining what lessons can be learned from the conduct of tax and industrial policy in those countries. What will become evident is that South Africa has maintained an industrial policy based on various sector- and industry-specific incentives that are quite different from either the Botswana or Namibian system. Botswana also maintains a programme of tax incentives with some modest subsidies to business that covers several areas. Namibia maintains a tax-free environment in its export processing zones. The paper is meant to help policy makers appreciate the disparity of capacity between southern African states in terms of their ability to attract both local and foreign investment. The importance of the difference in approach will become evident in this chapter where the modelling exercises look at the impact of incentives in the context of models of hypothetical firms.

Given that SACU remains a customs union and not a more deeply integrated arrangement, market-wide disparities in investment incentives are to be expected. There are no disciplines in the SACU agreement on investment incentive arrangements, although there are clear restrictions on the use of subsidies in other trade agreements such as the WTO. However, incentives cannot be viewed alone without consideration of other cost and location-specific factors that will influence decisions pertaining to investment location.

Two types of incentive systems will be examined here. The first are tax incentives provided to firms and the second the general fiscal and financial incentives provided for investment. The chapter is intended to cover several specific sectors, including manufacturing, services and mining, while agriculture is not considered for the purpose of this analysis. As we shall see, in the case of tax incentives Botswana appears to provide what appears to be a satisfactory but increasingly uncompetitive tax system. However, in terms of the general subventions that are available from the state, Botswana experiences serious disadvantages in comparison to South Africa and Namibia. This will become all the more apparent in this chapter . There is also a review of empirical studies on marginal average and marginal effective tax regimes which shows that, on the basis of comparison with its SACU competitors, Botswana has a relatively high tax regime despite comparative analysis of statutory rates. This is especially so in light of the many varied tax incentives available in RSA.

5.2 Legal Restrictions in Various Treaty Arrangements on the Use of Tax and Other Incentive Measures

The three tax regimes examined in this chapter contain measures that could potentially be considered as being in violation of various trade agreements. This section considers the various measures that are employed by governments in light of the treaty obligations that all members have in terms of regional agreements (SACU, SADC) with the EU (Interim EPA and the Trade, Development and Cooperation Agreement (TDCA)), and the WTO obligations. The section also considers whether these violations are likely to be brought to dispute settlement by a potential complainant.

5.2.1 World Trade Organisation (WTO)

The Agreement on Subsidies and Countervailing Measures (ASCM) defines a subsidy as a financial contribution by government or any public body, including a direct transfer of funds (e.g. loans, grants and equity injections), government revenue forgone (e.g. tax credits) and the provision of goods or services by a government other than infrastructure and income or price support. There are two important provisos – that the subsidy must confer a benefit on the recipient, and that it must be specific, namely available only to an enterprise or industry or group of industries or enterprises. Article 2.2 provides that '*a subsidy which is limited to certain enterprises located within a geographic region... shall be specific'*. This would imply that subsidies extended on the basis of administrative delineation would also be specific.

On the basis of the WTO definition, all three SACU members examined in this chapter offer subsidies to enterprises that are both specific and confer a benefit. However, this in and of itself does not imply that these provisions constitute a violation of WTO rules. There are two designations of red and yellow light subsidies. The ASCM specifies that red light or prohibited export subsidies are those '*contingent in law or in fact ...upon export performance... and that contingent upon the use of domestic over imported goods'*. Annex I of the ASCM provides an illustrative list of the export subsidy provisions that are in violation of the ASCM. The list includes transport and freight charge subsidies, provisions by government of export guarantees, and full or partial exemption from direct taxes for exports. This includes dividend withholding tax (DWT) and company taxes. Domestic content requirements are also prohibited.[76]

[76] *For a fuller explanation of the ASCM compatibility of EPZ regimes see Robertson, D (2004, pp.1-8) and FIAS (2008, p.55).*

It would seem that the Namibian EPZ scheme, which requires the beneficiary to export at least 70% of total exports in order to receive company tax relief, could be seen as conditional on exports and hence potentially a violation of WTO obligations. It is also possible that the criterion used for offering a host of tax benefits to companies in South Africa is dependent upon local processing requirements though the scoring arrangements are not in the public domain. These local processing requirements are also not compatible with the provisions of the ASCM. Botswana does not employ local processing requirements in order to receive a Development Approval Order (DAO).

Even if provisions do not violate the WTO prohibition on export subsidies these taxes may still constitute actionable subsidies. The tests employed for actionable subsidies are defined in Article 5 (ASCM):

No Member should cause, through the use of subsidy... adverse effects to the interests of other members' i.e.:

i) Injury to the domestic industry of another Member
ii) Nullification or impairment of benefits accruing directly or indirectly to other Members;
iii) Serious prejudice to the interest of another member.

Serious prejudice is deemed to occur where the total *ad valorem* subsidisation of a product exceeds 5% of its value or where subsidies are paid to cover operating losses of an industry. The exemption from import duty of inputs for the purpose of export of final processed product is a tax benefit provided to all SACU members and could well be seen as an actionable subsidy. There are potentially numerous tax and support provisions and measures practised by all three countries that are potentially actionable. Only Namibia maintains provisions in its EPZ regime that are almost certainly prohibited export subsidies.

5.2.2 SACU and SADC FTA

There appear to be no provisions of the SACU agreement that restrict members' ability to use subsidies to support industry. However there are disciplines imposed on members in terms of their ability to restrict trade. Goods are to circulate freely within the customs area. Infant Industry provisions of SACU 2002 limit the ability of governments to provide infant industry protection to only the BLNS members and only for a period of eight years unless permitted by council

(Article 26). Article 29 allows SACU members to maintain marketing restrictions on agricultural goods subject to a negotiated sunset clause.

Under the provisions of the SADC FTA (2008) there are clear limitations on the use of subsidies by SADC member states. Paragraph 1 of Article 19 states: 'Member States shall not grant subsidies which distort or threaten to distort competition in the Region.' Such a provision may have been important if the SADC members had chosen to define 'distort or threaten to distort competition'. However, this was not the case, and SADC members also chose not to use the language of the WTO, which refers to 'material injury' caused by subsidies and which has a lengthy jurisprudence. As the discipline is neither defined by the parties nor is it commonly used in international trade law, this could readily be construed to mean any subsidy that might rectify a distortion caused by a subsidy of another member. It therefore places no real discipline on the use of subsidies by SADC member states. Under the provisions of paragraph 2 of Article 19 members are permitted to maintain subsidies that are already in place.

5.2.3 Interim economic partnership agreement

The recently completed Interim EPA between several SADC countries and the EU signed in 2008 and scheduled for completion by the end of December 2012 contains provisions that impose strong disciplines on signatories. Many of the disciplines required can be considered 'WTO-plus' i.e. provisions that are imposed are far greater disciplines than those found in the WTO agreements as they pertain to developing countries. The disciplines imposed on subsidies are principally and implicitly those of the WTO as there is no explicit constraint on subsidies as they are not disciplined either by Article 36 on National Treatment or by Article 32 on Anti-Dumping and Countervailing Measures, which limits parties to use WTO disciplines.[77]

While the EPA remains quite silent on explicit subsidies, some of the implicit subsidies are highly disciplined. Quantitative restrictions are prohibited unless compliant with WTO, and countries are unable to use export taxes unless the EU agrees. Infant industry provisions in the EPA are also highly restricted. Countries are only permitted 8 years of restrictions and these are only available within the first 12 years of the agreement (15 years for Low Developing Countries (LDCs)). In all, the instruments of traditional industrial policy have been highly restricted by the EPA.

5.2.4 The cost of redress and dispute settlement

whether a particular action by a member of the WTO or a Contracting Party to a trade agreement is considered to be in violation of that agreement normally remains a matter to be adjudicated by the dispute settlement mechanism (DSM) of the respective agreement. In the case of the WTO its DSM is expensive and it is this fact alone, as much as the issue of politics, which will mean that the costs act as an effective limit on the application of these rules to almost all African countries. The cost of a dispute is in the vicinity of US$10 million and will often take 3 years to complete.[78] Other more conservative estimates were lower. In the case of the Fuji-Kodak dispute Fuji and Kodak each paid US$10 million for their dispute (Bohl, 2009). If the complainant is successful it may simply result in the right to impose duties on any non-compliant member and not necessarily a removal of the offending provision. Where the value of trade in any particular product is small, as is the case in almost all African countries, such a cost would not warrant an expensive legal dispute. The only African country where this does not apply is South Africa because of the size of the market. Thus, with regard to WTO disciplines, they may have the effect of moral suasion but in practice they are deemed as not having any effect on the conduct of policy.

In the case of the other agreements there is either no dispute settlement mechanism currently in existence (for SACU[79]) or none that is operating (in the case of SADC[80]). It is a measure of the degree of likelihood that parties to SACU and SADC see the possibility of a dispute and that the parties to the agreements had established the mechanisms for handling potential disputes. If the EPA is concluded, whether the EU will be willing to overtly use its dispute settlement mechanism to force small African countries to comply with the disciplines in these areas remains to be seen.

[77] *Interim Agreement with a View to an Economic Partnership Agreement Between the European Community and its Member States, of the One Part, and the SADC-EPA States, of the Other Part. http://trade.ec.europa.eu/doclib/docs/2009/july/tradoc_143981.pdf downloaded June 2012.*

[78] *See WTO Litigation Costs and the Seal Products Case. http://worldtradelaw.typepad.com/ielpblog/2009/07/wto-litigation-costs.html downloaded 6 June 2012.*

[79] *Article 13 SACU 2002 creates a tribunal which is supposed to resolve disputes yet ten years after the treaty the Tribunal has not been established. http://www.sacu.int/main.php?id=388 downloaded 6 June 2012.*

[80] *See Article 32 Annex V SADC FTA contains provisions for the establishment of a panel to hear a potential dispute. No panel has been formed nor did any public dispute occur.*

5.3 Economics of tax incentives and investment location decisions

there are a number of reasons why countries offer tax and financial incentives to potential investors:

a. Tax Competition

Countries feel that, irrespective of the merits of their countries as a place to invest, as long as the countries with which they compete for location-specific investment offer incentives, they are at a commercial disadvantage if they fail to offer similar concessions.

b. Compensation for Inherent Disadvantages

Countries that are small, landlocked or island states feel that firms choosing to locate in their jurisdictions suffer from commercial and cost disadvantages in comparison to neighbours that may benefit from economies of scale and agglomeration.

c. Compensation for Policy-Induced Disadvantages

Countries may offer incentives because they have introduced policies that raise the cost of operating in their jurisdiction and therefore feel that these incentives are compensatory in nature.

There exist at least two competing approaches to the question of tax and financial incentives that are represented in approaches taken by SACU members. None of the analysis below suggests that lowering taxes does not provide an incentive for investment, but the approach recommended differs from the approach of a low and flat nominal tax, which has been the preferred approach of tax advice coming from the Bretton Woods institutions. The second approach is based on the cost efficiency of taxes, and countries like South Africa – as we shall see below – have taken the approach of targeted incentives. Evidence and arguments exist in favour of both approaches.

The existing economic literature on tax incentives and their impact on FDI has proven to be at best ambiguous in terms of giving policy makers direction on which taxes or incentive instrument are most effective in achieving the desired objective of stimulating investment. The vast majority of the early econometric literature suggests that tax incentives have only a minor impact on the decision to invest in countries. However, even these results have been ambiguous. Most of the cross-sectional econometric work in the area has been based on research in areas other than Africa but even cross-sectional data has produced confused results. Several studies, including that of Chirinko (1993), OECD (2001), Morisset and Pirnia (2001), and Zee, Stotsky and Ley (2002), and other studies suggest that the effect on the user cost of capital is low but many of these very early studies were based on macroeconomic data which seems to yield poor results generally. More recent studies of Africa using macroeconomic data in Africa (Anyanwu, 2011) produce similar results.

While macroeconomic studies represent a first level of analysis of incentives there have been several important studies that have moved to using microeconomic data, which tends to be more closely focused on the principle decision variables for firms. An important study undertaken by Zee et al (2002) suggests that lowering taxes does have an impact on investment but it is generally not seen as being cost effective as an instrument for affecting investment. Moreover, other factors can be more important as the authors conclude 'that tax incentives can stimulate investment, but that a country's overall economic characteristics may be more important for the success or the failure of industries than any tax incentives package'. Sector- and industry-specific incentives are far more cost effective than general tax reductions (Shah, 1995). Basu and Srinivasan (2002) note the importance of tax incentives in the Export Processing Zone (EPZ) such as in Mauritius, which effectively used tax incentives as part of its policy instruments to diversify its economy.

However, general tax incentives through tax reductions are part of the process of globalisation and tax competition that has occurred. Capital is highly mobile and this has tended to put downward pressure on tax rates throughout the world as countries compete for scarce foreign investment (Overesch, M. & Rincke, J., 2009).[81] There has been a significant and noted decline in tax rates, especially in Africa (Abbas, S. and Klemm A., 2012). The authors argue '....a race to the bottom is evident among special regimes, most notably in the case of Africa, creating effectively a parallel tax system where rates have fallen to almost zero'. Mauritius is an exception to this general trend of tax incentives since it moved away from sector-specific tax incentives (tax

[81] *The authors note that: In 1983, the mean statutory corporate tax rate of 13 Western European countries accounted to 49.2%. As of 2008, the average tax rate of these countries had eroded to 27.2%.*

credits and tax holidays, investment allowances on capital expenditure, etc) to a more generalised low-tax regime.

However, the most recent work using perception surveys – which have come to replace objective data in the last decade – suggest that there are a number of possible motivating factors and limits to investment. (Singh et al, 2011), in a recent study of investment location decisions, has argued that the local investment promotion agency should be able to employ a targeted incentive approach once the motivation of the firm is determined. This does not consider the possible governance issues associated with such levels of discretion in the offering of incentives.

Policy-making has also been helped to some degree by survey data analysis that has been undertaken to determine decision making by firms. This approach has become increasingly common at the expense of the actual costs of doing business. Tax and incentive measures are generally not found to be particularly significant in surveys of businesses deciding upon investment locations. From the earliest studies (McMillan, Pandolfi and Salinger, 1999) of the issue, businessmen who have responded to these surveys have said that tax incentives may be important but other factors such as telecommunications, intellectual property rights, and skilled labour are more important. Even in more recent surveys (World Bank, 2000) tax incentives were not seen as crucial as the basic variable in determining investment decisions.

The last source of data on the effectiveness of tax incentives is that of case studies and even in this area the range of policy conclusions relating to the importance or irrelevance of such incentives come from case studies. Countries such as Ireland (Emmons, W. et al., 1999 and WIR, 1998) and Mauritius (Subramanium, A. & Roy D., 2001; UNCTAD, 2000) are commonly cited as examples of countries that have successfully used tax incentives as a means of attracting foreign investment. However, it has invariably been argued that the incentives by themselves are generally not sufficient even in these cases to stimulate investment, and that changes in the overall economic environment were also extremely important. In the case of Ireland it had started providing tax incentives long before they were effective and it was the membership of the EU, along with firm-specific incentives, that can best explain the very rapid growth of FDI in Ireland. There appears to be little dispute that the highly predatory low tax regime employed by Ireland inside the EU was extremely successful in inducing investment. It is a formula that has now been copied by many of the newly acceding East European members of the EU.

Equally, it is argued that in the case of countries like Uganda (Chen, D. & Reinukka, R., 1999) and Indonesia (Gillis, M., 1989; Wells, L, 2001), which have abandoned selective tax measures, this lead to no appreciable decline in the level of foreign investment. In the case of Indonesia, there was a very substantial increase in the number of foreign investment projects following the tax reform. It should be pointed out that the results from Indonesia follow shifts in both ASEAN trade policy as well as the Asian economic crisis and therefore appear to capture these effects along with changes in taxation rules.

Ramatex and the Limits to Tax Competition

Ramatex, a textile manufacturing company based in Malaysia, was seeking to locate a new production facility with a business model based on importing cotton from West Africa and exporting textiles to the US under the terms of AGOA. With a promised investment of R1 billion, the company approached the governments of South Africa, Madagascar, and Botswana, finally deciding to invest in Namibia despite a generous offer by South Africa. The Government of Namibia devised an incentive package that included a 20-year tax holiday, an exemption from wharf charges, subsidised rates for water and electricity, a 99-year tax exemption on land use, and N$60 million to prepare the site, including the installation of electricity, water, and sewage infrastructure.

It was expected that the investment would create 10,000 jobs, boost cotton production, and encourage ancillary industries. Production started in middle of 2002. By 2006, Ramatex and its subsidiaries employed 8,000 workers. Of these, 2,000 were migrant workers from Asia. Furthermore the government and the City of Windhoek incurred further costs of an estimated NAD 120 million for subsidies and grants for land, road, electricity and water infrastructure, and for repairing environmental damage caused by the company. The benefits were limited as the Ramatex investment failed to lead to any substantial technology and skills spin-offs or growth in subsidiary industries. In 2005, the first Ramatex subsidiary closed its doors due to 'lack of orders' and operations fully came to an end in 2008 due to stiff competition from China.

Source: *Rosendahl (2010,p. 25), Jauch (2006), Sherbourne (2009), AfDB (2009)*

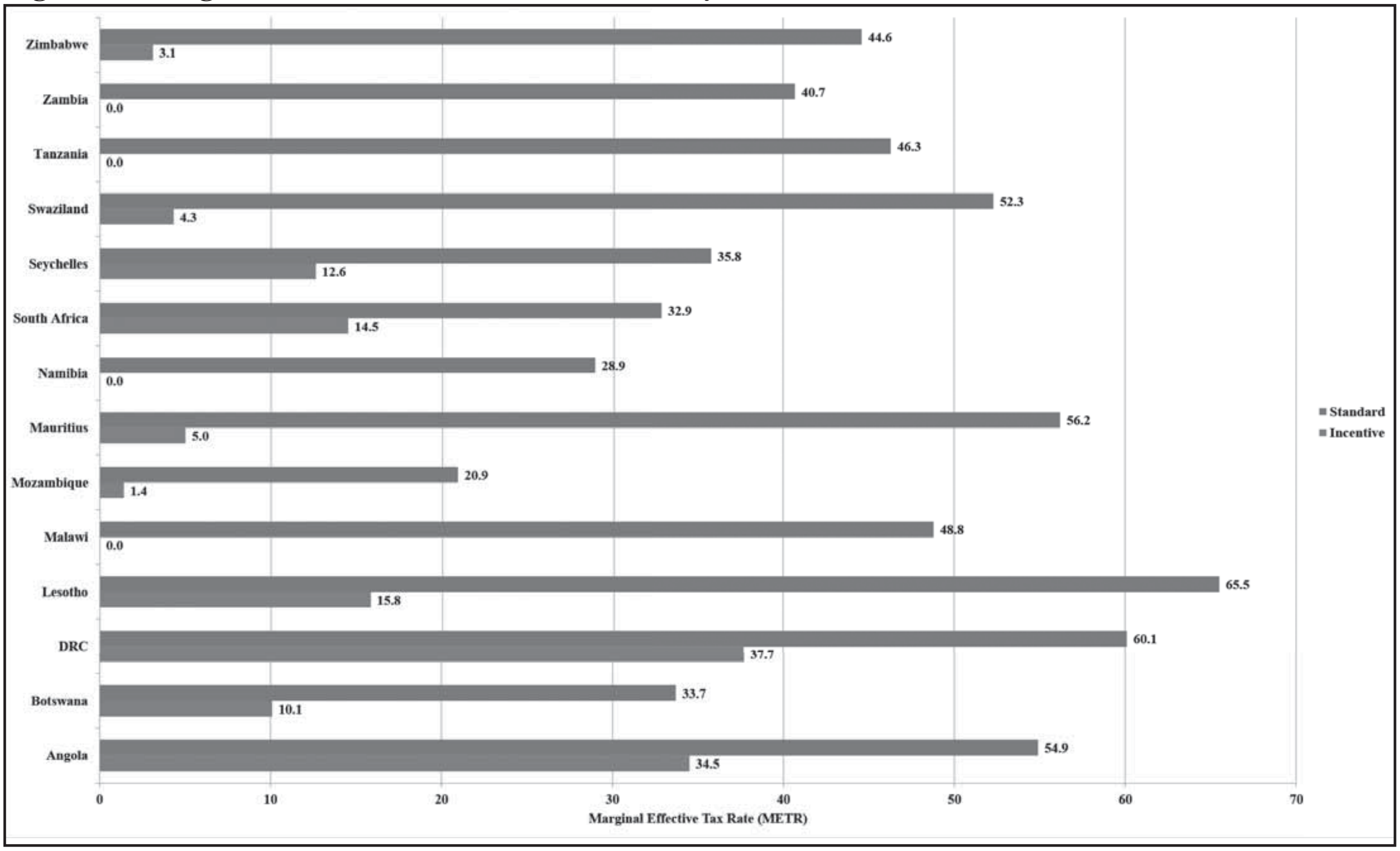
The box above considers the important case study of Ramatex where SADC members competed to provide the company with tax incentives in order to assure a significant investment. It is an important example of the limits that tax incentives can provide, in light of the unfortunate closure of Ramatex in 2008. What is important to note is that the Government of Namibia was willing to offer what was not only a tax-free environment, in common with the rules for its EPZs, but there were also considerable subsidies offered in order to assure that it succeeded in obtaining the investment. The timing of the investment, coming as it did on the heels of the phase-out of the Multi-Fiber Agreement at the WTO and resulting in heightened international competition, was particularly inauspicious. In the final analysis what is inescapable is the conclusion that no amount of tax incentives will work in attracting investment if there are no profits being generated by the firm in question or if profits are far greater in other jurisdictions.

5.4 Marginal and Average Effective Tax Rates in SACU

Economists over the last three decades have begun to develop quantitative measures to help them determine whether a tax regime results in a genuine and cost-effective stimulus to investment. The earliest concept, the marginal effective tax rate (METR),was developed in the 1980s and was based upon the determination of the rate of return on the investment without tax and the rate with the tax. This can lead to substantial differences between the statutory rate and the effective marginal rate and in some cases can lead to negative marginal value i.e. the tax system increases profitability. The formula for the METR is simply the discounted present value of profits without taxes minus the discounted present value with taxes divided by the former. This METR (Dunn, D. and Anthony P., 1990) provides an estimate of the tax wedge created by the taxation system.

It can be defined as METR = (P*-P)/P* where *P** is the present discounted value of the economic returns earned in the absence of taxation. *P* is the same in the presence of taxation.

Figure 21: Marginal effective tax rate with standard system and with tax incentives



Source: *Nathan Associates 2004, pp.7-17. NB The calculations are based on one illustrative model where there is 50% debt finance and 100% of the investment is used for machinery and equipment. It is further assumed that the firm is foreign owned and has a 20% real rate of return after 10% inflation. It is further assumed that interest rates are 25%. Import duty is assumed to be zero and the company is assumed to be sold at the end of 10 years. The calculations do not take into account excess deductions other than capital allowances but reflect the tax, dividend, loss carry forward and other capital allowances of each member of SADC.*

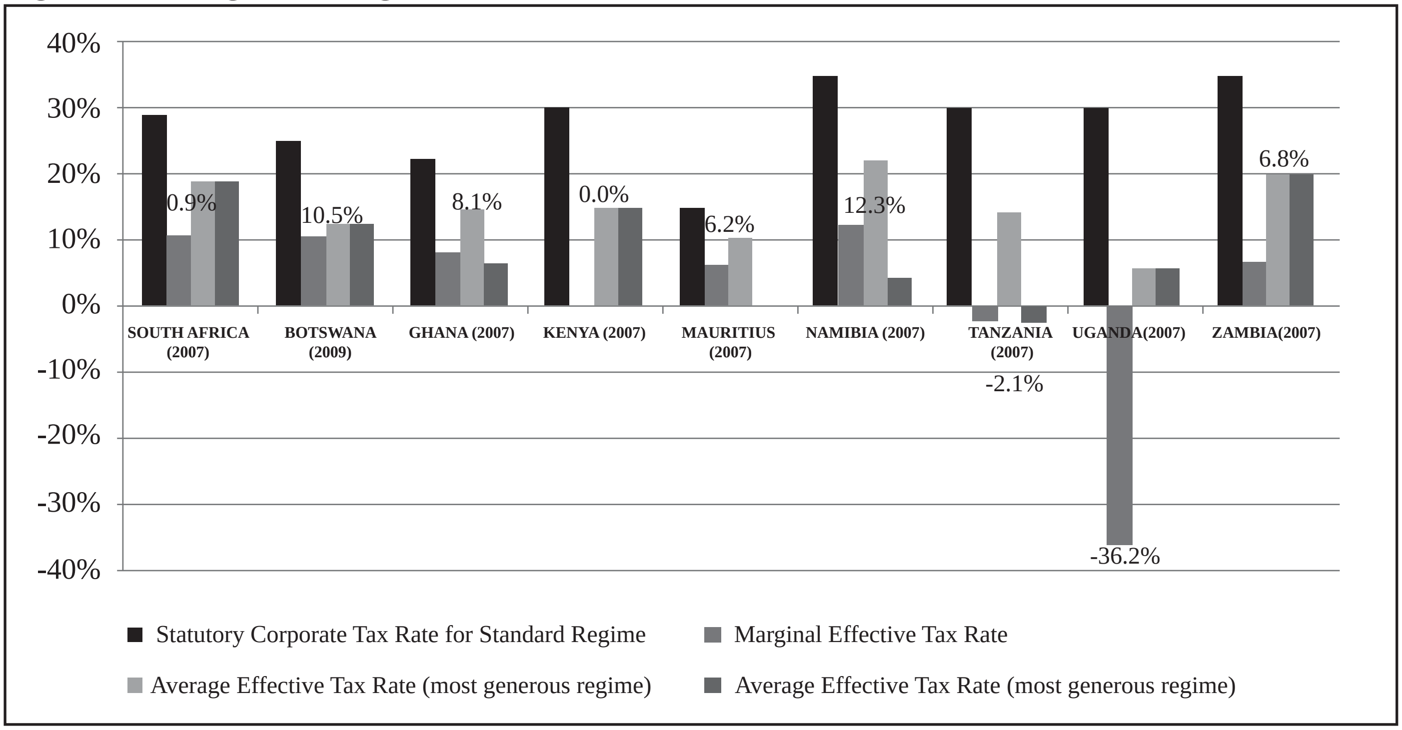
The authors of the Nathan report concluded that:

> ...the best package of tax incentives is a matter for each country to judge in light of national conditions and priorities. Nonetheless, one is tempted to single out Botswana and South Africa as having a particularly well balanced tax regime characterized by competitive standard tax rates, along with incentives packages that are attractive to investors while raising significant amounts of revenue,

without creating extreme economic distortions.

This has been the consensus view of those commenting on Botswana's tax system over the last 15 years (see for example, FIAS, 2003).Yet, it is the Mauritian EPZ system, which in the 1990s offered a negative METR, that succeeded in securing very significant local and foreign investment and facilitated the diversification of that economy from agriculture to industry. Equally, as we saw above, having a highly favourable tax regime for new investors does not, in and of itself, provide assurance that investors will invest.

Figure 22: Average and marginal effective tax rates in Africa



Source: *Database on Effective Corporate Income Tax Rates in Emerging Economies, IMF, 24 February 2012. http://www.imf.org/external/pubs/ft/wp/2012/wp1228.pdf NB Years in brackets indicate the year of the tax system.*

The more recently developed concept that is now increasingly used by tax analysts to measure the consequence of tax policy is the effective average tax rate (EATR) which is based on a model which assumes firms earn economic rents but leaves the traditional marginal effective rate as a special case. The EATR (Devereux-Griffith, 2003; Klemm, 2008) is defined as the ratio of the present discounted value of taxes over the present discounted value of the profit of a project in the absence of taxation.82

The estimates above of both the average and marginal effective tax rate for various African countries are based on a recent IMF data base (2012) but which employs information on tax systems that is relatively dated. Nonetheless, the estimates show average effective rate of taxation as well as marginal rates. If the calculation were made using the 2012 tax system in South Africa then the METR and AETR would be considerably lower.

It shows that even by regional standards Botswana does not maintain a particularly low tax regime and that South Africa, the country's most proximate trading partner, has a marginal effective tax rate of 10.9% as opposed to 10.5% in Botswana. It is becoming

[82] *EATR = R*-R/p(1+r)*

Where R is the present discounted value of the economic rent earned in the absence of taxation, R is the same in the presence of taxation, p is the pre-tax net profit and r is the real interest rate. The EMTR and EATR are the same where rents are equal to economic profits.*

increasingly clear that a 'race to the bottom' is occurring as the IMF report has noted. Botswana's tax rates are much higher than those of competing countries such as Mauritius and Namibia. Botswana's average effective rate is considerably lower than that of South Africa but this analysis predates the further diminution in nominal effective tax rates that has occurred recently in South Africa.[83]

5.5 Taxation and incentives regimes in southern african countries

5.5.1 Botswana tax incentives and support measures to industry

In July 2011 Botswana commenced a reform of its corporate taxation regime. The corporate tax rate in 2012 is 22% with a 7.5% dividend withholding tax.[84] The new regime is intended to encourage profit retention and re-investment by firms operating in Botswana. Capital allowances are 25% for industrial buildings in the first year with an annual allowance of 2.5% for both commercial and industrial buildings. The government also grants a 200% training deduction for all approved training of employees. Annual depreciation rates vary from 10% to 25% in conformity with the economic life of the asset.[85] Withholding taxes (WHT) are typically 15% for a variety of incomes paid to non-residents including royalties, interest and management fees. Loss carry forward is for five years for most forms of income but cannot be transferred from mining and agricultural income to other sectors.[86] Indirect taxes in Botswana are low with a VAT of 12% which is lower than that of neighbouring countries though there has been a tendency to include a number of new indirect taxes and levies on a variety of products and services.[87]

The greatest concessions available to manufacturing are where a Development Approval Order (DAO) is made by government88 and companies are able to benefit from a 15% rate of company taxation. In the past some companies have been granted tax holidays when DAOs are granted. The government is also able to negotiate individual taxation agreements with companies89 though these are not frequently used. In total 185 companies have been approved for concessional manufacturing tax rates. Of these only 1/3 pay taxes.90

In the mining sector the government maintains a quite different system of taxation that is in line with mining taxation regimes globally.[91] The tax regime is based on a variable tax that approximates an additional profits tax where taxes rise from a base of 22% to a high of 55% depending on the profitability of the mine.[92] On top of this there is *ad valorem* royalty based on the gross production value, which rises from 3% for base metals to 5% for precious metals up to 10% for precious stones.

In two areas of the service sector the government also provides further tax concessions. This includes firms locating in the Botswana Innovation Hub, which targets firms in ICT, mining technology, energy and environment and biotechnology, and which pay a rate of 15% company tax. The same rate is applied to firms in Botswana's International Financial Services Centre,[93] which together had 270 employees in 2010/11. In the agricultural sector small-scale producers (less than 300 head) are exempted from taxation and larger farmers may offset taxable income against other income.

It has been estimated that the total cost of tax concessions in 2010/11 is in the vicinity of Pula 50 million or 1.5% of non-mining corporate tax revenues.[94]

83 The calculations of the METR and AETR are based on 15% as the statutory corporate tax rate for Botswana as used in the IMF data base. This is incorrect as 15% tax rate applies only with a DOA which is not automatically granted.

84 Until 2011 the general corporate tax rate was 25%, 15% company tax plus 10% additional company tax. The additional tax could be offset against WHT of 15% on dividends.

85 www.sadc.int/tifi/tax/chapter/3/country/botswana downloaded 15 June 2012.

86 www.deloitte.com/assets/Dcom.../dttl_tax_highlight_2012_Botswana.pdf downloaded 15 June 2012.

87 There is in 2012 a 40% alcohol levy, 3% levy on telecommunications to fund the regulator, a training levy of 0.02% of turnover and 5t/kWh (9%) to fund rural electrification.

88 Under Development Approval Order. Companies, depending on the scale and the magnitude of the project, can apply for tax holidays. Normally this is granted to companies that are carrying out big projects. The tax holidays are restricted to five or ten years depending on the scale and the magnitude of the project..http://www.gov.bw/en/Ministries--Authorities/Ministries/Ministry-of-Finance-and-Development-Planning1/Parastatals121/Understanding-Financing downloaded May 2012.

89 The most important tax agreement is that between the GRB and De Beers over the taxation of mining in the country.

90 In 2010/11 39% of all tax paid by these firms was attributed to the 4 largest firms in the sector.

91 12th Schedule of the income Tax Act www.lowtax.net/lowtax/html/botswana/jbodctx.html downloaded May 2012.

92 The annual tax rate %= 70 – (1500/x) where x = taxable income/gross income. The maximum is 55% and the minimum 22%.

93 The innovation Hub which was created in 2009 has established a 90-hectare park near the airport and is attempting to establish an anchor tenant for the park. http://www.bih.co.bw/events.php?id=100 downloaded 15 May 2012. The IFSC has been in existence for 7 years and has attracted 42 investors though it is dominated by one large company. http://www.botswanaifsc.com/docs/Ifsc_annual_report2011.pdf downloaded 18 May 2012.

94 See World Bank.

It is argued by Jefferis that there is little additionality and that firms would have been located in Botswana in any case. He argues that the greatest benefit was derived from support for the services sector (IFSC) which would probably not have located in Botswana had it not been for the assistance provided.[95] The companies paid P13m in company tax in 2010/11, with employment at 270. The subvention provided by government to the operations of the IFSC was P9.3 million.[96] While the IFSC sector was not a drain on the fiscus in 20101/11 its economic and financial contribution was negligible.

5.5.1.1 Support measures for industry and their related costs

In Botswana the preference has not been for the use of discretionary variations of the taxation system as the principal means of supporting firms. Instead, since the end of the Financial Assistance Policy in 2000 government has developed specific support programmes for particular sectors. Two important examples are:

i) Direct subsidies to the clothing and textile industry

In 2010 the government has provided P33 million in direct support of the garment industry, which was hit by the twin effects of the 2008/9 recession and the effect of competition following the phase-out of the SACU Duty Credit Certificate subsidy scheme which provided direct benefits to Botswana producers. The scheme involved the payment of P18 – P20 per day for each of the 5,000 employees in the industry in 2011.[97] In 2007 BEDIA had undertaken a survey of the industry and found 60 firms operating within it.[98] The government support scheme provided support to some 225 firms by the end of the scheme in December 2011.[99] Support, rather than being focused on the firms that had been hit by the effects of the global recession, i.e. exporting firms, was extended to all small and micro-enterprises in the country including small tailoring shops. The government is still considering a request for an extension to the scheme.

[95] *Jefferis, K. Botswana Competitiveness and Diversification project, World Bank, October 2011. Not to be quoted until May.*

[96] *Ibid IFSC Annual report 2010/11. It should be noted that the financial contribution was much larger in 2009/2010.*

[97] *P20/day (USD2.8) is the rate paid to those working on government employment programmes called Ipelegeng.*

[98] *There were a total of 31 textile firms that had been granted DAO by the Ministry of Finance.*

[99] *Motswapong, M and Grynberg, R. (2013), 'Key Issues in the Textile and Clothing Sectors in Botswana', BIDPA Working Paper 34.*

ii) CEDA, NDB and BDC

Following the end of the Financial Assistance Program (FAP) in 2001 the government embarked on a programme of direct support to citizen-owned businesses through an interest rate subsidy on loans from CEDA. Under this programme, combined with assistance provided by government to the National Development Bank and the Botswana Development Corporation (which covers both local and foreign business), the government provides considerable direct support to business. In 2009/10, CEDA received P269 million from government transfers, which constituted approximately 60% of total revenues. This was directly a result of a loss-making business portfolio. National Development Bank (NDB) received a further Pula 24 million while the Botswana Development Corporation (BDC) generated a profit.

5.5.2 Namibian tax incentives and support measures to industry

Namibia maintains a multi-tiered tax system, which includes differential rates for particular activities. Corporate income tax rates attract a basic rate of 34% but a registered manufacturer pays 18%. In the mining sector taxes are 37.5% for mining companies with an effective rate of 55% for diamond mining and 35% for petroleum.[100] As of 2011/12 the maximum marginal rate of personal tax was 37%.[101] Dividends received by a company are exempt from the regular company tax, and expenses incurred in the production of dividend income are not deductible in the determination of the company's taxable income. Loss carry forward provisions on company losses are of indefinite duration. Dividends paid to non-residents are subject to a final 10% withholding tax unless they are paid out of oil and gas profits. A tax treaty may reduce the rate of such tax.

There exists a second tier of taxation which is for registered manufacturers. There is an allowance in respect of profits attributable for the export of manufactured goods, excluding fish and meat products. This allowance amounts to 80% of the total taxable income derived from such exports. This means that only 20% of taxable income will be taxed.[102] The tax rate on manufacturing activities, after the above mentioned

[100] *http://www.deloitte.com/assets/Dcom- Namibia/Local%20Assets/Documents/Namibian%20Quick%20Tax%20Guide%2020102011%20Jan%202011%20v3.pdf downloaded 30 May 2012.*

[101] *Ibid.*

[102] *http://www.mof.gov.na/inlandrev1.htm downloaded 29 May 2012.*

deductions and allowance, is 18% for a maximum of 10 years. Capital expenditure allowance on buildings used solely for manufacturing purposes is 20% of the cost for newly built or newly extended buildings in the first year utilised and 8% for every subsequent year on original cost for a period of 10 years. Importantly there is also a 125% expense for export marketing, approved training costs as well as remuneration for all manufacturing employees and a land transport allowance. Firms operating as registered manufacturers may export entirely into the SACU market. The relatively generous tax provisions for those firms which are registered manufacturers may not in effect be different from the outcome of the EPZ system.

For those companies that are exporting manufactured products outside the SACU market and are able to obtain an Export Processing Zone status there is an indefinite exemption from income tax, VAT, customs and excise duty, stamp and transfer duty, but not PAYE and withholding taxes. The only taxes payable are personal income tax on employees' income as well as the 10% withholding tax (non-resident shareholders) on declared dividends. In addition, EPZ enterprises are allowed to hold foreign currency accounts at commercial banks as well as to repatriate their capital and profits. The prohibition on the exports to SACU is limited and investors may apply for a right to export up to 30% of their production into SACU.[103]

5.5.3 *South African Tax and Support Measures to Industry*

In the 2012/13 budget South Africa undertook a basic reform of some of the more important elements of its income tax provisions. The rate of company tax remained at 28%. For registered micro-enterprises there is a progressive taxation system.[104] Dividend withholding tax of 15% was introduced in 2012. Normal depreciation of 40% in the first year for plant and equipment is permitted with 20% in each of the following three years.

There is no lower level of company taxation for firms operating in South Africa's Industrial Development Zones[105] though there is proposed accelerated depreciation provisions, which, combined with South Africa's indefinite loss carry forward provisions, implies a very significant tax concession of varying duration depending upon the size of the capital investment.[106] The accelerated depreciation provisions will also enhance the already existing bias towards capital-intensive projects in the Industrial Development Zone (IDZ). There is currently new legislation proposed in 2012/13 for a broader variety of Special Economic Zones which will include the current IDZ. Instead, what is offered in the IDZ scheme is a system of subventions and measures aimed primarily at alleviating the cost of indirect tax levels and administration.[107] Some of the various incentive schemes administered by the Department of Trade and Industry (DTI) are described below. It is not a complete description of the cost of South Africa's incentive regime as none has been publicly undertaken by the government of South Africa.

103 'An EPZ enterprise must export all or at least 70% of its products outside the SACU market (Namibia, Botswana, Lesotho, Swaziland and South Africa). However, after having been in operation for at least a year, an EPZ enterprise may apply to the Minister responsible for the EPZ for special consideration and permission to sell up to a maximum of 30% of its previous year's production output in the domestic (SACU) market.' *http://www.mti.gov.na/images/download/Namibias%20Export%20Processing%20Zone.pdf downloaded 30 May 2012.*

104 The rate of taxes rises from 0% of turnover for firms with profits of less than ZAR60,000 to a maximum rate of 28% of profits above ZAR 300,001.

105 'The incentive structure that is offered to investors essentially contains no additional items to those offered under existing policy and incentive schemes. The incentive structure thus involves the "packaging" of existing incentives and support measures, to enable these measures to more adequately support the IDZ objectives. These include fiscal incentives (six-year tax holiday and accelerated depreciation allowance), rebate item 470.03 of the Customs and Excise Act, exemption of VAT on inputs of IDZ companies sourced from the domestic economy and for export processing purposes, exemption from property and local taxes within the IDZ, automatic and unrestricted access to duty-free inputs (rebate item 360.01) as well as other export incentives (EMIA, Short-term Export Finance Guarantees, Export Credit Guarantees, and bilateral and multilateral market access arrangements.' http://www.sadc.int/tifi/tax/chapter/3/country/south%20africa downloaded 13 June 2012.

106 The Taxation Laws Amendment Bill (19 of 2011) states that in the case of green field manufacturing projects in the IDZ, manufacturers should be able to claim a 100% deduction of the cost of manufacturing assets (the allowed deduction in non-IDZ investments is 55%). For brown field IDZ projects the proposed deduction is 75% of manufacturing assets (outside IDZs the deduction is 35%). http://www.kpmg.com/global/en/issuesandinsights/articlespublications/taxnewsflash/pages/south-africa-idz-tax-incentive-manufacturing.aspx downloaded 13 June 2012.

107 These measures include 1) Relief from customs duties at time of importation into a Customs Controlled Area (CCA) including, any goods for storage; raw material for manufacture; and machinery used in the manufacturing process. 2) Simplified customs procedures including clearance of goods – importation, exportation and transit; Application for designation, licensing and registration; Release of cargo; Consideration of stage consignments if the requirements are met Consideration of release under embargo and lesser amounts for security – licensing, registration and movement of bonded goods. 3) Fiscal incentives on goods when Goods are imported for storage, Raw material imported for manufacture, Machinery imported for use in the manufacturing process; or Any material imported for use in the construction of the CCA infrastructure, Goods are exported from the CCA to a foreign country. Any services are rendered to a CCAE or in the CCA. 4) Subsidised infrastructure including no import duties payable on goods imported for use in the construction and maintenance of the infrastructure of a CCA in an IDZ (rebate item 498.02). and No Value-Added Tax shall be payable when, goods imported for use in the construction and maintenance of the infrastructure of a customs controlled area, Land supplied to a CCAE in the CCA for sale, letting or any other agreement, Electricity or water supplied to the IDZ Operator or CCA Enterprise located in the CCA. http://www.sars.gov.za/home.asp?pid=44747#concept downloaded 15 May 2012.

Table 8: Overview of DTI Managed Incentive Programmes

Programme	Cost
Critical Infrastructure Programme	Launched in August 2000, it has supported 42 investment projects worth ZAR34 88.4 billion in investment. Grants of ZAR 1,147,054,564 have been issued, creating 47 219 permanent jobs.
Enterprise Investment Programme	a) Combined: Manufacturing Investment Programme (MIP) and Foreign Investment Grant (FIG): 2008 to March 2011, 846 projects approved, with ZAR 2,292,008,317 of funds committed at total cost to fiscus of ZAR 198,380,873, creating 2 851 direct jobs; projected to create 23 996 direct jobs. b) Tourism Support Programme: Between 2008 and March 2011, 401 projects approved: ZAR 869,369,283 in investment commitments costing the fiscus ZAR 64,039,658; 283 direct jobs created.
Automotive Investment Scheme	July 2009–March 2011, 36 projects approved and ZAR 2,155,688,982 investment commitments at total cost to fiscus of ZAR 249,252,065; 15 014 direct jobs created.
a) Business Process Outsourcing and Offshoring Incentive **b) Business Process Service Incentive**	a) December 2006–March 2011, 18 projects approved worth ZAR 362,788,365 in commitments and total cost to fiscus of ZAR 260,743,329; 7 275 direct jobs supported. b) January 2011–March 2011, 10 projects approved with ZAR 157,760,000 funds committed; 3 944 projected direct jobs.
12-i Tax Allowance	Four projects recommended by adjudication committee since 31 March 2011, total investment ZAR 4.1 billion, with investment allowance of ZAR 1.3 billion and training allowance of ZAR 13.3 million; 370 direct jobs created.
Film and Television Incentive	Approval granted to 169 films with ZAR 704,165,844 funds committed at total cost to fiscus of ZAR 377,620,856.
Cooperative Incentive Scheme	From 2005 to March 2011, 455 projects approved worth ZAR 100,509,964 in commitments and total cost to fiscus of ZAR 92,523,000. Study commissioned in June 2011 aims to determine why most co-operatives so far assisted by CIS to date are still performing poorly. Recommendations for the co-operatives include marketing, technical assistance, mentoring and administrative assistance.
Export Marketing and Investment Scheme	August 1997–31 March 2011, 7 295 projects approved with ZAR 452,947,886 funds committed, at total cost to fiscus of ZAR 350,866,370; 10 545 jobs supported.

Black Business Supplier Development Programme	From 2002 to March 2011, 10 761 projects approved of ZAR 458,189,045 in investment commitment and total cost to fiscus of ZAR 303,889,103.
Industrial Development Zones	Since first operator permit issued in 2007, total investment of ZAR 5,749,650,000 with total cost to fiscus of ZAR 4,830,842,000; 41 229 projected direct jobs (construction and investor combined).
Capital Projects Feasibility Programme	Twenty-two feasibility projects approved, of which three are bankable; a total commitment of ZAR 67,272,343 at total cost to fiscus of ZAR 32,219,901 in agro-processing, mining and infrastructure.

Source: *DTI presentation to Portfolio Committee on Trade and Industry, 19 October 2011 in Wentworth L (2012), 'South Africa's Investment Landscape: Mapping Economic Incentives, South African Institute of International Affairs', Occasional Paper.*

In 2012, with the expansion of section 12i incentives to as much as 200% of the approved with what has been referred to as 'super allowances' for capital expenditure, it is worth considering the new project recently approved by the government of South Africa.[108]

Table 9: Recent section 12(i) concessions granted by DTI and their employment generation effect

Project	Investment (qualifying assets)	Cost to Fiscus	Employment Generated (cost per job)
Sephaku Fluoride Ltd Sulphuric Acid, Hydrogen Fluoride, Aluminium Fluoride and Alphydrite.	1,373, 383, 275	135, 436, 537	211 (R 64,200)
Unilever South Africa (Pty) Ltd – liquid personal care products and liquid household care products.	1170 714 223, (734 767 200)	73 972 786.	195 (R38,000)
Sasol Chemical Industries Ltd – manufacture medium and hard wax and paraffin.	8 020 089 401 (1 626 406 924)	155,162,602	94 (R 1,650,666)

Source: *Government Gazette, 12 April 2012, Notice 308 of 2012, Department of Trade and Industry Section 12i Tax Allowance Programme, No. 35253 RSA mining taxation*

The South African mining tax regime is based upon a net revenue taxation regime. The key elements include:

- **Royalties and Export Taxes**: The rate varies depending on the Earnings before Interest and Taxation

[108] *South African Institute of Chartered Accountants, Newsletter of May 2012, Issue 152.*
'The very attractive section 12I allowance of the Act (ITA) is to be further enhanced to provide "super allowances" for capital expenditure to be incurred on qualifying green-field (i.e., new) projects located within an industrial development zone (IDZ). Please note that this is likely to be promulgated in November 2011, without any changes to the present content… The section 12I allowances are in addition to the capital allowances (i.e. s11 (e), s12C and s13 allowances) that may be claimed on qualifying expenditure. Therefore, the taxpayer could obtain up to 200% tax deductions in respect of qualifying capital expenditure. http://www.saica.co.za/integritax/Archive/Integritax_May_2012_Issue_152.pdf downloaded 15 June 2012.

(EBIT) and gross sales. For refined minerals the maximum rate is 5% and for unrefined minerals, the rate is 7%.[109] There also exists, at least nominally, a 5% export tax on unprocessed diamonds.

- **Corporate Income Tax**: A standard corporate tax rate of 28% and a secondary tax on companies (STC) at 10% is levied on mining companies. The secondary tax on companies was scrapped in 2012/13 budget. There exists a special formula for the taxation of gold mines in South Africa.[110]

- **Withholding taxes (WHT)**: South Africa does not currently apply a WHT on dividends. However, plans are under way to introduce a WHT at a rate of 10% in 2013 which would replace the STC.

- **Capex Expensing**: Mining companies are eligible for an upfront deduction of all capital expenditure incurred. However, the deduction can only be claimed when the company reaches production stage and is subject to sufficient mining taxable income. Assessed losses may be carried forward indefinitely provided the company carries on a trade.

It should be noted that the taxation rate in South Africa is not used as the principle method of providing incentives to the private sector. South Africa has maintained the integrity of the single rate of company tax for all economic activity. South Africa has a strong preference for sector- and industry-specific intervention through state-funded assistance.

5.6 Conclusion – the race to the bottom

The above analysis has shown that based on recent analysis Botswana does not have a very competitive taxation regime and Botswana's METR are not significantly different from that of South Africa. As we shall see below this however disguises subtle differences in the taxation regime which give South Africa an effective advantage. Perhaps more importantly is the fact that the METR is much higher in Botswana than in comparators in SACU such as Namibia and other countries in SADC such as Mauritius. In southern Africa there has been a race to the bottom when it comes to corporate tax rates and incentives and it is a race that Botswana is not winning. Low effective rates of taxation are by no means an assurance that a country will be in a position to attract investment. A host of other cost and business environment factors ultimately determine where investments occur. It is evident from the widely divergent experiences of Namibia and Mauritius that it is possible to maintain what is in effect a zero tax environment with completely opposite results. In the case of Namibia the generous tax regime has been insufficient to overcome the other cost factors.

It must again be recalled that the IMF data base is based on the tax regime in South Africa in 2007. In the interim there have been a very large number of tax concessions and financial benefits that will have dramatically lowered the METR for South Africa while at the same time there have been few major changes in the tax regime in Botswana since 2009. With the further liberalisation of tax provisions proposed for 2102 to South African Industrial Development Zones, which will include up to a 200% capital cost deduction, effective rates in South Africa will approach zero for the special taxation regimes that are available.

Historically policy makers in Botswana have used the low, flat corporate tax to level the playing field between itself and neighbouring South Africa. It was felt that the relatively high costs of operating in Botswana, rather than being addressed directly, could be compensated for through a lower corporate tax rate. However, the data above suggests that the growing list of tax incentives and support measures available in RSA has meant that any tax advantage available to investors in Botswana has been eroded over time.

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[109] *Act No. 28, 2008 Mineral And Petroleum Resources Royalty Act, 2008, Section 3*

(1) The percentage mentioned in section 3(1) is—0.5 + [earnings before interest and taxes/(gross sales in respect of refined mineral resources x 12.5)] x 100.

(2) The percentage mentioned in section 3(2) is—0.5 + [earnings before interest and taxes/(gross sales in respect of unrefined mineral resources x 9)] x 100.

(3) (a) The percentage determined in terms of subsection (1) must not exceed 5 percent.

(b) The percentage determined in terms of subsection (2) must not exceed 7%.

See also 'Explanatory memorandum for the mineral and petroleum resources royalty Bill, 2008 (20 August 2008) http://www.treasury.gov.za/public%20comments/EM%20Royalty%20Bill%202008%20-%2020%20Aug%202008.pdf downloaded May 2012.

[110] *To date the formula is based on Y= 34 - (170/ x) or for those companies that do not elect to pay STC Y = 43 - (215/ x) in which formula: x= the ratio, expressed as a percentage, calculated as follows:*

Taxable income from gold mining/Total revenue (turnover) from gold mining And y = calculated percentage which represents the rate of tax to be levied

SARS: Guide For Tax Rates/Duties/Levies (2011/12 and prior years) www.sars.gov.za/Tools/Documents/DocumentDownload.asp?FileID...

Modelling of Industrial and Manufacturing Investments in Botswana and SADC

6

6.1 Introduction

We begin with a discussion in this chapter of the various ways in which countries are compared as possible destinations for investment in the prevailing economics, business and accounting literature. Three different mechanisms are considered of evaluating a particular destination as a prospective location. The first is the competitiveness index of the World Economic Forum. This is followed by a brief consideration of the World Bank Ease of Doing Business Index, which is strictly speaking not a measure of competitiveness but has become used as a proxy amongst policy makers. The third and most information-intensive approach, favoured traditionally by financial analysts, looks at rates of return on investments in particular destinations. This is the approach favoured by investors, bankers and financial stakeholders and will be the principal tool employed in this analysis.

This chapter considers in detail the direct costs of doing business in Botswana as opposed to six other SADC countries (Mauritius, Mozambique, Namibia, South Africa, Tanzania and Zambia) as well as three comparators in Asia (China, India and Malaysia). The purpose of the modelling is to attempt to assess the impact of various components of costs on operating a business in Botswana as opposed to other jurisdictions for potential investments. This approach considers the direct financial costs of doing business in terms of dollars and cents. This approach employs cash flow modelling of a hypothetical firm that is moved from one jurisdiction to another and faces the operating costs prevalent in that jurisdiction.

The significance of a particular direct cost of doing business depends on the weighting afforded to that cost in the overall NPV of a company's investments. The modelling is based on the weightings used in cash flow models derived from actual private investors and by models established by accounting firms (e.g. KPMG models). Minor costs in the industrial processes modelled here, such as the costs of water and telecommunication are not formally modelled because of their relative insignificance in models of the industrial firms that have been developed. This is not saying that these costs may not be significant in other industries such as call centres, coal mining and tanneries etc.

6.2 Differing interpretations of competitiveness – fundamentalism and institutionalism

The traditional models of business competitiveness have usually defined competitiveness purely in terms of economic fundamentals i.e. dollars and cents costs per unit. The approach, as we shall see below, used by the WEF and World Bank is based on the quality of the institutions and firms. If firms are highly productive in a particular country, then the country will be competitive and if the institutions of governance are effective then the country will rank highly on the WB Ease of Doing Business Index and, by extension, attract investment.

The approach taken in this chapter is fundamentalist in nature, looking at the direct cost of production and the impact this has on cash flow models of specific or hypothetical firms. Highly productive firms will, by their nature, have low costs and this should be reflected in the financial aggregates analysed here. This type of modelling emphasises the dollar cost of production, including that of taxes as the prime determinants of business location decisions. This method typically involves the calculation of unit costs of operation in each of a number of locations. The current work is based on the most widely used of such models by KPMG.[111]

There are no doubt aspects of a country's competitiveness that are not readily captured in cash flow models and it is for this reason that other institutional indices are used. Moreover, cash flow modelling has a number of weaknesses as a tool of analysis. It is common to assume in such models that the capital-to-labour ratio in each of the jurisdictions where such comparisons occur is fixed (i.e. the Leontief assumption). The KPMG approach, as we shall see below, assumes no differences in the use of factors of production across various locations and does not effectively address major issues such as productivity and factor intensity differences between various possible locations. These are not examined with the rigour they deserve. The analysis of competitiveness below which looks at the overall environment is generally done separately from such cash flow modelling. Significantly, the work in this chapter modifies the models as it attempts to consider a completely export-oriented enterprise.

The chapter considers first the Global Competitiveness Report[112] and the World Bank Annual Ease of Doing Business Report,[113] which have been instrumental in shaping thinking regarding competitiveness and shifting policy away from the traditional focus on costs of production in Botswana. While these multifaceted approaches to national competitiveness are very useful in many cases in pointing to other aspects of national competitiveness the traditional cost-based model of competitiveness based on a microeconomic model of hypothetical firms is better able to quantitatively assess sources of lack of competitiveness than are the qualitative and institutional indices.

6.2.1 Global Competitiveness Report – World Economic Forum

The more recent estimates of determining business costs are those associated with the work of Porter and Schwab, which have very much shaped policy thinking about national competitiveness. This approach does not focus principally on the direct dollar cost of doing business but rather on factors that determine national productivity. This work has given rise to the development of the Global Competitiveness Index from the World Economic Forum. Where the data is available the rankings of various countries used in the sampling of costs are presented in Table 10.

Table 10: Global Competitiveness Report rankings, 2012

	GCI 2012-2013		GCI 2011-2012	
Country/ Economy	Rank	Score	Rank	Change
Switzerland	1	5.72	1	0
Singapore	2	5.67	2	0
China	29	4.83	26	-3
Brazil	48	4.40	53	5
South Africa	52	4.37	50	-2
Mauritius	54	4.35	54	0
Rwanda	63	4.24	70	7
Malaysia	25	5.06	21	-4
India	59	4.32	56	-3
Botswana	79	4.06	80	1
Namibia	92	3.88	83	-9
Zambia	102	3.80	113	11

[111] *KPMG (2012) 'Competitive Alternatives: KPM's Guide to International Business Location Costs'. http://www.competitivealternatives.com/default.aspx downloaded 13 August 2012.*

[112] *http://www.weforum.org/issues/global-competitiveness*

[113] *www.doingbusiness.org/reports/global-reports/doing-business-2013*

Tanzania	120	3.60	120	0
Mozambique	138	3.17	133	-5

Source: *Global Competitiveness Report, 2012*

Botswana's National Export Strategy (NES) is based, both factually and conceptually, in very large measure on the Global Competitiveness Report and hence, by extension, to the work of Porter and Schwab. The specific objectives of the NES are to make the non-mineral export sector a major engine for growth and to specifically develop several key sectors including Arts and Crafts; Garment and Textile; Meat and leather products, Jewellery, glass and diamond and other mineral products.

The only reference in the NES objectives to dealing with the direct cost of doing business in Botswana refers to government-related costs and producing an enabling environment, a theme common to policy documents on competitiveness and exports from Botswana.[114] The definition of competitiveness as found in the NES comes from the Global Competitiveness Report (GCR) and Porter and Schwab.[115]

The status of Botswana in the classification created by the GCR and used by the NES is that of a country in transition between the first stage of development, i.e. where progress is driven by factors of production, and the second stage of development where competitiveness is driven by efficiency. In the first category are most of the SADC member states and the SADC countries. In the second category are Namibia, South Africa and Maurtius, with Botswana in transition.[116] Developed status can only occur when countries reach stage II where their firms are innovation driven. It is this focus on innovation that is central to GCR and the NES

The classification system developed by Porter and Schwab for the annual GCR are ultimately arbitrary, as is the case with all such taxonomies. In large measure the thresholds and definitions employed are offered without justification – a simple delphic approach is implicit with no elaboration or justification of the various cut-off points in the stages of development. However, the theory behind Porter's work and the use of these classifications is elaborate and has already had important implications for the policy that Botswana has adopted. It is for this reason that the GCR can consider the issue of whether one country is a more competitive location than another without even once considering the direct financial costs confronting a particular investor. In all cases competitiveness is not an economic or accounting concept but rather is qualitative in nature, focusing almost entirely on the conduct of public policy towards the attainment of national competitiveness, or the perception thereof, rather than actual input costs which form, in basic international economics, the standard basis of determination of a country's commercial or comparative advantage.

The focus on innovation is becoming increasingly important in Botswana's competitiveness and export policy. Indeed the government has established an Innovation Hub as part of its diversification strategy. The foundations for this policy that is still part pursued in Botswana are found in the works of Porter (1990), in the 'Competitive Advantage of Nations' where he attempts to develop, what was at the time, a new theory of competitiveness and introduces the concept of 'national competitive advantage' as opposed to the traditional Ricardian concept of comparative advantage based on relative costs.

The most important assertion in Porter's work as it pertains to Botswana's competitiveness and export

[114] *The objectives of the NES state that the policy will aim, inter alia:*
(iv) To improve the business environment and lower direct costs of doing business by removing bottlenecks to trade, developing an appropriate infrastructure and making available to exporters professional services in clearing, forwarding, packaging and labelling.
(vi) To provide exporters with a competitive trade finance facility, equip them with up-to-date specific market information to support their business decision and ensure that they produce goods that meet international standards

[115] *The NES states: 'The Global Competitiveness Report (2008–09) defines competitiveness as the set of institutions, policies and factors that determine the level of productivity of a country. This definition of competitiveness is based on factors that do not require a country to sacrifice resources and the standards of living in order to be globally competitive. Notwithstanding this, at lower levels of development competitiveness is often defined in terms of cost-reduction measures such as maintenance of low wages, low interest rates, provision of subsidies, currency devaluation, etc. This strategy uses the first definition as this allows the NES to use stronger factors of global competitiveness.'*

[116] *In the GCR the two criteria established are the level of GDP/capita and second the extent of primary resource production. The cut-off used by the authors for GDP/capita (GCR, 2008, p.20) and the extent of resource production is whether its exports of total goods and services is more than 70% of the total. However, the GCR specifically excludes agriculture from this criteria and focuses only on minerals and fuel (GCR, 2008, p.50 fn 20). The authors of the GCR, when classifying countries, place Botswana in transition because of its very high GDP/capita. Namibia, Botswana and South Africa, while having high GDP/capita also export far more than 70% threshhold. The reason why GDP/capita is particularly high is the very large natural resource/minerals base in all three countries, especially Botswana, with its very rich diamond deposits.*

policy is that a nation must reach the 'innovation-driven' stage if high real incomes are to be achieved. Lastly and most importantly, as it bears on Botswana's policy, is that in Porter's theory 'international success cannot be based upon comparative advantage brought about by basic factor conditions but must be built on the up-grading of a nation's industries through innovation, product differentiation, branding and superior marketing' (Davies and Ellis, 2000).

Irrespective of the veracity of the proposition that countries must reach a high technology stage to achieve prosperity (with Australia and New Zealand often cited as counter-examples), it is the policy implication for those developing countries wishing to achieve developed country status like Botswana that is of concern. Porter's analysis has lead to premature implementation of policy by developing countries that is inappropriate to the level of development and the evolution of its human capital stock. Perhaps the most damning criticism of Porter, Shwab and the GCR work concerning developing countries like Botswana comes from Davies and Ellis (2000, p.1201), who are among Porter's most important critics. They argue:

> 'Comparative advantage is about which industries a country should have while competitive advantage is about how firms within industries (especially those in advanced countries) compete with each other. The elision of the two, and the resulting emphasis placed on the need for firms to compete on a basis other than cost, even in developing nations, leads to dangerous policy recommendations whereby poor countries are exhorted to change their product mix towards more differentiated and 'high-tech' products for which their current resource endowments are inappropriate.' (emphasis added)

6.2.2 Ease of Doing Business – World Bank Index

The Ease of Doing Business Index prepared by the World Bank[117] has generally been used as a proxy in both public and policy discussions for the cost of doing business. While some of the elements of the index do reflect on costs, others are institutional in nature. The cost of gathering data on an annual basis of actual dollar costs is prohibitive and so international institutions use proxies for cost. However, there are conceptual issues pertaining to the relevance of the cost of doing business index that indicate that it is not a useful guide for investors. While there can be no doubt that everything else held constant, a business context in which doing business is more difficult raises cost, it is by no means the over-arching consideration of the choice of location for investments. Below are the rankings in the World Bank Ease of Doing Business Index for selected SADC countries. The sample of countries chosen also includes the BRICS (Brazil, Russia, India, China, South Africa) countries which have been the countries attracting most private investment over the five years in question.

Table 11: World Bank Ease of Doing Business rankings

Country	2013	2012	2011	2010	2009
Botswana	59	54	52	45	39
Mauritius	19	23	20	17	24
Mozambique	146	139	126	135	140
Namibia	87	78	69	66	54
South Africa	39	35	34	34	32
Tanzania	134	127	128	131	126
Zambia	94	84	76	90	99
China	91	91	79	89	86
India	132	132	134	133	132
Malaysia	12	18	21	23	21
Brazil	130	126	127	129	127
Russian Federation	112	120	123	120	118
Rwanda	52	45	58	67	143

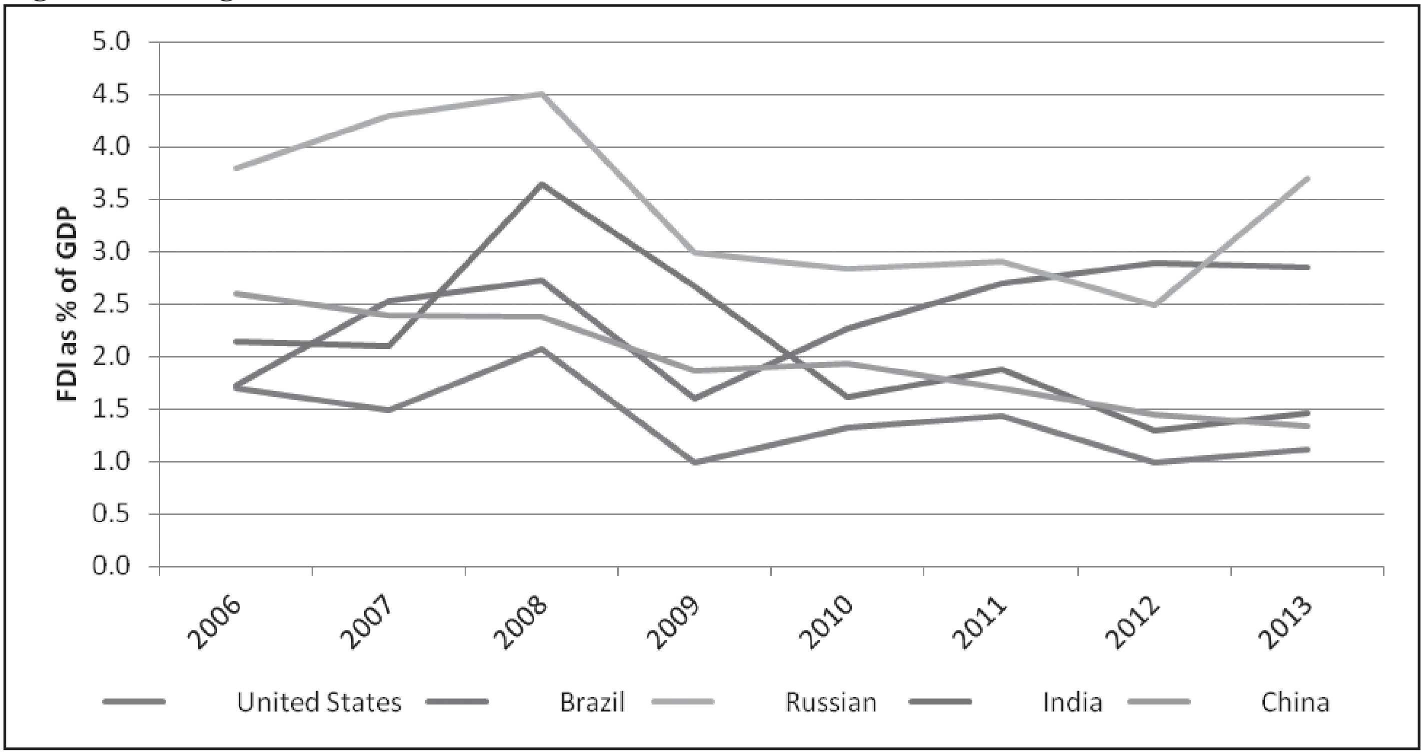
Source: *World Bank*

What is most evident about the ranking is that those countries that have attained the highest levels of

[117] *http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Annual-Reports/English/DB13-Chapters/Executive-Summary.pdf downloaded 22 November 2102.*

investment as a percentage of GDP have not necessarily been those with the highest Ease of Doing Business Ranking. The US has a high ranking on the World Bank Ease of Doing Business ranking and yet the highest level of FDI is amongst BRICS countries, as seen in Figure 23 below.

Figure 23: Foreign Direct Investment in the USA and BRICS as % of GDP



Source : *UNCTAD http://unctadstat.unctad.org/TableViewer/tableView.aspx, http://www.indexmundi.com*

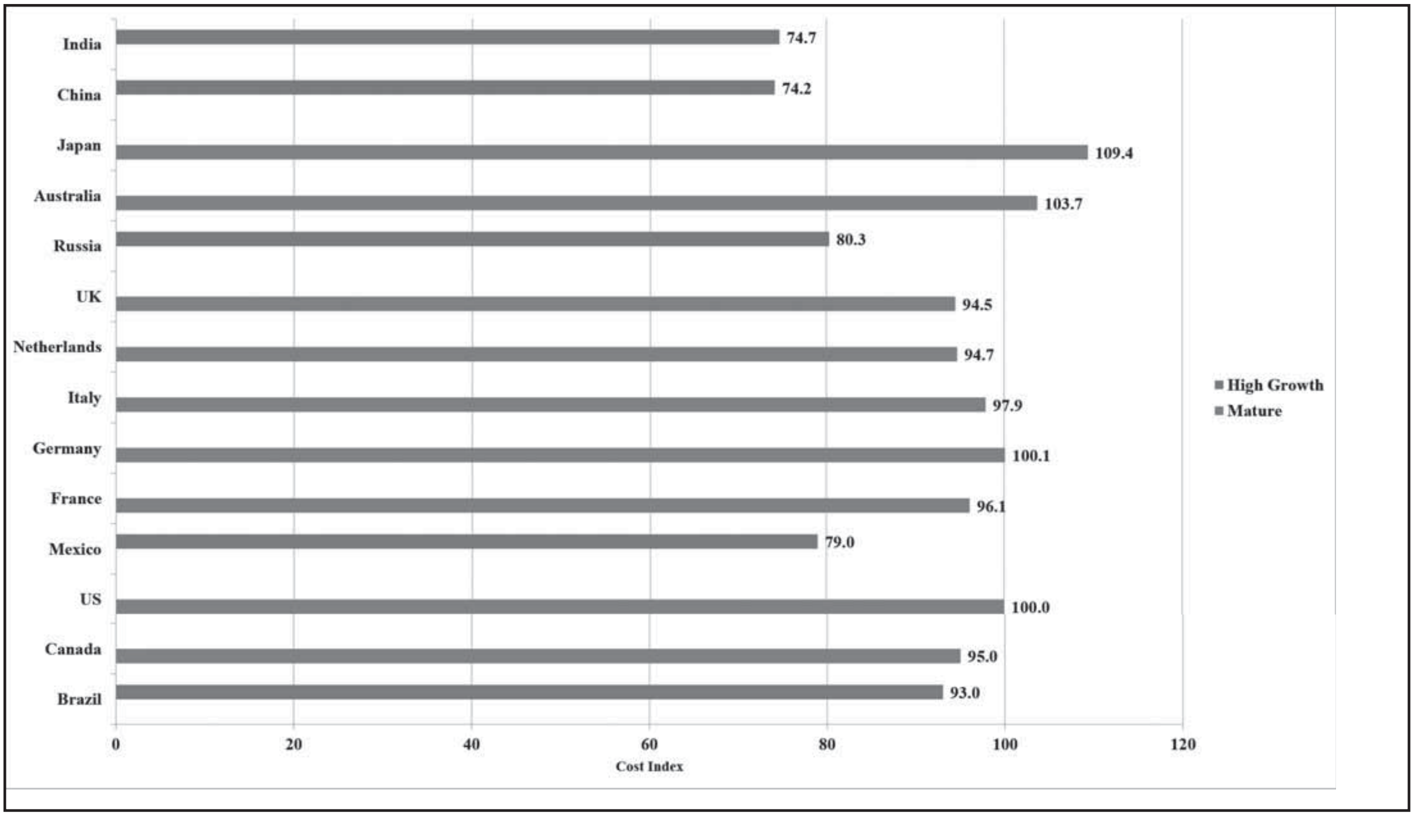
Investment normally occurs where costs are lowest and where market potential and profitability is the greatest. Large and relatively low-cost economies like some of the BRICS countries may prove difficult locations for private investors but they nonetheless remain destinations of priority for firms looking to make manufacturing investments.

Perhaps equally significant is that all the African countries in the sample, with the exception of Mauritius and Rwanda, have seen their rankings drop over the last five years. Rwanda is included in the sample only for expository purposes and is considered the 'star pupil'. It has moved from amongst the lowest rankings in the index to being the third highest in Africa. It is testimony to the enormous effort by the Rwandan administration to genuinely lower barriers and costs of investment in the wake of the conflict in that country in 1994. While there can be no logical justification for raising costs of doing business, this raises the question as to whether small, remote, landlocked and post-conflict Rwanda is likely to achieve greater success in attracting investment than countries that are less disadvantaged by virtue of their inherent or inherited characteristics.

6.3 Cash flow modelling and competitiveness – modified kpmg models

Unlike the approaches above this study focuses primarily on traditional cash-flow and financial analysis methods of examining the financial implications of the cost of doing business to determine the constraints to national competitiveness. The reason for this approach is that it most closely approximates the actual decision making of firms looking to develop Greenfield projects. It remains standard business practice for firms to undertake a detailed analysis of costs and revenues of various locations prior to making a location decision. The qualitative indices such as Doing Business or GCI are important in assisting location decisions but they do not determine the bank-ability of a particular project. This ultimately rests on the economic and commercial modelling.

Figure 24: KPMG ranking of 14 countries in terms of the average costs of production in 19 economic models, 2012



Source: *KPMG Competitive Alternatives 2012, Vol. 1, p.7*

Figure 24 shows the results of ranking of costs of production of 14 advanced countries, including BRICS countries. Using USA as 100 it is evident that for the range of 19 industrial and service activities used for the modelling exercises the least-cost countries were invariably BRICS. Thus, based on standard accounting measures, an entirely different ranking arises.

6.3.1 Comparative costs

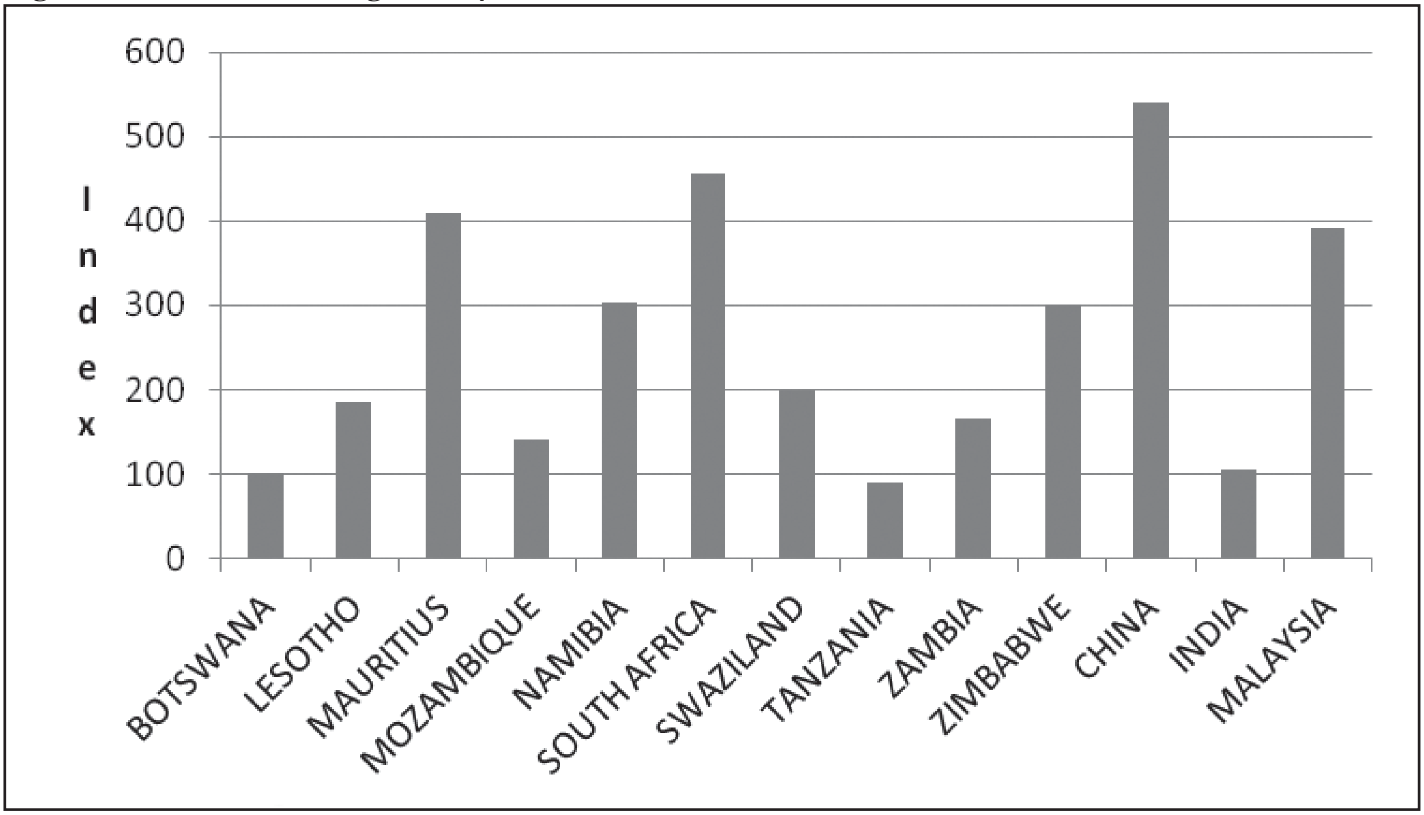
This section considers some of the data for important components of the cost of production, including labour costs, transport, electricity costs and costs of debt.

6.3.1.1 Labour costs

- Unskilled Workers

Figure 25 shows the comparison of Botswana's unskilled labour costs. It shows the average wages from three different jobs i.e. construction worker, checkout operator in large supermarkets, and a kitchen porter. The figure shows that unskilled workers in Botswana are paid lower wages as compared to many countries in SADC and low-cost-producing countries. Unskilled workers in China, South Africa, Mauritius and Malaysia are paid about four times more than unskilled workers in Botswana who receive in these categories wages slightly lower than India (see Annex IV for details). Two countries in the SACU region, Lesotho and Swaziland, the former being an LDC, pay unskilled workers higher wages as compared to unskilled workers in Botswana.

Figure 25: Unskilled, average hourly rate, index, 2012

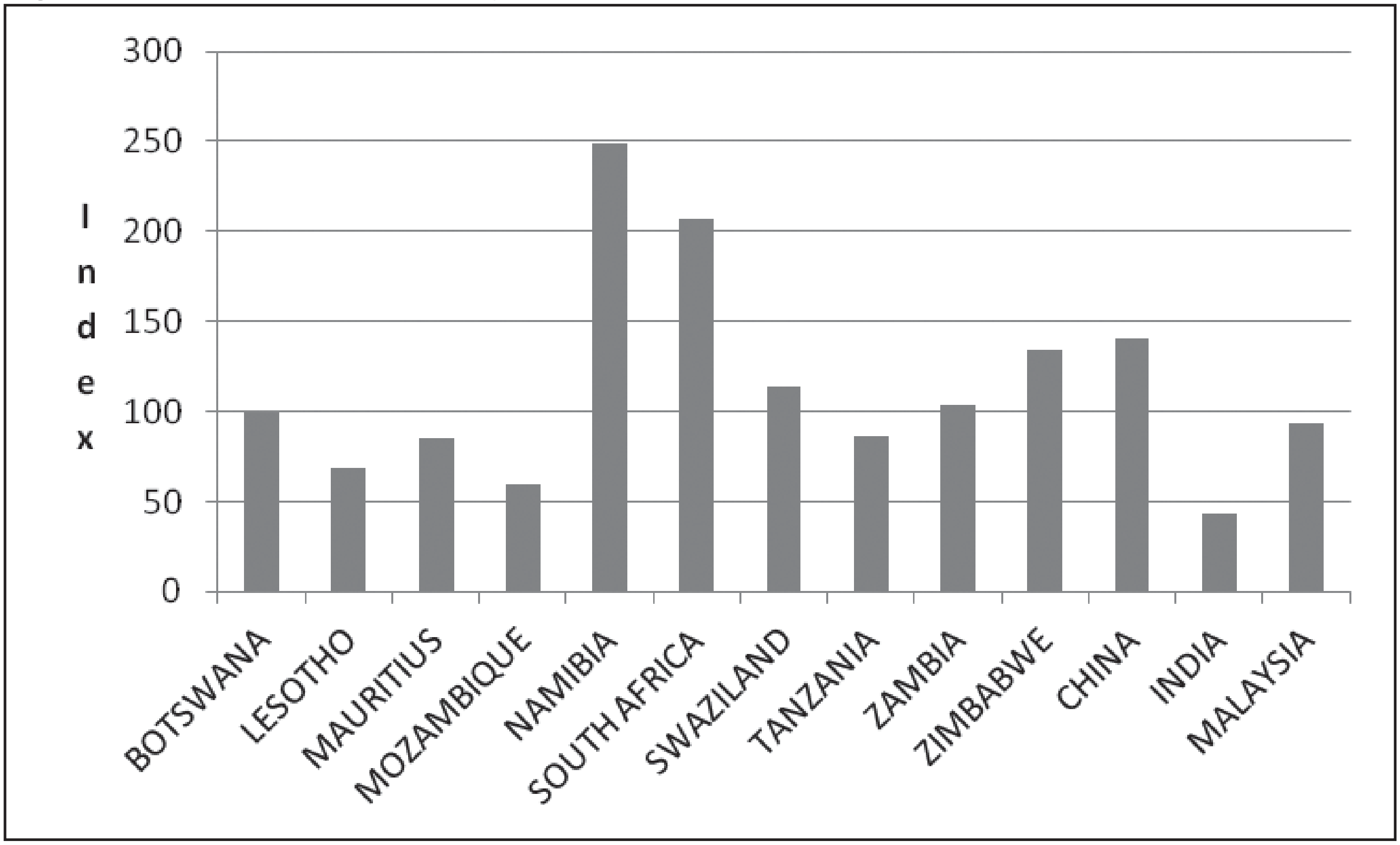


Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index (Botswana = 100)

- Semi-skilled Workers

Figure 26 presents a comparison of salaries for semi-skilled workers. It shows that unlike unskilled workers, semi-skilled workers in Botswana are paid higher wages as compared to most of the other SADC countries. It is only in Namibia and South Africa where workers are paid over two times more than workers in Botswana. Salaries and wages in China in this category are slightly higher than in Botswana, whereas they are lower in India and Malaysia. This semi-skilled category includes workers from three different jobs: bank clerk or teller, garage mechanic and payroll clerk.

Figure 26: Semi-skilled, annual salary, index, 2012

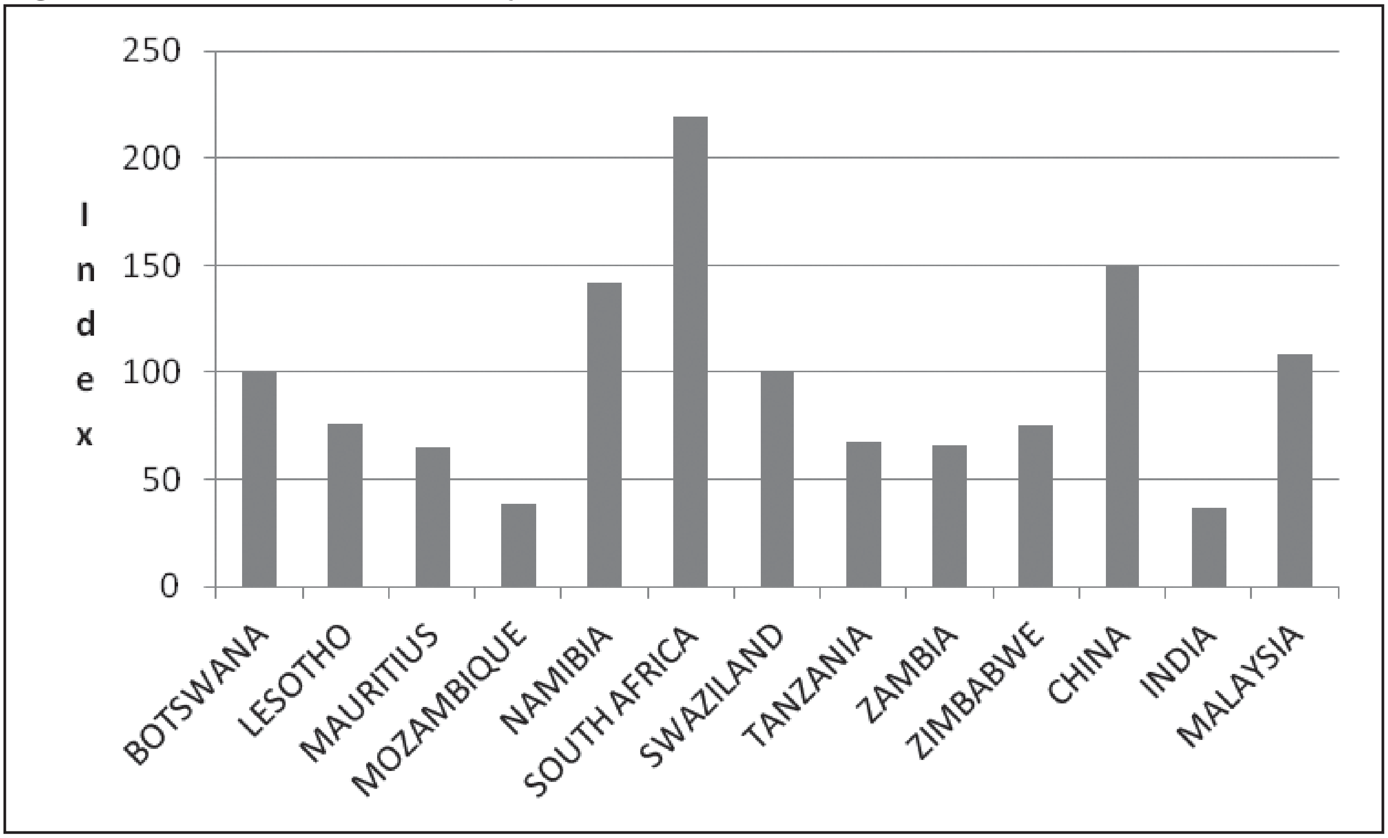


Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100.

- Professional Salaries

Figure 27 depicts comparisons in average professional salaries. The professional jobs category includes workers from six different jobs used in the current sample: qualified teacher in a state school, bank branch manager, general registered nurse, qualified accountant, production supervisor in a garment or textile plant and a production supervisor in an electrical assembly plant. Professional workers in South Africa, Namibia, China and Malaysia are, on average, paid higher wages than in Botswana. The magnitude of Botswana's commercial disadvantage is diminished by averaging across a host of relatively low-salary professions such as teaching and nursing. For the purposes of comparison salaries of commercial professionals, i.e. bank managers and accountants, have been used as a basis for international comparisons. It is here that the differentials are far larger (see salaries in Annex IV to this report).

Figure 27: Professionals, annual salary, index, 2012



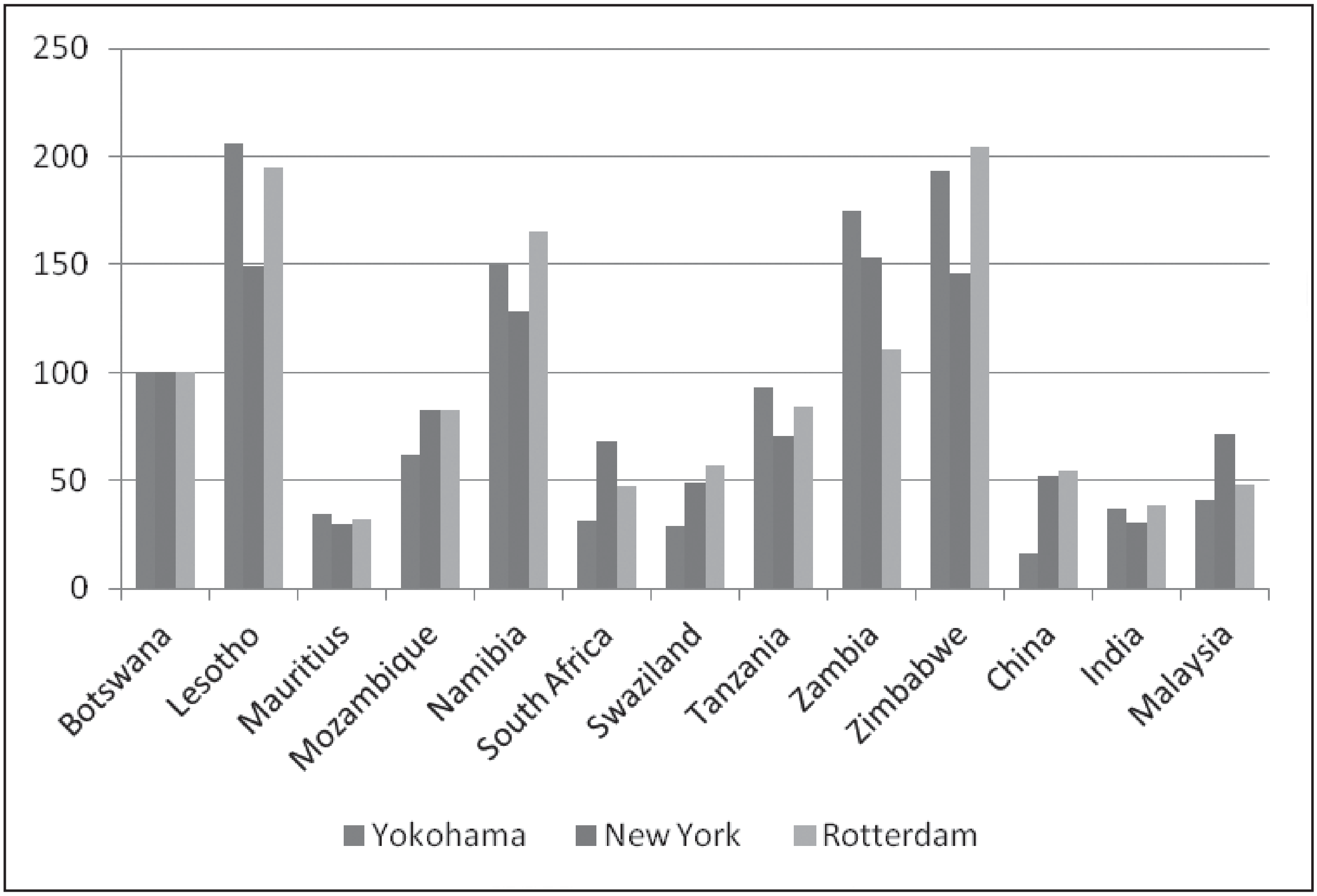
Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100.

6.3.1.2 Transport costs

Figure 28 provides international comparisons of the cost of exporting a 20ft FCL of general cargo from the capital of the country to Yokohama, New York and Rotterdam. Several important observations need to be made. First, back rates are quite different as is common in countries which have a structural trade imbalance. However, the cost differential of shipping between different destinations is not simply determined by whether a country is landlocked or not. The four BLNS of SACU – Botswana, Lesotho, Namibia and Swaziland – pay quite different shipping rates. Namibia, which is not landlocked and has a capital that is 300 km from Walvis Bay, pays a much higher shipping rate of exports than does Botswana which is landlocked with a capital that is 800 km from Durban. Indeed, Namibian shipping rates are higher than all SACU members with the exception of Lesotho, which is small, remote and landlocked.

It is evident that the three Asian comparators in the analysis have much lower shipping rates than most of African countries, even to relatively remote destinations like New York or Rotterdam. Remoteness clearly matters but so do economies of scale in determining shipping rates. As we shall see when it comes to comparisons between Botswana and India as possible locations for investment the differences in shipping rate matter significantly in determining the relative competitiveness of the investment destinations.

Figure 28: Shipping rates (20ft FCL General Cargo) between the capitals of various countries and major destinations

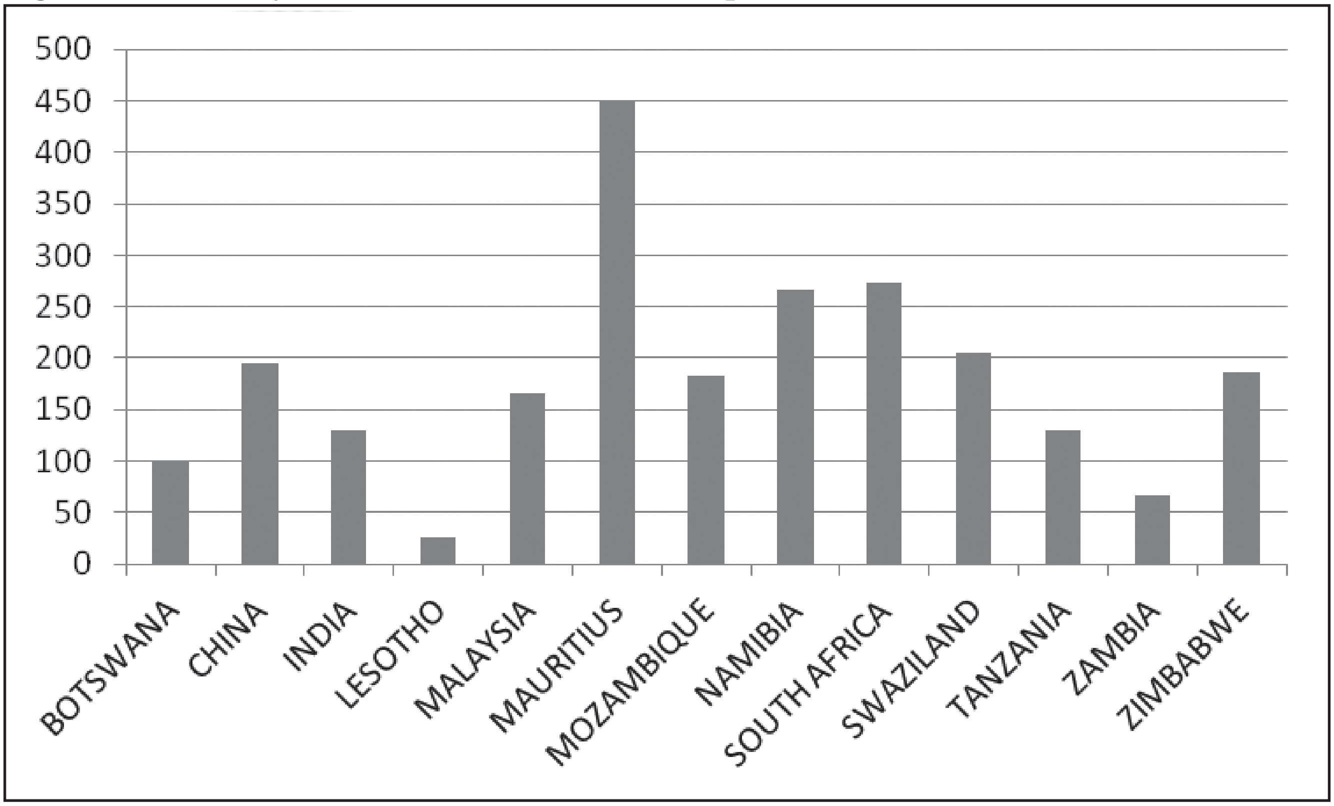


Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100.

6.3.1.3 Electricity charges

Figure 29 shows quite clearly that none of the Asian comparators have electricity rates close to the Botswana. More importantly, electricity tariffs are the lowest in SADC countries with the exception of hydro-electricity-rich Lesotho and Zambia. Nominally its low electricity rates provide Botswana with a considerable commercial advantage over other countries, especially when it comes to highly energy-intensive industries. However the fact that Botswana continues to import a great deal of electricity from South Africa and other Southern African Power Pool (SAPP) members in 2012 and 2013 but maintains electricity tariffs well below those of exporting countries such as South Africa and Mozambique suggests that the rates will be revised upwards unless government establishes an electricity policy that uses electricity tariffs as a strategic instrument of the country's industrial policy.

Figure 29: Electricity tariffs in African and Asian comparator countries, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

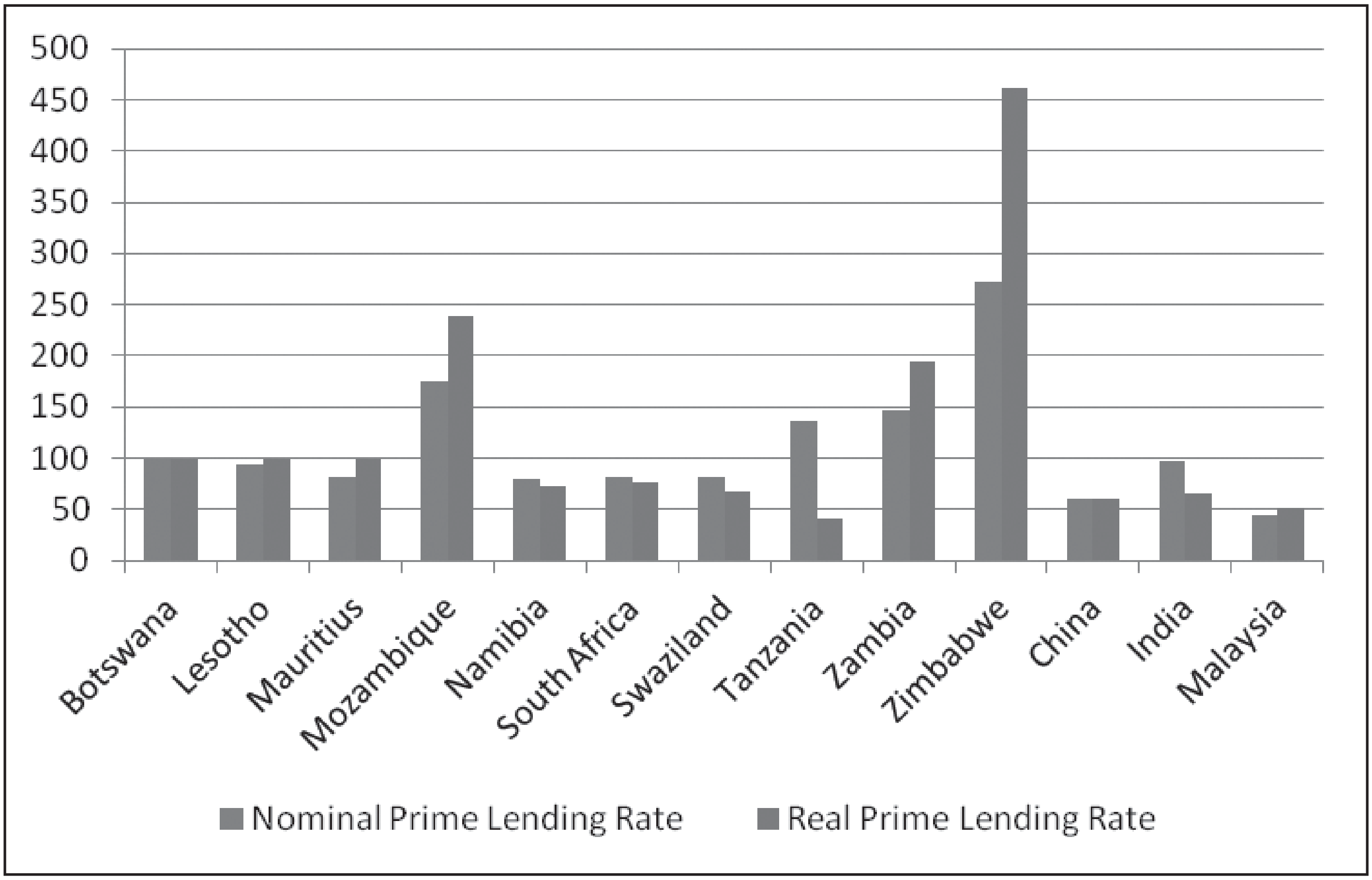
NB: Index: Botswana equals 100.

6.3.1.4 The cost of borrowing

One of the most important location-specific costs faced by a firm choosing a location for its investment is that of the cost of domestic borrowing to acquire capital. Often this is local content of fixed capital and for working capital All of the models below assume debt/equity ratios of 45-55% and hence the interest rates at which firms must borrow for both physical and working capital is of considerable commercial significance to the potential investor. It is assumed in the models below that all firms face the same risk assessment by commercial banks and can borrow at rates of interest of prime plus two per cent. However, these firms face repayment at a later date and all revenues derived by these export-oriented firms are assumed to be in US dollars. As the export-oriented firm's revenues will rise as the value of the local currency depreciates as a result of inflation and as all other costs are set in US dollars, then the domestic debt burden has to be adjusted by the exchange rate. This has been done in the modelling by assuming that domestic debt is borrowed at the real, rather than nominal prime rate plus two per cent.

In Asian countries where governments have often intervened in money markets to assure low prime borrowing rates for the private sector one finds that the rates provide an important source of advantage. Rates in Malaysia and China are well below those found in Africa or India.

Figure 30: Nominal and real prime interest rates in African and Asian comparator countries, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100.

6.4 The Financial Analysis and Cash Flow Models

The Assumptions

This study utilises a modified version of this KPMG CompetitiveAlternatives.com Cost Model, which analyses costs for businesses in various business operations across multiple geographic locations. The modelling of the Greenfield operations is based on standard operating specifications from a private developer. The model uses two streams of information:

i) Standardised operating specifications or factor proportions for each business operation based on an adjusted variant of the KPMG model.

ii) Current business investment and operating cost data for each location based on surveys conducted by the Economist Intelligence Unit in May–June 2012.

By combining this information for each business operation and location, the model produces estimates of annual costs and cash flows for a new business facility in each location. Outputs from the Cost Model include standard financial and project evaluation reports including:

i) ten-year income statements
ii) ten-year cash flow statements
iii) net present value of cash flows
iv) corporate income tax calculations.

This analysis forms the basis of the cost comparisons contained in this report as modified by the range of assumptions needed for a context where transport costs constitute a significant constraint in many of the countries used as a basis of comparison. The result is a snapshot of business costs in each location, scaled relative to the significance of each cost item during the establishment, ramp-up, and full operation phases, over a period of ten years. The KPMG model is not designed for the particular context of comparing Asian high-growth economies with that of Botswana or other SADC economies. Assumptions regarding the nature of the firm are made. What appears common to all the models is that the firm is generally a stand-alone entity and is an SME that is solely export oriented. This means that one of the most important constraints facing countries like Botswana, i.e. the absence of economies of scale in the domestic product market, is not captured. It is assumed that, unlike the KPMG model, all output is exported to the EU and that all inputs are imported from Japan. The purpose of the assumption is to analyse differences in transportation costs and their impact on returns given the importance of these to remote landlocked countries such as Botswana.

Addressing Productivity Differences

One of the weaknesses of this type of analysis is the absence of accurate productivity data. That which exists in Botswana is very dated and considered unreliable as is similar data from other African countries. In order to not simply skirt over the issue an assumption has been made regarding the pace of ramp-up which is a common technique for addressing such productivity differentials. The assumption is that in a low-productivity country the pace of ramp-up to full production and revenue generation is slower and full productivity is achieved later. In the case of the models used below the slower ramp-up of low-productivity countries is based on the assumption that ramp-up occurs on the following basis over the 10-year life of the project.

Table 12: Ramp-up assumptions (% of total revenue at full capacity)

Year	1	2	3	4	5 onwards
Base Case	40%	70%	90%	100%	100%
Low Productivity Case	40%	60%	80%	90%	100%

It is assumed that Botswana, Namibia and the other Africa LDCs in the sample have a low-productivity ramp-up. The other countries, i.e. China, India Malaysia, South Africa and Mauritius, are assumed to operate on the base case i.e. higher productivity assumptions. The implication of this assumption for the models is that Botswana's productivity results in a unit labour cost that is twice that which would otherwise exist in the absence of the assumption.[118] In the case of the very low wage LDCs such as Zambia, Mozambique and Tanzania the impact of the assumption on the increase in costs is far greater than in the case of Botswana.

[118] *The reason for the outcome is that labour costs are generally a relatively small fraction of total revenue in most of the models and a 10% decrease in full ramp-up revenues will constitute a doubling of labour costs where labour costs are, for example, 10% of revenue.*

Three models have been selected based on their respective factor requirements. The three firms include a highly skill intensive electronic assembly plant, a food-processing plant and an energy-intensive second-tier motor vehicle parts plant.

6.4.1 Electronic assembly plant

The representative firm used for this model manufactures both finished electronic devices for brand-name manufacturers. It is assumed that the firm is a stand-alone profit centre and that it imports components from Japan and exports a finished product to the EU. The factor proportions employed in this representative firm are not predicated upon the assumption of entirely fixed proportions as in the Leontief case. As has been discussed above it is assumed in this and other models that productivity in most of the African facilities is lower than that of Asia and some of the more developed economies in Africa such as South Africa and Mauritius. The way in which these productivity differentials are managed is through a base-case ramp-up assumption and an arbitrary lower and slower ramp-up to full capacity which applies to all LDCs and Botswana and Namibia. In the base case production and productivity are ramped-up to full capacity by year 4 but in the lower productivity case production is lower for longer and reaches full capacity only in year 5 of the 10-year model. The implication of the slower and lower ramp-up assumption is that it lowers net revenue with a given amount of labour.[119]

This operation is characterised by the following:

- High transport costs for both inputs and final product which are imported and then exported
- Significant building, and equipment requirements
- A workforce weighted heavily toward technical employees, plus a mix of skilled and unskilled staff
- Modest energy requirements
- Relatively high costs for materials, reflecting the significant use of components and sub-assemblies
- No R&D activities.
- The business is assumed to operate as a stand-alone profit centre.

[119] *As will become evident below the model specification based on fixed capital/labour ratios means that a higher and faster ramp-up will mean a rising of total cost (but an increase in profitability). With employment levels given across models in various countries this leads to the paradox that the higher ramp-up raises costs of complementary inputs which are needed as production increases but raises profitability.*

Table 13: Assumptions – electronic assembly

Assumptions – Electronic Assembly	
Electronic Assembly Summary of Operation Parameters of the Model (All values in US$ thousands unless otherwise stated)	
Requirements of Facilities	
Size of Factory	11,148 sq mt (120,000ft^2)
Initial Investment Requirements	
• Machinery and Equipment	18,000
• Office Equipment	1,000
• **Inventory**	5,000
Equity Finance as a Percentage	60% (debt @ prime =2%)
Workforce	
ii) Management	7
iii) Sales and Administration	12
iv) Production/Non-dedicated product development	
a. Professional/technical	52
b. Operators	20
c. Unskilled	9
Energy Use	
• **Electricity**	225,000kWh
• **Gas**	5,6000 CCF
Transport	
• **Capital Goods**	20 FCL
• **Inputs**	4/US$1 million sales
• **Output**	3/US$1 million sales
Ramp –up	
• High Productivity	Years 1-5 (40%, 70%, 90%, 100%, 100%)
• Low Productivity	Years 1-5 (40%, 60%, 80%, 90%, 100%)
Other Operating Characteristics	
• **Sales at full production**	US$45,000
• Materials and other op. costs – % sales	48%
• Other Operating Costs – % sales	4%

Most importantly, it is assumed that all ten country-specific models are based on a debt/equity ratio of 40% and that all debt, in all countries, is acquired by the firm in the local market at the real prime rate plus 2%. This is a powerful and significant assumption as will become evident below because this factor, especially in Africa, with very high nominal and real interest rates, often translated into a cost that has a punitive effect upon investment in those countries maintaining a highly restrictive monetary policy and consequently high interest rates. All energy costs are assumed to be electricity and any potential gas use is converted to kWh of electricity equivalents

Results

Results from the international comparisons are presented in Table 14. These results reflect the combined impact of some 16 location-sensitive cost components applied to the modelled operation. The project is measured against four criteria: average total cost, METR the NPV and the IRR. It is assumed throughout that the project is undertaken on the basis of the most favourable tax regime available in the country at the time of writing. Those tax provisions are taken from 2012 tax reports by Deloitte and KPMG, depending on the country in question. NPV is calculated on the basis of LIBOR + 3% i.e. 5%.[120]

The results below indicate that Botswana is uncompetitive in electronic assembly which is a medium-skilled-intensive sector, an area where labour costs in Botswana are particularly high. The situation is further exacerbated by the relatively high cost of transport of inputs and final product. The differences between average annual total cost of production as a percentage of average revenue between the highest cost producer in the sample i.e. Namibia and the lowest, India, is only 7%. These differences in costs appear relatively small and in turn reflect the very high cost of non-location-specific components in the model which account for 52% of total costs. The NPV and IRR calculations put Botswana at almost the bottom ranking. This is explained by three factors. First, the assumptions regarding the ramp-up implies that the productivity in the initial years is considerably lower than the more industrialised and developed countries used as comparators in the analysis. The implication of this assumption regarding slower ramp-up within the context of this model means that revenue is lower in Botswana by an amount equivalent to the labour cost i.e. labour costs are in effect double what would otherwise be the case.

[120] *The London Inter Bank Offer Rate or LIBOR was approximately 2% in 2012 which was the base period for the analysis.*

Table 14: Results of financial analysis (rankings in brackets)

Country	Average Total Cost of Production / Average Total Revenue	METR	NPV(US$)	IRR
Botswana	0.631 (7)	0.15	57,509,421 (10)	34.39% (8)
Mauritius	0.612 (2)	0.15	65,267,346 (4)	38.86% (3)
Mozambique	0.622 (5)	0.128	61,779,458 (5)	36.17% (6)
Namibia	0.673 (10)	0	59,830,098 (8)	34.14% (9)
South Africa	0.656 (9)	0.21	58,736,948 (9)	34.39% (8)
Tanzania	0.617 (3)	0	76,909,784 (1)	41.87% (2)
Zambia	0.637 (8)	0	70,903,481 (3)	39.15% (5)
China	0.628 (6)	0.15	60,753,938 (7)	36.69% (7)
India	0.597 (1)	0.11	73,389,711 (2)	45.46% (1)
Malaysia	0.621 (4)	0.17	60,865,624 (6)	39.35% (4)

The second reason for the low NPV and IRR for the project is because of transport costs for the Botswana producer. Energy, rent and other sundry costs are relatively low in Botswana but because this is an exporting firm the difference between the highest and lowest cost producer comes in large measure as a result of skilled labour and transport cost. Some of the countries like China also maintain low interest rates which has a significant impact on the NPV calculations.

A third reason lies not in costs but in the nature of tax concessions offered. Countries which offer tax holidays e.g. India or lower rates in the initial period of the investment end up with significantly higher NPV values. This is also true of countries like South Africa and Malaysia which front end load concessions rather than providing tax holidays as in the case of countries like Namibia or Tanzania.

Policy and Sensitivity Analysis

When one compares the results for Botswana to those of the most competitive producer, India, two important factors appear to cause the wide divergence in the results. Table 15 below decomposes the various operating costs in the two countries. Of the differences in annual average cost between Botswana and the lowest cost producer, India, fully 60% can be explained by labour costs and the remainder by transport costs of inputs and output to market with differences in real interest charges making up approximately 8%. Botswana has lower rental and energy charges but these constitute an insignificant portion of total cost.

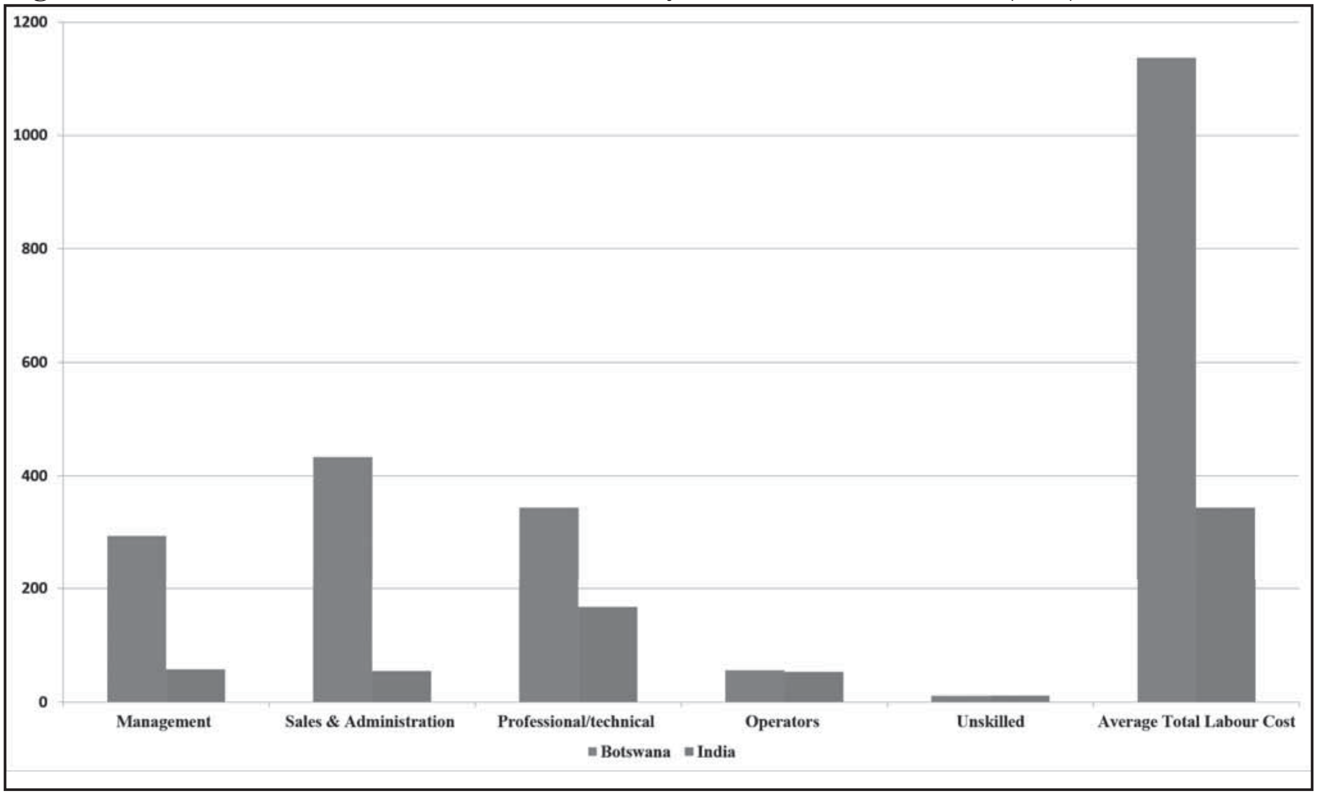
Table 15: Differences in operating cost for Botswana and Indian producer (US$)

	Annual Average Cost of Production / Total Revenue	Labour Cost	Transport Cost	Interest Charge	Energy	Rental
Botswana	**0.631**	**1,136,927**	**750,783**	**387,931**	**28,188**	**55,000**
India	0.597	343,768	367,906	289,289	36,450	84,370

Source: *Authors' calculations. NB: Comparisons of cost between Botswana and India are not strictly comparable by virtue of the different ramp-up assumptions applying to the countries*

However, what is important to note is that, as pointed out in the annex, the differences in wages between Botswana and India do not lie at the unskilled end of the market. As is evident from the chart below the source of the differences in labour cost are at the top end of the skill range for this particular industry. A combination of factors, including relatively high management costs and skilled labour cost, render such an industry uncompetitive. It is significant that the average cost of unskilled workers is lower in Botswana than in India. However, in the Botswana model, unskilled labour cost is 0.05% of total cost and is therefore commercially insignificant. The magnitude of the impact of international pay differentials rises as one moves up the professional scale. The absolute advantage to India of having an abundant and low-cost managerial elite is what, within the context of these models, renders it such a competitive producer.

Figure 31: Total labour cost in electronic assembly in Botswana and India (US$)



Source: *Authors' calculations.* NB *Comparisons of cost between Botswana and India are not strictly comparable by virtue of the different ramp-up assumptions applying to the countries.*

This then raises the question of what policy measures would be needed to make the results for Botswana similar to those of India given the difference in productivity and the cost structure. A tax and incentive policy sensitivity analysis is undertaken below which considers a variety of policy options that the government of Botswana could implement to drive the financial results to the levels seen for India. The table below shows the results of various policy experiments undertaken on the cash-flow models. As is evident the level of productivity assumed for Botswana, which lowers NPV and IRR and raises costs, is significant but as the results in row (2) below demonstrate the increase in NPV or IRR is not sufficient to approximate that of the Indian case. On the other hand Botswana providing a tax holiday to the investor as seen in row (3) below raises both NPV and IRR significantly but still the project in Botswana, even with a tax holiday for the entire duration of the project, cannot derive results similar to that of India. A tax holiday does not, of course, lower average total cost and there is no direct cost to the fiscus from this proposal as, given the results, the project would not proceed without it. While this measure does raise results for NPV and IRR to amongst the highest in Africa, it does not raise them sufficiently to compete with India.

Table 16: Sensitivity analysis: electronic assembly plant – impact of policy on financial aggregates

	Average Annual Total Cost	NPV(US$)	IRR	Average Annual Direct Cost to Fiscus
(1) Botswana Base Case	0.631	57,509,421	34.4%	
(2) Low Productivity Ramp Up	0.628	61,866,076	37.3%	
(3) Tax Holiday		72,549,587	39.7%	
(4) 200% accelerated depreciation		59,975,301	36.7%	
(5) Interest Subvention = 5% prime	0.624	59,339,029	35.2%	295,903
(6) Transport Cost Subvention = 50% cost	0.622	59,799,065	35.4%	375,392
(7) Three above (3,5,6)	0.614	77,419,366	41.8%	671,295

Source: *Authors' estimates*

Only when there are a full battery of direct subventions provided to the firm that cover the cost of production for both interest charges and transport cost combined with a tax holiday as in row (7) is Botswana able to compete with India as a possible destination. The cost to the fiscus would be considerable in terms of direct subventions and would be approximately US$6, 700/employee or 59% of the existing average labour costs. It is doubtful that such an industry, dependent upon imported materials and export to the EU, using high-cost skilled labour and management would be sustainable in Botswana given the relative ranking of the country and range of high-cost policy interventions needed to significantly alter that ranking.

6.4.2 Food processing

This model is of a firm, in keeping with that of the previous model, which is a small stand-alone profit centre which operates on a business model where the final product is exported to the EU market. In the food-processing sector it is normally the case that firms produce a segment for the domestic market where there are country-specific and local market characteristics and tastes. But in some sub-sectors of food processing, e.g. fish canneries, it is not uncommon that the entire output is aimed at the global market and the local processor simply acts as a manufacturing facility for a specific retail outlet. This also happens when existing tax laws require that all production from an Export Processing Zone must be exported in order to gain tax advantages.

Table 17: Assumptions – food processing

Assumptions – Food Processing	
Summary of Operation Parameters of the Model (All values in US$ thousands unless otherwise stated)	
Requirements of Facilities **Size of Factory**	4,600 sq mt (120,000ft^2)
Initial Investment Requirements ● Machinery and Equipment ● Office Equipment ● **Inventory** **Equity Finance as a Percentage**	 18,000 300 2,000 50% (debt @ prime =2%)
Workforce v) **Management** vi) **Sales and Administration** vii) **Production / Non-dedicated product development** a. Professional/technical b. **Operators** c. **Unskilled**	 6 12 14 43 25
Energy Use ● **Electricity** ● **Gas**	 370,000kWh 30,000 CCF
Transport ● **Capital Goods** ● **Inputs** ● **Output**	 10 FCL 1/US$1 million sales 3/US$1 million sales
Ramp-up ● High Productivity ● Low Productivity	 Years 1-5 (40%, 70%, 90%, 100%, 100%) Years 1-5 (40%, 60%, 80%, 90%, 100%)
Other Operating Characteristics ● **Sales at full production** ● Materials and other op. costs – % sales ● Other Operating Costs – % sales	 US$40,000 44% 6%

Several important assumptions pertaining to factor intensity and usage are made and are found in the specification below. It is important to note this sector is relatively intensive in its use of unskilled workers as well as energy and that the transport assumptions are based on basic food products originating from within the country as this is the normal condition associated with food processing. Imports are of other materials such as cans and can-making equipment.

Results

The results of the modelling of the firm in 10 locations are presented below. These results reflect the combined impact of the 16 location-sensitive cost components applied to the modelled operation. The project is measured against four criteria: average total cost per dollar of revenue, METR, the NPV and the IRR. It is assumed throughout that the project is undertaken on the basis of the most favourable tax regime available in the country at the time of writing. Those tax provisions are taken from 2012 tax reports by Deloitte and KPMG, depending on the country in question. NPV is calculated on the basis of LIBOR + 3% i.e. 5%.

Table 18: Results of financial analysis – food processing (rankings in brackets)

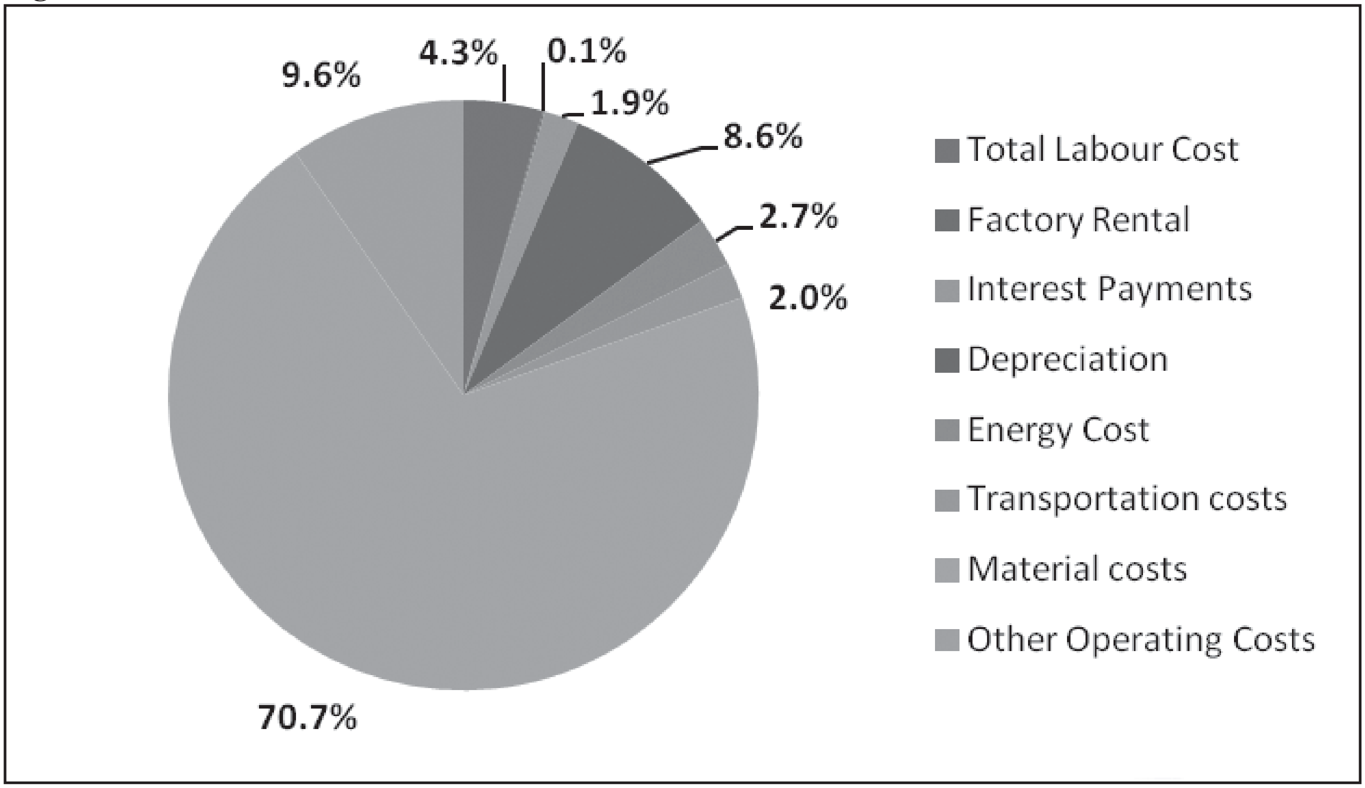
Country	Average Total Cost of Production/dollar of revenue	METR	NPV(US$)	IRR
Botswana	0.622 (5)	14.5%	50,865,682 (7)	35.3% (8)
Mauritius	0.667 (8)	14%	46,648,278 (10)	35.4% (7)
Mozambique	0.636 (6)	12.3%	52,281,151 (4)	36.8% (4)
Namibia	0.688 (10)	0%	49,724,752 (8)	33.6% (9)
South Africa	0.673 (9)	28%*	47,928,463 (9)	32.0% (10)
Tanzania	0.615 (2)	0%	68,333,281 (1)	43.1% (2)
Zambia	0.616 (3)	7%	59,074,241 (3)	40.7% (3)
China	0.644 (7)	15%	50,885,452 (6)	36.4% (6)
India	0.599 (1)	11%	63,132,111 (2)	43.7% (1)
Malaysia	0.622 (4)	17%	51,688,769 (5)	36.7% (5)

Source: *Authors' calculations.*

**It is assumed that the rate of depreciation for South Africa in this sector is 100% for a non-high-tech export sector located in an SEZ.*

It should be noted that the bunching of results stems from the very high percentage of non-location-specific costs which includes depreciation for accounting purposes. As can be seen below for the case of Botswana, total costs that are location specific constitute approximately 17% of total cost. This implies that material costs, depreciation and other operating costs dominate the distribution of costs. The range of average total cost per dollar of output is also narrow because the estimates are being undertaken for several low-cost countries with very similar operating cost structures.

Figure 32: Distribution of total cost – Botswana

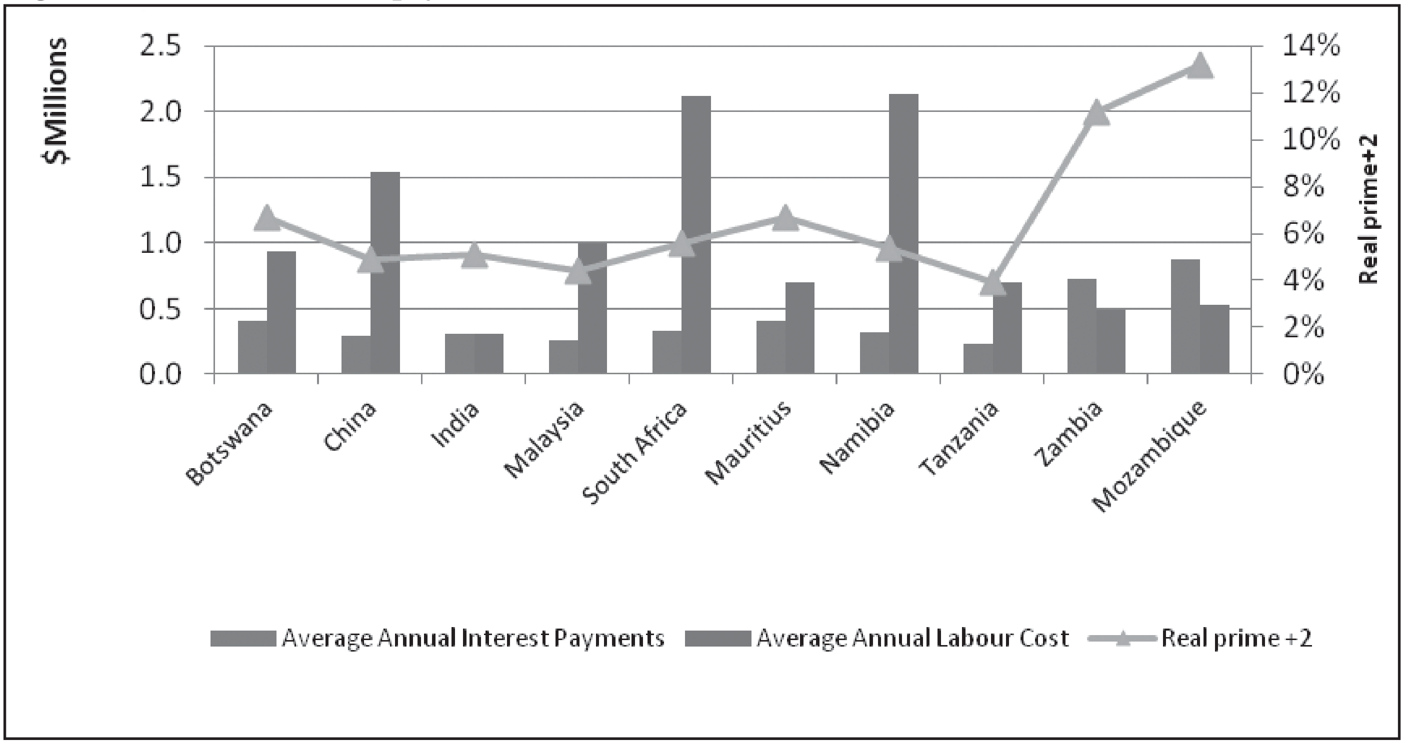


Source: *Authors' estimates*

As this project is neither more nor less capital intensive than any of the other projects considered here, the implications of differing interest rates on the overall cost structures deserves consideration. What is evident is that China and Malaysia, with their very low prime rate of interest, derive a considerable commercial advantage over other producers and while it is not sufficient to overcome the increasing costs of doing business in China, it would be of far greater importance in capital-intensive industries. While much discussion has taken place over the advantage to Chinese producers of access to an under-valued currency, the existence of access to relatively low-cost loans has a particularly significant effect on the commercial viability of firms operating in such a context.

As we can see the cost advantage of low nominal and real interest rates for business in China and Malaysia simply mean that companies have more space on their spread sheets to cope with increasing costs. Perhaps the most important and telling cases are those of relatively low-cost African producers – Mozambique, Zambia and Tanzania – which have the highest interest rates in the sample and the ratio of interest charge to total labour cost is of a factor of 3. Thus whatever economic benefits may accrue to a country from being an otherwise low-cost centre can evaporate in the face of an interest rate and monetary policy that undermines the incentives to investment. If Mozambique, Zambia and Tanzania had interest rates on commercial loans similar to that of the average SADC country in the sample, i.e. approximately 14%, then they would certainly have average total costs of production per unit that would be lower than the Asian comparators used in the analysis.

Figure 33: Interest rates and payments and labour costs



Source: *Authors' estimates*

Policy and Sensitivity Analysis

Table 19 considers the same issues that were considered in the case of electronic assembly. Unlike the previous case, Botswana in this case, is better able to use more traditional and accepted industrial policy instruments such as a tax holiday to improve the financial outcomes to the point where they are comparable if not better than India. More interventionist instruments which change market prices facing the firm such as interest rate subsidies or transport cost subsidies are unnecessary to achieve a competitive NPV. With an NPV of US$64.3 million following the use of a tax holiday it is, with the exception of Tanzania, the most profitable of the 10 cases examined. An accelerated depreciation provision does not raise either IRR or NPV sufficiently to change significantly the relative ranking of Botswana amongst the ten nations used in this sample.

Table 19: Sensitivity analysis: food processing – impact of policy on financial aggregates

	Average Annual Total Cost/Total Revenue	NPV (US$)	IRR	Average Annual Direct Cost to Fiscus
(1) Botswana Base Case (low productivity)	0.622	50,865,682	35.3%	
(2) Base Case Productivity Ramp-up	0.618	54,963,901	38.6%	
(3) Tax Holiday		64,333,296	40.9%	
(4) 200% depreciation with indefinite loss carry forward		53,074,286	37.8%	
(5) Interest Subvention = 5% prime	0.613	52,800,111	36.4%	312,856
(6) Transport Cost Subvention = 50% cost	0.616	52,157,112	35.9%	211,821
(7) = (3)+(5)+(6)	0.607	68,153,377	42.8%	524,677

Source: *EIU and authors' estimates*

6.4.3 Automobile parts and assembly

The model depicted in the assumption set below is a relatively small second-tier automobile parts producer. The assumed characteristics are that, in line with all previous models, the firm is a stand-alone profit centre and produces entirely for the export market. The differences between this model and that of previous cases is that Botswana already has at least one export-oriented second-tier automobile parts producers that exports to the South African market and by extension to other parts of Africa. These exports are largely made possible by the South African Motor Industry Development Plan (see box below) which provides financial incentives for producers in the SACU region that assemble and produce vehicles and parts for export as well as for the domestic market. The operations of the support measures are described in the box below.

While the company depicted below is not particularly labour intensive and uses no more labour than the previous model, relative to the size of the capital investment, the amount of labour employed is significant. Debt to equity ratios are in line with earlier models and so the issue of significance is whether an industry such as this, which is unskilled labour intensive is more competitive in the Botswana context. From the assumption set below it is clear that the firm has two characteristics that are significant for Botswana's factor prices. First, production is highly energy intensive but not transport intensive. Given what we have observed from the earlier models of both food processing and electronic assembly, these factor intensities should weigh strongly in the country's favour as a destination for investment.

SACU's Motor Industry Development Plan

The Motor Industry Development Program (MIDP) came into effect on 1st of September 1995 to assist an industry that was self-sufficient as a result of extremely high import duties and local content requirements. The original goal of the MIDP program was to help the automotive industry in South Africa adjust to trade liberalization and become internationally competitive. The program was confined to export facilitation, which entailed a phasing down of tariffs, a removal of local content requirements, duty-free imports of components up to a percentage of the wholesale value of the vehicle, and duty rebate credits earned on exports. In simple terms, the local value-added of components or built-up vehicles exported earn credits that can be used to rebate import duties on components and vehicles. These duty credits are tradable and can either be used to import or sold to provide a separate source of revenue for the exporter. The program was initially scheduled to run for five years, but it has been extended three times, and is slated to end in 2020.

Source: *Madani, D and Mas-Guix, H (2011)*

The fact that the production process only requires a small number of managers and proportionately large amounts of relatively unskilled labour should mean this would be a sector where some measure of competitive cost advantage may exist for the country. Non-country- specific material and operating costs remain a very significant portion of total costs

Table 20: Assumptions – automotive parts and manufacturing

Assumptions – Automotive Parts and Manufacturing	
Auto Parts Manufacturing – Summary of Operation Parameters of the Model (All values in US$ thousands unless otherwise stated)	
Requirements of Facilities	
Size of Factory	9,290 sq mt (100,000ft^2)
Initial Investment Requirements	
• Machinery and Equipment	13,000
• Office Equipment	500
• **Inventory**	2,500
Equity Finance as a Percentage	50% (debt @ prime = plus 2%)
Workforce	
viii) Management	4
ix) Sales and Administration	15
x) Production / Non-dedicated product development	
a. Professional/technical	27
b. Operators	35
c. Unskilled	19
Energy Use	
• **Electricity**	4,230,000 kWh
• **Gas**	4,672,522 kWh equivalent
Transport	
• **Capital Goods**	8 FCL
• **Inputs**	2 / US$1 million sales
• **Output**	2 / US$1 million sales
Ramp-up	
• High Productivity	Years 1-5 (40%, 70%, 90%, 100%, 100%)
• Low Productivity	Years 1-5 (40%, 60%, 80%, 90%, 100%)
Other Operating Characteristics	
• **Sales at full production**	US$41,500
• Materials and other op. costs – % sales	55%
• Other Operating Costs – % sales	6%

Results

As is evident from the results below the ranking of Botswana is considerably better than in either of the other two models of food processing and electrical assembly. In large measure this stems from the energy intensity of the production process and the relatively low price of electricity in Botswana. Because energy costs comprise 23% of Botswana's total location-specific costs in this model the advantage of relatively low prices that are, at the time of writing, available from BPC suggest that this type of activity is most likely to be cost competitive in Botswana. The difficulty lies in the fact that these prices may be adjusted upwards at any time as they do not reflect a conscious energy pricing policy by the GRB. Furthermore, until the thermal generating plant at Morupule B is completed in September 2013 there is unlikely to be any security of supply for firms using this as a source of energy. Moreover, given demand projections for electricity in Botswana over the remainder of the decade, unless there is a further expansion in generating capacity supply there will certainly be a need for continued imports or further load shedding can be expected. Thus the price advantage that existed at the time that the price survey was largely undertaken in May 2012 may be transitory and, given the unstable supply, may also be illusory.

Table 21: Results of financial analysis (rankings in brackets)

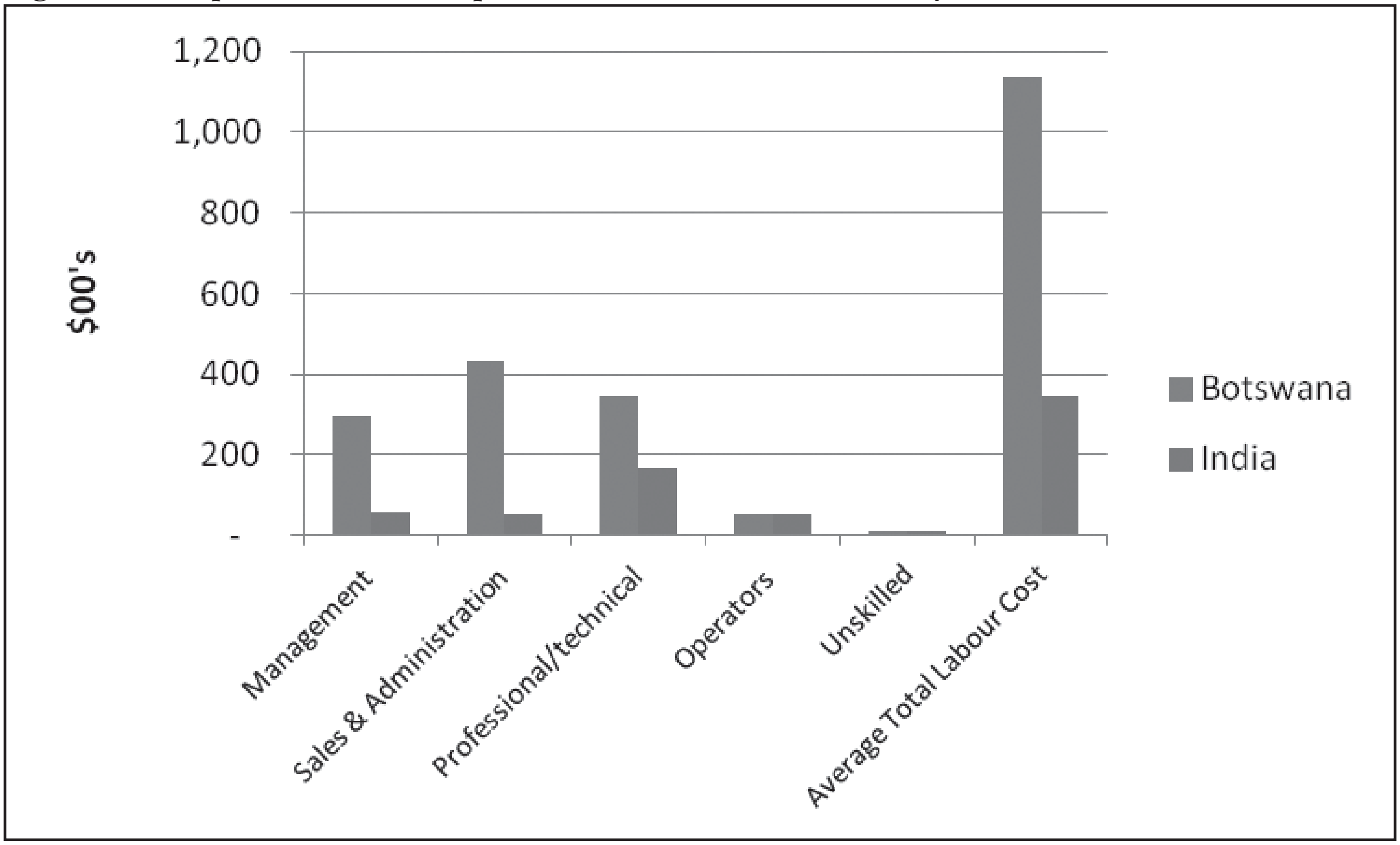
Country	Average Total Cost of Production/dollar of revenue	METR	NPV	IRR
Botswana	0.716 (4)	14%	38,910,954 (7)	34.4% (5)
Mauritius	0.754 (8)	15%	34,880,566 (9)	33.7% (6)
Mozambique	0.724 (5)	12.8%	40,917,171 (5)	36.4% (4)
Namibia	0.763 (9)	0%	39,135,919 (6)	33.4% (7)
South Africa	0.774 (10)	30%*	44,672,770 (4)	30.5% (10)
Tanzania	0.709 (3)	0%	53,164,275 (1)	42.3% (2)
Zambia	0.705 (2)	10%	44,965,067 (3)	40.1% (3)
China	0.746 (7)	16%	34,008,456 (10)	31.5% (9)
India	0.702 (1)	12%	50,964,783 (2)	44.5% (1)
Malaysia	0.726 (6)	17%	32,295,243 (8)	31.9% (8)

Source: *EIU and authors' calculations*

**It is assumed that the rate of depreciation for South Africa in this sector is 100% for an export sector located in an SEZ.*

The other source of advantage is the relatively low labour skill intensity of the production process. In this particular model unskilled labour costs constitute 0.05% of total costs and are not commercially significant. Moreover, management, professionals and highly skilled workers are not a significant part of the cost structure. The figure below presents the differences in location-specific costs between Botswana and India which is the lowest cost/highest NPV location in the sample. Perhaps equally significantly is the fact that NPVs are lower than in the other models and hence the differences in tax regime, an area where Botswana has a considerable disadvantage, are far smaller.

Figure 34: Comparison of costs of production in automobile assembly between Botswana and India



Source: *Authors' calculations*

NB Comparisons of cost between Botswana and India are not strictly comparable by virtue of the different ramp-up assumptions applying to the countries.

Policy and Sensitivity Analysis

The analysis below indicates that the application of a tax holiday will raise the NPV of the project to levels comparable but not equal to that of India. A tax holiday would change the NPV ranking of Botswana from seventh position to third after India and Tanzania. The impact on the IRR would be considerably more modest. It would certainly place the firm in the highest ranking of the SACU countries that could potentially benefit from the Southern African Motor Vehicle Plan. It is significant that while the cash flow analysis indicates that Botswana is the lowest cost location for such second-tier producers in SACU the vast majority of firms are located in South Africa which has a considerably higher cost of production but the NPV is much higher in South Africa than it is in Botswana because of the accelerated depreciation allowances. This issue is considered below.

The sensitivity analysis demonstrates that Botswana can, with interventions to lower the cost of debt and transport costs, achieve the highest rates of return in the sample. These may be unnecessary as the country is relatively competitive in the sector within the SACU market. A policy of providing accelerated depreciation with indefinite loss carry forward is unlikely to have significant impact upon the results as this is not a high capital cost firm. However, the cost per employee of providing a tax holiday of the duration of the project along with interest and transport subventions would result in rates of return for the investment which are far greater than all other competitors. The costs to the fiscus of such interventions (line 7) are approximately US$3,600 per employee or 35% of the total payroll.

Table 22: Sensitivity analysis: automotive parts and manufacturing – impact of policy on financial aggregates

	Average Annual Total Cost/dollar revenue	NPV	IRR	Average Annual Direct Cost to Fiscus
(1) Botswana Base Case	0.716	38,910,954	34.4%	
(2) Low Productivity Ramp-up		42,206,689	37.7%	
(3) Tax Holiday		49,332,272	39.9%	
(4) 200% Accelerated depreciation		40,426,035	36.7%	
(5) Interest Subvention = 5% prime	0.709	40,435,627	35.4%	246,586
(6) Transport Cost Subvention =50% cost	0.708	40,837,745	35.6%	113,333
(7) (3+5+6)	0.701	53,402,484	42.5%	359,919

Source: *EIU and authors' estimates*

6.5 The special case of south african investment incentives

One issue as it pertains to the automotive parts industry is worthy of further and deeper consideration. All the analysis thus far has proven to be very information intensive. However what has not been included in these models, in order to assure their relative simplicity, has been the enormous complexity of country-specific incentives that are available to investors. The amount of information gathering to assure a genuinely accurate financial analysis for ten countries is beyond the scope of this study and is part of very high-cost feasibility studies. However, it is precisely in these complexities that the answer to important issues of policy is often resolved. The Motor Industry Development Programme is a SACU-wide system of subventions aimed at helping the development of the automobile industry in SACU. The reality is that with the exception of one second-tier producer in Botswana virtually all automotive production occurs in South Africa. Given the costs and comparative results in the tables above this outcome is not entirely obvious. Given the high cost of production in South Africa as witnessed by both the raw data and the analysis in Table 21, why does most automotive production not migrate to Botswana or to other low-cost destinations in SACU? While part of the reason can be explained by the lower costs, not reflected in the analysis of geographic proximity to suppliers and markets, the substantive answer to this question is found in the added complexity of the financial incentives that are available to firms that choose to locate in South Africa.

Table 23 presents the results of a modified sensitivity analysis for South Africa and Botswana alone. The modified case reflects the incentives found in South Africa's Automotive Investment Programme (see Chapter 5) whereby firms are able to receive a 20% capital cost subvention which is then taxable. It is also assumed that the firm making the investment borrows the required debt financing from South Africa's Industrial Development Corporation at the rate of Prime minus 2%. It is also assumed, as in the base case, that the firm is allowed to apply 100% capital cost allowance in year 1 with indefinite loss carry-forward because they operate under Article 12(i) provisions in a South African IDZ. Under these assumptions the curious result arises that South Africa still has the highest unit cost of production per dollar of revenue of the ten countries in the sample but has an NPV that is close to that of India. Thus the combination of strong fiscal incentives in the sector, along with strong centripetal forces that lead to agglomeration, will explain the reason why there has been such a concentration of industry in South Africa as opposed to lower-cost SACU peripheral states. It should be noted that South Africa is not alone among the five SACU states in offering incentives to attract investment. All countries will offer extraordinary incentives to attract a large-scale investment as was the case with Ramatex in Namibia and Mozal in Mozambique. However, in the quiet quotidian competition for investment, those with the deepest pockets are more likely to win. Whether the costs and benefits justify the incentives is yet another matter.

Table 23: Financial analysis for automotive parts with various financial incentives from South African DTI

	Average Annual Total Cost/dollar revenue	NPV	IRR
(1) Botswana Base Case	0.716	39, 910, 954	34.4%
(2) Botswana – Tax Holiday		49, 332, 272	39.9%
(3) South Africa Base Case – 100% capital cost allowance	0.774	43,934,629	29.9%
(4) South Africa with IDC loan, AIP assistance (20%), 100% capital cost allowance	0.773	48,397,718	36.6%

Source: *EIB and authors' estimates.*

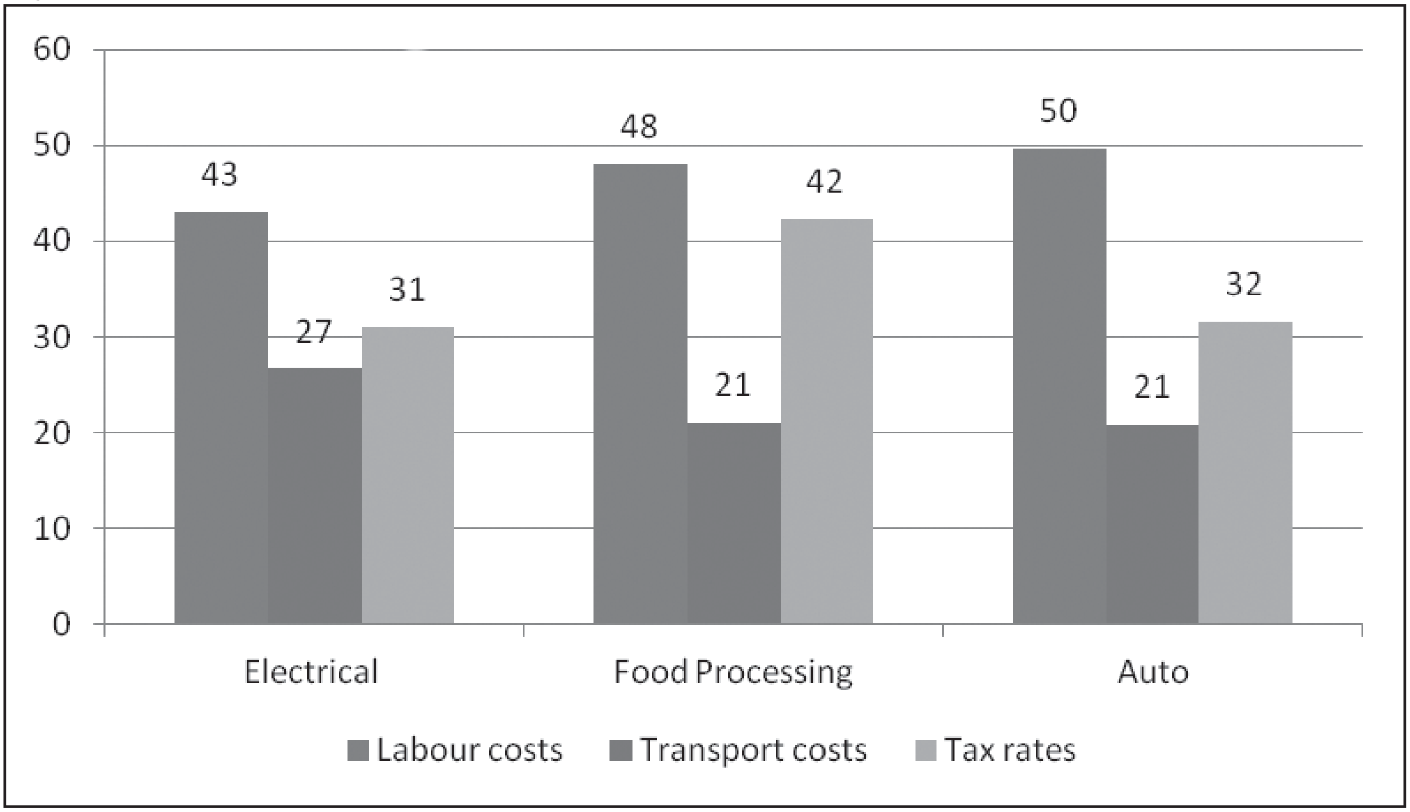
Summary

It is conceptually difficult to summarise the results of such a broad analysis which considered three different industries and compares the results over ten countries. But the fundamental question that is posited in this study is 'what is holding Botswana back from diversifying?' and therefore coming to some general policy conclusions is vital. The table below does attempt to capture what impact various cost and policy differences that are known to be significant have upon explaining the difference between Botswana and India NPV results in the three sectors. As we have seen three types of costs have been instrumental in explaining differences in the NPV. These include labour costs, transport costs and taxation i.e. the cost of government. Interest payments on debt are also particularly important but in the comparisons between Botswana and India which have the same prime rates, the impact of debt is not significant. The figure below presents the percentage of the difference in the normalised NPV[121] between India and Botswana's models that can be explained by the various parameters. In the case of labour, for example, the Indian wage and salary rates were assumed to prevail in Botswana, everything else held constant. On average 45% of the difference in the normalised NPV could be explained by the differences in labour costs i.e. skilled, professional and management costs. On average, transport costs, long cited as the principal disadvantage of Botswana, could explain 23% of the difference in the NPV. Applying the India tax liabilities in their EPZ to Botswana's models could explain on average 35% of the difference in NPV.[122]

[121] *The assumptions regarding productivity differences between the countries as outlined in page 112 of this chapter is based on an assumption which does not stem from this analysis. Instead it is based on the assumption that total factor productivity in Botswana is roughly half that of South Africa which comes from 2006 analysis by the World Bank. The ramp-up assumptions resulted in effect in a doubling of costs for Botswana and therefore reflected these differentials. In order to isolate the impact of important variables as found in Figure 34 it was felt logically necessary to assume that productivity in the two cases was the same and thus the NPVs were normalised on the same base case ramp-up assumptions. In this way it would be easier to focus the other empirically verifiable elements of the model.*

[122] *The figures do not add up to 100% because the cost advantages of Botswana in terms of electricity charges and rental are not included.*

Figure 35: Percentage of difference between the Indian and Botswana NPV that is explained by various key variables



Source: *EIB and authors' estimates*

Conclusions

7

1) *Lessons from Botswana's Diversification Experience*

The discussion of Botswana's diversification experience has been useful in that it has shown that while diversification away from diamond mining has been very limited over the last three decades, there have been periods when diversification of the nation's export base has accelerated. The two most important episodes have been the mid-1990s when Botswana began automobile production and exports. At that point manufactured exports had become a significant portion of total exports. However, with the closure of the Hyundai plant manufactured exports went into decline. The second period when industrial exports accelerated was when the Government of Botswana decided to promote the aggregation of diamonds as well as to localise a large section of the diamond cutting and polishing industry. This period of rapid growth of manufactured exports coincided with the onset of the international economic crisis in 2007/8. Nonetheless Botswana's exports of polished diamonds is now the country's single largest manufactured export, employing 3,000 workers and worth Pula 6 billion in exports in 2011.

The explanation as to why Botswana has failed to diversify exports has become a minor industry for development economists with almost annual publications on the subject by one or other analysts. There is general disagreement on whether the country experienced any Dutch Disease effects which implies an appreciation of the real effective exchange rate and the ensuing decreased competitiveness in the (non-mining)-tradable sector. Even if the country did have an overvalued exchange rate it was not of a sufficient order of magnitude or apparent duration as to explain the lack of diversification. There is less disagreement amongst economic analysts as to whether Botswana has suffered from other effects of the much broader ailment commonly called the 'Resource Curse', of which Dutch Disease is only one manifestation. There is much less disagreement that diamond exports did facilitate substantially increased salaries and wages in the country and also created less impetus to pursue change and economic transformation. As we shall see below the process of salary increases and the ability of the country to pay these salaries because of diamond exports, both in the private and public sector, has created what this paper has shown to be the country's greatest source of commercial disadvantage for the development of manufactured exports.

2) *Experience from SADC Countries*

The experience of neighbouring countries sheds great light on the question of the future of Botswana's own diversification effort. Namibia, though never as dependent upon diamonds as Botswana, is the country that geographically and structurally most closely resembles Botswana and has diversified its economic base away from diamond mining. However, the diversification effort has been largely away from diamond mining towards other base and energy minerals such as uranium, zinc and copper. Since independence there has been diversification in the agricultural sector towards the export of table grapes and the export of beer by Namibian Breweries. This latter case is particularly important as it is one of the few examples of successful manufactured export development in SADC outside of South Africa. The case study in Chapter 3 provides insights into how this marketing and branding success has been achieved and how, with a combination of the natural forces of agglomeration and South African financial incentives, production of Namibia's most successful manufactured export is progressively moving from Namibia to South Africa.

Namibia has moved to down-stream processing of base metals and both copper and zinc are smelted and refined in Namibia. Copper smelting of high-arsenic copper ore from Bulgaria occurs at Tsumeb largely because health rules prohibit its processing in Europe. Zinc is refined in Namibia but this, like Mozambique, has been completely dependent upon very low-price electricity being available from Eskom which exported power to both Mozambique and Namibia for base metal refining. Namibia remains, despite its considerable efforts, largely a captive of its geology and geography and the path to diversification from diamonds into base and energy minerals is one that Botswana is likely to follow in the coming years. Unless the path of diversification within the base metals and energy minerals sector can be pursued beyond refining in a commercially viable manner then its impact on employment will be limited.

Mauritius and Mozambique are the only two countries in SADC that transformed their economic base away from resource dependence to manufacturing and services since independence. Both were agricultural exporters of sugar and cashew nuts respectively. Mozambique is now amongst the world's largest exporters of aluminium and Mauritius is moving to becoming a service exporter though it still exports sugar, manufactured products, as well as tourism, financial and IT services. In both cases a considerable price has been paid for the transformation. In the case of Mozambique the government agreed to generous, potentially over-generous tax concessions of 50 years tax-free status with a 2% turnover tax. BHP Billiton, which largely owns Mozal Aluminium smelter, was purchasing electricity from Eskom in SA at what were extremely low prices of approximately US$0.02/kWh in 2005–8 but large quantities of electricity were being exported by Mozambique from the Cahora Bassa Hydro-electric dam to SA. It is commonly argued that a considerable price has been paid by Mozambique to become an exporter of aluminium which is now by far its largest export. It is however not evident that the price paid by Mozambique was, at the time, a real economic cost as the electricity used had little alternative use at the time and the taxes foregone would not have accrued had Mozambique demanded more onerous terms. But Mozambique has as yet not succeeded in making use of the aluminium produced in the country. Moreover, despite considerable investments by various aid donors Mozal has only made the weakest of connections to the local economy in Mozambique through backward linkages. Aid donors and international lenders which are frequently opposed to beneficiation have not invested in helping facilitate forward linkages. Thus while Mozambique has diversified to an industrial base it is largely an enclave diversification.

Mauritius is frequently cited by economists and the international community as the most successful economic transformation in Africa. In the space of a generation the country has moved from being almost totally dependent upon the export of sugar to developing manufacturing exports and then to the development of an increasingly diversified service portfolio. The transformation has been completed in a generation with such apparent ease that many of the most important lessons from the so-called 'Mauritius miracle' are lost. Most importantly at every stage of its development Mauritius received preference arrangements from the EU (Sugar Protocol and Lomé/Cotonou Preferences), the US (AGOA for textiles) and India (Double Taxation Treaty for financial services) that underwrote its economic transformation. Without these preference arrangements it is very doubtful that investors would have located in a remote small island state. No other country in Africa has received such generous trade treatment from the international community as Mauritius. Equally, and this is perhaps the essence of the 'Mauritian Miracle', in no other country did the political and bureaucratic elite take as much advantage of what was on offer as Mauritius did over the last thirty years.

What has emerged in much of the recent discussion of diversification in Africa is the notion that economic transformation can be done largely by invitation as long as the investment climate is satisfactory. The only cost is the provision of infrastructure and if the investment climate is good then the investors will come. The counter-argument is that investors will only come where a specific commercial advantage exists and this can be created by the state as was the case in Mozambique or by the international community as in the case of Mauritius. In both cases the creation of this commercial advantage was costly.

3) *Lessons from Global Experiences*

The study has not only considered the experience of other African countries but also resource-rich countries in Asia and Latin America. Two countries were examined in some detail – Malaysia and Chile. Each is resource-rich and has followed distinct paths to middle-income status. Malaysia pursued an assertive state policy where government was willing to provide both incentives and subsidies to energy that caused the rapid increase in the export of manufactures – particularly in electronics and electrical products which have now come to dominate Malaysia's export portfolio. But prior to this Malaysia has used its natural resources in an unsustainable manner and during the 1980s stripped away its forests in Sabah and Sarawak and planted palm oil. It is now the world's largest producer and has moved up the value chain using both export taxes and incentives to down-stream processing. It has also used revenues from its oil and gas sector to subsidise education and development. It has not shied away from providing and using domestic subsidies and incentives that have fundamentally transformed the country. Energy subsidies that have been provided to both consumers and industry have been a vital component in attracting industry to invest in Malaysia, especially in the 1970s when oil prices rose sharply and the electronics and electrical assembly industry flocked to Malaysia to benefit from tax concessions, low wages and low energy prices. However, incentives have been provided within a context which has provided a stable and commercially competitive environment for investment.

Chile provides a fascinating counter-point to that of Malaysia. Following the 1973 coup the government pursued a free-market policy which remained largely in place until the present. While Malaysia pursued active policies of export-led industrialisation, Chile focused on the areas where it has a natural comparative advantage i.e. in the agricultural sector. It has used its massive copper resources to develop and expand exports from the agricultural sector which has grown consistently with new exports such as salmon, wine and grape exports at a rapid rate. However, the country remains largely dependent upon copper mining for its prosperity and its current upper-middle income status would be in doubt in the absence of the revenues from the state-owned Codelco Mines.

Despite the laudable economic progress that has been achieved Chile, like Namibia and Botswana, remains a captive of its geology and geography. What Malaysia, and to some degree Mauritius, have shown is that with good leadership committed to transformation countries can develop to the point where geology and geography do not determine the future economic development path of the country.

4) *SACU, SADC, the WTO and the EPAs*

The taxation system of countries within SACU provides considerable tax competition for Botswana. This trade arrangement, because it is a century-old customs union, is the most significant in terms of all the various treaty arrangements to which Botswana is a signatory. While Namibia has conducted a tax-free EPZ policy even South Africa, which has maintained a relatively high nominal corporate tax rate, has maintained a very extensive system of incentives that in effect pushes up returns for those companies investing there. It is possible, with sufficient and properly targeted incentives to overcome an absolute cost disadvantage that would face an investor in a particular jurisdiction. The effective use of government financial incentives in eliminating any export competitiveness disadvantage was discussed and analysed at length in the modelling exercise. It remains clear from the case of Namibia that where the magnitude of the commercial disadvantage facing an investor is such, then financial incentives cannot by themselves alter the investment climate. Without first tackling the economic fundamentals which raise costs investment will not occur.

The WTO and the EPA put extensive limits on the use of some of the industrial subsidies that were once employed in Asia. These measures, such as direct export subsidies and export taxes can now no longer be applied. It should however be pointed out that with the exception of South Africa, it is likely that no country in Africa is large enough as a trading partner for other countries to use the WTO dispute-settlement mechanism. It remains doubtful that trading partners will choose the high costs of a dispute-settlement mechanism as a means of addressing trade policy issues in a country as small as Botswana.

5) *Analysis of Competitiveness*

Commercial competitiveness is a multifaceted phenomenon and no one statistic or even one approach provides a true and comprehensive picture of the competitiveness of a nation. This chapter began with a discussion of the two newer approaches to competitiveness as found in the World Economic Forum Global Competitiveness Index and the World Bank Doing Business Index. This latter index has become the principal focus of concern of the Government of Botswana. The former approach emanating from the work of Porter and Schwab emphasises, even for countries like Botswana, factors other than costs. This approach emphasises the need for innovation-driven firms and investment, which it is felt are premature for a country like Botswana that, despite its high income, remains at a relatively early stage of its development. While neither of the approaches looks directly at economic fundamentals, the World Bank approach is closer to this approach. All these approaches provide some insight into aspects of competitiveness though the World Bank approach provides more analysis of the economic and commercial fundamentals that face business.

The approach taken to analysing competitiveness in this report is boldly microeconomic and based more on the direct costs of facing a business when investing i.e. what is commonly referred as the economic fundamentals. The reason why this approach is taken is that it more closely approximates the decision making of business when deciding on a location for a Greenfield investment. However, this is not to suggest that business does not consider the factors included in the Doing Business Index. Indeed, in the models that have been employed, the non-location specific costs are invariably greater than 50% of total costs and hence in a country where it is particularly difficult to do business, those costs may be subsumed in a higher cost of management or in higher fixed costs and overheads. These have not been incorporated into the modelling and hence the Doing Business Index is an important supplement to the financial analysis in this report. Nevertheless, financial analysis remains the principal vehicle for convincing shareholders, bankers and investors of the viability of a particular project.

The analysis above of the three quite different types of industry shows, unsurprisingly, that Botswana is not, at this stage of its development, a competitive producer when it comes to this range of manufacturing activities. Botswana's situation however is by no means irreversible and where the right factor intensities are chosen that play to the country's strengths the results can be positive. This is especially so when the right fiscal incentives are chosen in combination with the right industry. However, the analysis has revealed the various strengths and weaknesses and these quantified with interesting and quite surprising results that clearly point the way towards an effective industrial policy for the country.

From the analysis above it seems that the more intensive a project is in its energy usage the more likely it is to be successful in Botswana given its internationally low cost of energy. The problem with the importance of this variable is that the only variable used in these models has been the price of electricity. Electricity supply in Botswana has been inconsistent and without the development of sufficient capacity to meet rising demand, the commercial advantage currently emanating from the relatively low price of electricity will not materialise in the form of investment. Considerable public investment is needed to assure that electricity supply is available at prices that would facilitate energy-intensive projects. Unless there are direct subventions provided by government then independent power producers will not enable the country to use electricity prices as a source of commercial advantage for the country. Perhaps as significant is the fact that there is no policy of using electricity pricing as a source of commercial advantage. In May 2012, shortly after the EIU cost survey was undertaken, the Water Utilities Corporation raised its water rates by some 25% for the first time since 2003 and eliminated a source of commercial advantage for the country. While water in Botswana is scarce, electricity, by virtue of the nation's very substantial coal and CBM reserves, is potentially abundant and with the appropriate use of marginal cost pricing techniques for large-scale electricity users prices to industry can be kept at levels that provide an important incentive.

The analysis above has shown that projects that are intensive in their use of unskilled labour tend to be relatively cost competitive. The analysis has attempted to address the differences in labour productivity that almost certainly exist between Botswana and other comparators both in SADC and in Asia. However, the approach used is based on assumption rather than a detailed analysis of labour productivity which is unavailable and beyond the scope of this analysis. Botswana also has relatively cheap land available for factory space, which also provides some, albeit minor source of commercial advantage. However, it is important to note that in all three of these projects that are examined unskilled labour costs are at most 0.09% of total cost in the three case studies and can therefore provide only the most minor commercial advantage for the country.

Unfortunately, where the country is most uncompetitive is in those projects intensive in their use of skilled and professional labour and management. This is a common situation in many developing countries that have not yet developed an abundant and low-cost source of skilled labour and management. This is one of the greatest sources of advantage of the Asian comparators used in this study as their education systems have provided industry with large numbers of trained and skilled workers and managers. What is of importance is that skilled, professional and management costs are a far more commercially significant source of disadvantage than are transport costs which are the most commonly cited sources of disadvantages of locating investment in Botswana. Medium- and long-term government policies aimed at both increasing the supply of skilled and professional labour and management as well as decreasing national and international barriers to entry into the recognised professions are the interventions most likely to increase Botswana's commercial prospects as a destination for direct investment**.** It is in the most skill-intensive case study, i.e. electronic assembly, where Botswana's disadvantage in terms of costs over that of India is greatest. Some 54% of Botswana's cost disadvantage in this sector can be explained by differences in skilled, professional and management costs.

However, the importance of transport, in particular rail, road and sea transport costs, also has to be addressed because it impacts not only the direct costs of production but also in terms of taking advantage of commercial opportunities from the processing of inputs from within the country. The analysis has shown that some 24% on average of the difference in the NPV of the Botswana projects as compared to that of India can be explained by differences in transport costs.

The offering of Tax Holidays as a principle instrument of compensating investors for the high cost of production has been precisely the instrument used by Namibia to attempt to attract investment through its EPZ. Thus far its efforts have not borne significant fruit and while it has diversified in the mining sector significant industrial investment has not occurred because, as the analysis of business costs demonstrates, it is either the highest or second-highest cost producer in the sample in all three industries. Offering tax concessions where there are either no profits to be made or much higher profits to be earned in other proximate locations is unlikely to be a successful industrial strategy. Nevertheless the establishment of SEZs, already mooted by the Botswana government, and based upon tax-free investments in locations in closest proximity to good transport infrastructure, is likely to have the greatest impact upon investment in the country. In light of the accelerating tax concessions becoming increasingly available in neighbouring SADC countries a properly ring fenced tax-free EPZ regime that protects existing corporate tax revenue is the instrument most likely to meet with success in attracting investment in the short term.

However, the removal of company taxes is becoming increasingly seen as necessary to make Botswana tax and financially competitive with its SADC neighbours who are in a clear race to the bottom when it comes to tax rates and concessions to investors. Addressing this and the factors that have seen a progressive worsening of Botswana's position in the World Bank Doing Business Index over the last five years is also part of what are the relatively easy short-term interventions. This is especially so if they are first implemented within the contexts of a tax-free Export Processing Zone.

6) *Envisioning a Future Competitive Botswana*

The first volume of this series of reports considered the future of mining projects in the country. The results of that report made it entirely clear that almost irrespective of industrial policy, the private sector in Botswana is moving in a particular direction and that is the development of newly discovered or now commercially viable mineral deposits. These include coal, uranium, copper, coal bed methane, iron ore and lead/zinc as well as several new and much smaller diamond mines. That report also made it clear that even if all known mineral and energy deposits are developed into mines the revenue generated will still not be anywhere near sufficient to compensate for the loss of revenue from diamonds which are expected to go into decline after 2025 and that Botswana can expect its own 'fiscal cliff' at that time.

There appears to be a clear disconnect between industrial and minerals policy in Botswana, which was possibly understandable when the only significant mineral deposit was diamonds but with the discoveries of a wide range of minerals this can no longer be justified. Policy has continued to be written with little consideration for these developments. It is imperative that Botswana policy makers rectify the disconnect or valuable opportunities for up- and down-stream value addition will be lost.

The existence of massive coal deposits which may be used primarily for export and yield very substantial quantities of discards creates the possibility for Botswana to leverage its energy deposits in much the same way as Malaysia did by providing a policy of low-cost energy, amongst other policy changes. It is imperative that Botswana embark on a policy programme immediately to maximise the synergies that will be created through the developments and implement the needed developments in transport infrastructure.

The natural resource base of Botswana constitutes a very bountiful basis for the future of a prosperous country where neither geography nor geology determines the future of its development. It is Botswana's good fortune that it has a massive energy base that can be the foundation of a minerals and energy complex that can develop the nation over the next quarter century. Using appropriate incentives along with properly priced energy has been the basis for transformation that has occurred in not only Malaysia but in other countries like Indonesia and South Africa. Developing and pricing the rail and energy infrastructure is thus the key to providing appropriate incentives. A failure to do so will simply mean a continuation of the traditional policy of extraction and export of unprocessed raw materials.

However, unless Botswana also addresses the source of its commercial disadvantage as discussed at length in this volume then the opportunities provided by the nation's natural resource abundance will be exploited in other countries What then constitutes the appropriate policy response to Botswana's revealed commercial disadvantage in these various areas? Policy responses need to be divided into two categories. Short-term responses simply involve mechanisms that will compensate firms for the disadvantage associated with their location decision. Longer-term strategies need to address the actual costs so that the country attains a more competitive position vis-à-vis its SADC neighbours. As we have seen from the sensitivity analysis, in most cases the magnitude of the cost disadvantage faced by firms in most of these sectors is such that the standard instrument of compensation i.e. a Tax Holiday is insufficient to push the country to the highest rates of return of the sample group and certainly not when it has to compete with low labour cost LDCs such as Tanzania and Zambia. It is however in selected industries where prices and factor intensities are such that adequate rates of return are possible. Botswana's tax system is generally considered to be low and reasonable by international standards. This has been the consensus of many analysts. However, this is simply irrelevant in the face of regional and international tax competition that places great pressure on governments to lower tax rates in order to attract investors i.e. the so-called race to the bottom.

The long-term issues are however more fundamental for assuring the productivity and profitability of export-oriented investments in the country. These are both politically difficult to achieve and in many cases require considerable infrastructural investment. Here there are a number of costs that need to be addressed in order to assure the relative profitability of export-oriented investments. These include, in descending order of commercial importance:

- <u>Skilled, Professional and Management Costs</u> – Here it is a combination of long-run policy that aims at an increased investment in skills needed for the development of the private sector along with policies to increase the level of competitiveness. However, unless there is a simultaneous effort to address both domestic and international barriers to the movement of skilled professionals and managers then increased domestic supply may simply result in greater unemployment as the high domestic prices will not make investment possible. Liberalisation will require limiting the anti-competitive practices of some professional societies.

- Costs of Land and Sea Transport – Botswana's position of being located some 300km from Gauteng and 800km from the nearest sea port naturally raises costs of exports. These costs explain 24% of the country's disadvantage. Assuring competitiveness in the transport sector is essential. This can be done through enhancing competition through existing road and rail transport but more significantly expanding rail capacity by developing an efficient new railway directly to the coast will lower the cost of road transport. This remains a necessary condition for the development of a coal export industry and will help significantly lower other transport costs into Botswana.

- Interest Rate Costs – In comparison to countries such as Malaysia the analysis has shown that high interest rates in Botswana would have the effect of significantly decreasing the return on these projects. In part this is addressed through low interest loans made available by BDC and CEDA. However, conducting monetary and interest rates policies that lower commercial bank interest rates faced by investors in the Botswana market would decrease the cost of investment in the country.

- Electricity Pricing and Supply Policy – As discussed in this chapter electricity prices are, at the time of writing, a source of considerable commercial advantage for Botswana. However, a policy of low prices based on marginal cost and a commitment to long-term supplies are necessary to assure the private sector that energy-intensive investments in Botswana will continue to be supported by government policy. This will of necessity require the government of Botswana to commit to an expansion of thermal generating capacity in the coming years along with an appropriate energy pricing policy.

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ANNEX I: Terms of Reference

THE THREE COMPONENTS OF THE AfDB POST- DIAMOND STUDY

1. Future Mining and Energy Investments in Botswana

BIDPA shall, in consultation with the appropriate authorities and the private sector, undertake the following activities:

- Review existing mining and energy projects and develop a detailed time series on estimated production, net revenue and tax revenue over the coming decade. A number of different scenarios based on information provided will be prepared;
- Following consultations with mineral and energy projects developers in Botswana in base and precious metals as well as energy projects, BIDPA shall prepare an analysis of probable and possible projects that will be developed in the next ten years;
- In consultation with stakeholders consider appropriate incentives that may accelerate the pace of investment in mineral and energy projects in Botswana in order to ensure minimal disruption to the economy from the decline in revenues from diamond mining;
- Consider the impact of any other proposed large investment projects that may not be in the mining and energy sector and their impact on the Botswana economy;
- Prepare a report for the Government of Botswana to consider;
- Prepare a paper for public dissemination regarding the existing and new potential investment projects and the ramifications for macroeconomic aggregates; and
- Following the completion of the analysis of various mining projects and expected revenues it is necessary to model the impacts and to determine the appropriate adjustment strategies for the country in light of recent experience with the 2008/9 financial crisis.

2. Economic Modelling of Impacts and Policy Options for Adjustment

BIDPA shall undertake the following activities:

- Undertake an economic review of Botswana and an analysis of the impact of the 2008/9 financial crisis on the economy of Botswana and the economic adjustments which ensued;
- Undertake an analysis of the effect of new and existing mining and energy projects outlined in the paper above on macroeconomic aggregates, including tax revenues, employment and GDP;
- Determine whether macroeconomic adjustment will be necessary and in conjunction with other international organisations suggest appropriate measures that will maintain fiscal balance;
- Review the existing taxation regime and determine the adjustments necessary in light of future revenue projections;
- Suggest possible measures, including assistance programmes, that the GoB may wish to consider in order to ensure macroeconomic stability;
- Suggest the role of various international agencies in preparing for the adjustment; and
- Prepare a paper for the consideration of the GoB and relevant international institutions.

3. Botswana's Diversification Response

Botswana has had a very successful policy of macroeconomic stability and good governance in the management of its existing resources. It has been pursuing a policy of economic diversification almost since the commencement of large-scale diamond mining. This has not yet borne fruit. It is necessary to ask why Botswana has not generated dynamic efficiency and what responses are appropriate to the changed circumstances. To that end, the report will undertake a detailed analysis of comparative business costs in various SADC countries and then use those costs to determine the source and extent of cost disadvantage to the private sector from potentially profitable investments in Botswana.

BIDPA shall undertake the following tasks:

- Review the existing literature on economic diversification and draw on the lessons of successful examples;
- Consider the experience of neighbouring countries with economic diversification, and why some have been relatively successful and why others have been less successful;
- After reviewing Botswana's experience with diversification consider why it has not yet borne fruit;
- Consider whether the provisions of existing and proposed trade agreements will inhibit Botswana's ability to diversify;
- Prepare a comparative cost analysis of the direct costs of doing business in 8 SADC countries (Botswana, Namibia, Malawi, Mauritius Mozambique, Swaziland, RSA, and Zambia);
- Using cash flow models of internationally (i.e. export) competitive firms in RSA and other SADC countries determine the sources of private sector cost advantage and disadvantage from locating those firms in Botswana;
- Recommend measures to diminish the sources of cost disadvantage that the private sector faces in Botswana;
- Develop, in conjunction with the private sector, an appropriate response strategy to the long-term development of the private sector in Botswana;
- Make recommendations to the government of Botswana to improve the economic diversification process, its governance structure and consider alternative strategies; and
- Prepare a report on the above.

ANNEX II: Definitional Issues of Diamond Processing

A significant and contentious issue in the international trade and industrial taxonomy is precisely what constitutes manufactured production. Normally diamonds are classified as either being rough or cut and polished and are in categories that are in close proximity in both the HS 2007 and Standard International Trade Classification (SITC). Rough diamonds are classified as SITC code 667.21 (corresponding to HS 7102.10) but cut and polished diamonds are a different SITC category 667.22 (corresponding to HS 7102.31).[123] The paradox is that using trade classifications i.e. the HS or SITC the production of both rough and polished diamond products are considered to be part of a manufacturing process. The confusion arises because of the use of trade classification indices which have regrettably become more common to classification of production processes. If, however, one employs the UN's International Standard Industrial Classification (ISIC Rev 3) rough diamonds are classified in the section termed 'ores and minerals' under the class 1631 i.e. Precious stones (including diamonds, but not industrial diamonds) and semi-precious stones, unworked or simply sawn or roughly shaped. Cut and polished diamonds, on the other hand, are classified under ISIC category D i.e. manufacturing in Class: 3691 – Manufacture of jewellery and related articles.

The other important export from Botswana is copper and nickel matte which are treated completely differently in the HS system and the UN's SITC. In the HS system copper and nickel concentrate (HS 26) are considered to be mineral ores but matte (HS 74) is considered a manufactured good. But in the SITC both concentrate and matte (SITC 283 and 284) are considered to be mineral ores. The essential difference between the two is the degree of purity of the metal with copper concentrate containing as much as 40% copper and copper matte containing approximately 70% copper. The paradox is that all diamonds, whether rough or polished, are deemed to be manufactured products but only copper and nickel matte is manufactured.

While the international trade taxonomies offer a counter-intuitive definition, common sense and ISIC dictates that polished diamonds, and their process of production, are fundamentally different from the screening and processing of diamondiferous rock and extracting rough diamonds. Moreover, the cutting and polishing of diamonds most significantly results in the production of a finished product which has commercial value in and of itself. Rough diamonds, like copper matte, are not finished product, and are derived from a screening and crushing process having only a derived but not an inherent value. Polished diamonds have inherent value as no further processing is required for the product to achieve one of its economic functions as a store of value. They can be set into jewellery and hence it is argued that cutting and polishing diamonds is 'an industrial process' and removing rough diamonds from a kimberlite or alluvial deposit is a mining process. In Botswana the cutting and polishing industry employed some 3,000 workers in 16 firms in 2010 and needs to be treated for statistical and analytical purposes in a way quite different from the rough diamonds using the distinction in ISIC as opposed to trade classifications.

123 UN (2006) *Standard International Trade Classification 'Revision 4', Department of Economic and Social Affairs, Statistics Division Statistical Papers Series M, No. 34/Rev. 4'* http://unstats.un.org/unsd/trade/SITC%20Rev%204%20FINAL.pdf *downloaded 8 July 2012.*

ANNEX III: Major Exports from Botswana

Table 1: Top 50 Exported Commodities, 2004 (Pula)

Rank	Hs Code	Description	Value	%
1	71023100	Non-industrial diamonds not worked or simply sawn, cleaved or bruted	12,328,944,475	74.8
2	74011000	Copper mattes	1,578,290,271	9.6
3	87012020	Tractors for semi trailers of vehicle of a mass exceeding 1600KG	402,549,909	2.4
4	02013000	Fresh or chilled boneless bovine meat	132,232,190	0.8
5	61109020	Jerseys, pullovers, cardigans, twinsets, bed jackets and jumpers	107,803,721	0.7
6	28362000	Disodium carbonate	106,547,877	0.6
7	02023000	Frozen boneless bovine meat	100,395,820	0.6
8	26030000	Copper ores and concentrates	89,680,935	0.5
9	71022100	Industrial diamonds not worked or simply sawn, cleaved or bruted	63,490,901	0.4
10	25010000	Salt and pure sodium chloride, whether or not containing anti-caking agents...; sea water	57,002,387	0.3
11	61091000	T-shirts, singlets and other vests, of cotton, knitted or crocheted	54,222,771	0.3
12	17041000	Chewing gum	51,871,032	0.3
13	87060020	Chassis fitted with engine for vehicle of mass > 1600KG or of a G.V.M. exceeding 3500 KG	50,935,708	0.3
14	84071000	Aircraft spark-ignition piston engines	50,072,045	0.3
15	99990000	Used personal effects	47,898,912	0.3
16	61103090	Other similar articles of man-made fibres; NES	37,350,257	0.2
17	87032390	Other vehicles of a cylinder capacity exceeding 1500cmcb but not exceeding 3000cmcb NES	36,952,733	0.2
18	73262090	Other articles of iron or steel not elsewhere specified	26,264,947	0.2
19	85369020	Other electric apparatus identifiable for use or principal with motor vehicles	25,993,058	0.2
20	30023000	Vaccines for veterinary medicine	25,937,040	0.2
21	62046200	Women's or girls' trousers, breeches, etc, of cotton	25,332,033	0.2
22	71023900	Non-industrial diamonds, not mounted or set; NES	23,985,333	0.1
23	61099000	T-shirts, singlets, etc, of other textiles, knitted or crocheted; NES	23,519,934	0.1
24	19053000	Sweet biscuits; waffles and wafers	20,281,392	0.1
25	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	19,034,586	0.1
26	71103900	Rhodium in semi-manufactured forms	17,824,869	0.1
27	41011000	Whole hides and skins of bovine animals, =<8kg dried..., etc	17,366,860	0.1
28	63026090	Toilet linen	17,170,303	0.1
29	48194000	Sacks and bags, including cones of paper, paperboard; NES	17,115,303	0.1

30	62034200	Men's or boys' trousers, breeches, etc, of cotton	16,894,299	0.1
31	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	15,942,584	0.1
32	11010000	Wheat or meslin flour	15,458,136	0.1
33	71022900	Industrial diamonds, not mounted or set; NES	14,938,000	0.1
34	61103020	Jerseys, pullovers, cardigans, twinsets, bed jackets and jumpers	14,927,392	0.1
35	61069000	Women's or girls' blouses, etc, of other textiles, knitted or crocheted	14,754,012	0.1
36	87032490	Other vehicles of a cylinder capacity exceeding 3000cm^3	13,566,488	0.1
37	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	13,456,982	0.1
38	87042290	Other vehicles for goods with GVM exceeding 5t but not exceeding 20tonnes; NES	13,287,971	0.1
39	62041900	Women's or girls' suits of other textiles; NES	12,950,549	0.1
40	62034900	Men's or boys' trousers, breeches of other textiles; NES	12,203,623	0.1
41	55131900	Other unbleached/bleached woven fabric of synthetic fibre with cotton mass < 170g/m	11,924,454	0.1
42	61121900	Tracksuits of other textiles, knitted or crocheted	11,778,925	0.1
43	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	11,753,327	0.1
44	73262010	Gabions of wire netting, covered with plastics	11,667,584	0.1
45	88033000	Parts of aeroplanes or helicopters; NES	10,924,412	0.1
46	62059000	Men's or boys' shirts of other textiles; NES	10,211,923	0.1
47	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	9,516,034	0.1
48	39232900	Sacks and bags (incl. cones) of other plastics (excl. ethylene)	9,379,473	0.1
49	36020000	Prepared explosives, (excl. propellant powders)	9,189,467	0.1
50	87043190	Other motor vehicles for the transport of goods with G.V.M. not exceeding 5t; NES	9,143,017	0.1
		Top 50 Exported Commodities	15,819,936,254	96
		Other Goods	666,633,973	4
		Total Exports	16,486,570,227	100

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2004*

Table 2: Top 50 Exported Commodities, 2005 (Pula)

Rank	HS Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	16,693,266,279	74.3
2	74011000	Copper mattes	2,314,852,049	10.3
3	87012020	Tractors of a vehicle mass exceeding 1600kg	397,964,198	1.8
4	61103090	Other similar articles of man-made fibres; NES	317,235,186	1.4
5	02013000	Fresh or chilled boneless bovine meat	206,793,113	0.9
6	02023000	Frozen boneless bovine meat	163,021,811	0.7
7	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	140,808,522	0.6
8	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	130,038,995	0.6
9	28362000	Disodium carbonate	110,397,488	0.5
10	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	85,063,895	0.4
11	61091000	T-shirts, singlets and other vests, of cotton, knitted or crocheted	84,955,087	0.4
12	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	76,499,136	0.3
13	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	74,769,538	0.3
14	62034900	Men's or boys' trousers, breeches of other textiles; NES	70,283,636	0.3
15	17041000	Chewing gum	59,551,025	0.3
16	99990000	Used personal effects	56,337,470	0.3
17	71022900	Industrial diamonds, not mounted or set; NES	48,167,781	0.2
18	71021000	Unsorted diamonds	44,201,858	0.2
19	87032390	Other vehicles of a exceeding 1500cm3 cylinder capacity_3000cm3; NES	42,309,299	0.2
20	62046200	Women's or girls' trousers, breeches, etc, of cotton	41,503,265	0.2
21	62034200	Men's or boys' trousers, breeches, etc, of cotton	38,686,398	0.2
22	87060020	Chassis fitted with engine for vehicle of mass > 1600kg or of A G.V.M. >3500kg	37,367,002	0.2
23	61109020	Jerseys, pullovers, slip-overs, cardigans, twinsets, bed jackets and jumpers	36,821,416	0.2
24	19053000	Sweet biscuits; waffles and wafers	31,887,641	0.1
25	85369090	Other elec. apparatus for switching or protecting elec. circuits; NES	30,014,075	0.1
26	73262090	Other articles of iron or steel, NES	27,534,658	0.1
27	48194000	Sacks and bags, including cones of paper, paperboard; NES	24,940,217	0.1
28	62059000	Men's or boys' shirts of other textiles; NES	24,871,651	0.1
29	63026090	Toilet linen	24,015,153	0.1
30	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	23,886,011	0.1

31	61069000	Women's or girls' blouses, etc, of other textiles; NES, knitted or crocheted	22,516,897	0.1
32	55131900	Other unbleached/bleached woven fabric of synthetic fibre with cotton mass < 170g/m	19,196,283	0.1
33	87043190	Other motor vehicles for the transport of goods with G.V.M. not exceeding 5t; NES	18,402,867	0.1
34	61102020	Jerseys, pull-overs, slipovers, cardigans, twinsets, bed jackets and jumpers	17,928,520	0.1
35	85252000	Radio/tv transmission apparatus incorporating reception apparatus	17,668,522	0.1
36	30023000	Vaccines for veterinary medicine	16,982,048	0.1
37	62063000	Women's or girls' blouses, shirts, etc, of cotton	14,928,594	0.1
38	72043000	Waste and scrap of tinned iron or steel	14,387,254	0.1
39	10070000	Grain sorghum	13,053,642	0.1
40	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	11,081,967	0
41	39232900	Sacks and bags (incl. cones) of other plastics (excl. ethylene)	10,910,389	0
42	61046900	Women's or girls' trousers, etc, of other textile, knitted or crocheted	10,886,684	0
43	73262010	Articles of iron or steel wire; Gabions of wire netting, covered with plastics	10,757,291	0
44	39232100	Sacks and bags (incl. cones) of polymers of ethylene	10,009,568	0
45	84292000	Graders and levellers	9,921,906	0
46	88022000	Aeroplanes and other aircraft; NES, of an unladen weight =<2000kg	9,846,044	0
47	61102090	Other similar articles of cotton; NES	9,574,438	0
48	85071000	Lead-acid accumulators for starting piston engines	9,408,996	0
49	84082000	Engines of a kind used for the propulsion of vehicles of chapter 87	8,989,949	0
50	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	8,511,761	0
		Top 50 Exported Commodities	**21,723,007,473**	**96.6**
		Other Goods	**757,370,961**	**3.4**
		Total Exports	**22,480,378,434**	**100**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2005*

Table 3: Top 50 Exported Commodities, 2006 (Pula)

Rank	Code	Description	Value	%
1	71023100	Non-industrial diamonds, not worked or simply sawn, cleaved or bruted	19,145,647,372	72.1
2	74011000	Copper mattes	3,618,850,968	13.6
3	26030000	Copper ores and concentrates	338,612,868	1.3
4	71022900	Industrial diamonds, not mounted or set; NES	261,391,743	1
5	02013000	Fresh or chilled boneless bovine meat	250,673,172	0.9
6	02023000	Frozen boneless bovine meat	219,694,875	0.8
7	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	211,835,971	0.8
8	28362000	Disodium carbonate	114,442,227	0.4
9	61091000	T-shirts, singlets and other vests, of cotton, knitted or crocheted	112,812,132	0.4
10	61109020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets and jumpers	101,641,630	0.4
11	17041000	Chewing gum	82,015,070	0.3
12	25010000	Salt and pure sodium chloride, whether or not containing anti-caking agents...; sea water	66,104,144	0.2
13	61102020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets and jumpers	61,287,131	0.2
14	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	59,455,537	0.2
15	99990000	Used personal effects	58,843,457	0.2
16	61069000	Women's or girls' blouses, etc, of other textiles, knitted or crocheted	58,079,474	0.2
17	87032390	Other vehicles of a cylinder capacity exceeding 1500cmcb but not exceeding 3000cmcb	52,167,975	0.2
18	87012020	Other tractors of a vehicle mass not exceeding 1600kg	51,217,611	0.2
19	71022100	Industrial diamonds not worked or simply sawn, cleaved or bruted	45,481,054	0.2
20	62046200	Women's or girls' trousers, breeches, etc, of cotton	40,269,046	0.2
21	87163900	Trailers and semi-trailers for the transport of goods; NES	38,589,207	0.1
22	62034200	Men's or boys' trousers, breeches, etc, of cotton	36,072,497	0.1
23	48194000	Sacks and bags, including cones of paper, paperboard; NES	32,737,580	0.1
24	63026090	Toilet linen	32,362,595	0.1
25	62034900	Men's or boys' trousers, breeches of other textiles; NES	29,273,107	0.1
26	61046200	Women's or girls' trousers, etc, of cotton, knitted or crocheted	28,039,724	0.1
27	72286000	Bars and rods of alloy steel; NES	27,974,565	0.1
28	62059000	Men's or boys' shirts of other textiles; NES	27,893,819	0.1

29	85369090	Other electrical apparatus for switching or protecting elec. circuits; NES.	27,662,946	0.1
30	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	27,505,702	0.1
31	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	24,407,744	0.1
32	61061000	Women's or girls' blouses, etc, of cotton, knitted or crocheted	23,488,790	0.1
33	61099000	T-shirts, singlets, etc, of other textiles, knitted or crocheted	22,567,004	0.1
34	30023000	Vaccines for veterinary medicine	22,544,039	0.1
35	87052000	Mobile drilling derricks	22,406,593	0.1
36	61046300	Women's or girls' trousers, etc, of synthetic, knitted or crocheted	21,934,268	0.1
37	62043900	Women's or girls' jackets and blazers of other textiles; NES	19,779,727	0.1
38	85252000	Radio/television transmission apparatus incorporating reception apparatus	18,581,690	0.1
39	72043000	Waste and scrap of tinned iron or steel	18,443,346	0.1
40	39232900	Sacks and bags (incl. cones) of other plastics (excl. ethylene)	17,975,703	0.1
41	72042900	Waste and scrap of alloy steel (excl. stainless)	17,170,426	0.1
42	19053000	Sweet biscuits; waffles and wafers	17,165,404	0.1
43	10019000	Spelt, common wheat and meslin	16,707,639	0.1
44	39172990	Other tubes, pipes, hoses & fittings of other plastic; NES	16,637,897	0.1
45	27011200	Bituminous coal, not agglomerated	14,719,491	0.1
46	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	14,699,050	0.1
47	87043190	Other motor vehicles for the transport of goods with G.V.M. not exceeding 5t; NES	14,603,702	0.1
48	19053100	Sweet biscuits	12,738,310	0
49	74040000	Copper waste and scrap	12,634,477	0
50	39232100	Sacks and bags (incl. cones) of polymers of ethylene	12,464,001	0
		Top 50 Exports	**25,620,304,500**	**96.5**
		Other	**928,443,044**	**3.5**
		Total	**26,548,747,544**	**100**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2006*

Table 4: Top 50 Exported Commodities, 2007 (Pula)

Rank	HS Code	Description	Value	%
1	71023100	Non-industrial diamonds not worked or simply sawn, cleaved or bruted	19,562,257,985	61.5
2	75011000	Nickel mattes	4,879,978,596	15.3
3	26030000	Copper ores and concentrates	1,037,988,700	3.3
4	74011000	Copper mattes	774,734,066	2.4
5	61102020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets & jumpers	461,607,001	1.5
6	02013000	Fresh or chilled boneless bovine meat	368,481,672	1.2
7	02023000	Frozen boneless bovine meat	320,852,004	1
8	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	304,706,410	1
9	61069000	Women's or girls' blouses, etc, of other textiles; NES, knitted or crocheted	297,297,112	0.9
10	61109000	Of other textiles materials	281,896,778	0.9
11	71022100	Industrial diamonds not worked or simply sawn, cleaved or bruted	227,257,677	0.7
12	71022900	Industrial diamonds, not mounted or set; NES	152,102,430	0.5
13	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	139,384,720	0.4
14	61091000	T-shirts, singlets and other vests, of cotton, knitted or crocheted	139,021,373	0.4
15	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	133,914,048	0.4
16	28362000	Disodium carbonate	123,072,327	0.4
17	85369090	Other elec. apparatus for switching or protecting elec. Circuit; NES	119,572,887	0.4
18	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	113,963,690	0.4
19	62034900	Men's or boys' trousers, breeches of other textiles; NES	109,137,166	0.3
20	71023900	Non-industrial diamonds, not mounted or set; NES	101,782,691	0.3
21	26040000	Nickel ores and concentrates	78,427,537	0.2
22	25010000	Salt & pure sodium chloride, whether or not cont.g anti-caking agents...; sea water	70,375,511	0.2
23	62059000	Men's or boys' shirts of other textiles; NES	60,986,132	0.2
24	17041000	Chewing gum	52,456,532	0.2
25	99990000	Used personal effects	51,033,750	0.2
26	48194000	Sacks and bags, including cones of paper, paperboard; NES	45,973,792	0.1

27	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	44,795,119	0.1
28	62045900	Skirts and divided skirts of other textiles; NES	41,760,996	0.1
29	87012020	Of a vehicle mass exceeding 1600KG	41,480,089	0.1
30	63026090	Toilet linen	37,510,966	0.1
31	87163900	Trailers and semi-trailers for the transport of goods; NES	37,275,401	0.1
32	61046900	Women's or girls' trousers, etc, of other textile, knitted or crocheted	36,031,724	0.1
33	30023000	Vaccines for veterinary medicine	34,678,199	0.1
34	72042900	Waste and scrap of alloy steel (excl.. stainless)	31,108,613	0.1
35	39172990	Other tubes, pipes, hoses & fittings of other plastic; NES	30,808,437	0.1
36	87032390	Other vehicles of a 1500cm3 ≤cylinder capacity ≤3000cm3; NES	30,651,256	0.1
37	27101105	Petrol, leaded, as defined in additional note 1(c)	27,124,977	0.1
38	19053100	Sweet biscuits	26,737,938	0.1
39	61121900	Track-suits of other textiles; NES, knitted or crocheted	26,001,856	0.1
40	62034200	Men's or boys' trousers, breeches, etc, of cotton	25,922,732	0.1
41	39011000	Polyethylene having a specific gravity <0.94, in primary forms	25,737,811	0.1
42	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	22,395,364	0.1
43	27101103	Petrol, unleaded, as defined in additional note 1(b)	21,962,297	0.1
44	72043000	Waste and scrap of tinned iron or steel	21,753,021	0.1
45	61109020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets & jumpers	21,055,531	0.1
46	72286000	Bars and rods of alloy steel; NES	20,963,063	0.1
47	84082000	Engines of a kind used for the propulsion of vehicles of chapter 87	19,117,377	0.1
48	61061000	Women's or girls' blouses, etc, of cotton, knitted or crocheted	17,933,286	0.1
49	41039000	Other hides and skins, fresh or preserved, not tanned; NES	17,795,689	0.1
50	85071000	Lead-acid accumulators for starting piston engines	16,628,984	0.1
		Top 50 Exported Commodities	**30,685,493,313**	**96.5**
		Other Goods	**1,106,079,909**	**3.5**
		Total Exports	**31,791,573,222**	**100**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2007*

Table 5: Top 50 Exported Commodities, 2008 (Pula)

Rank	Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	18,684,442,822	56.8
2	75011000	Nickel mattes	4,509,058,744	13.7
3	71023900	Non-industrial diamonds, not mounted or set; NES	2,041,800,403	6.2
4	26030000	Copper ores and concentrates	983,876,925	3
5	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	670,784,511	2
6	26040000	Nickel ores and concentrates	378,317,873	1.2
7	02013000	Fresh or chilled boneless bovine meat	377,436,775	1.1
8	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	321,450,546	1
9	61102020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets and jumpers	304,485,591	0.9
10	99990300	Consolidated cargo – various goods	229,604,855	0.7
11	02023000	Frozen boneless bovine meat	221,612,179	0.7
12	85369090	Other elec. apparatus for switching or protecting elec. Circuits; NES	204,976,700	0.6
13	61069000	Women's or girls' blouses, etc, of other textiles; NES, knitted or crocheted	173,113,475	0.5
14	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	170,365,291	0.5
15	62034900	Men's or boys' trousers, breeches of other textiles; NES	165,374,842	0.5
16	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	121,496,647	0.4
17	28362000	Disodium carbonate	99,658,519	0.3
18	87012020	Other tractors of a vehicle mass exceeding 1600KG	98,045,427	0.3
19	87163900	Trailers and semi-trailers for the transport of goods; NES	78,283,505	0.2
20	87041090	Other dumpers designed for off-highway us; NES	77,050,875	0.2
21	62059000	Men's or boys' shirts of other textiles; NES	75,451,177	0.2
22	17041000	Chewing gum	75,038,407	0.2
23	61109000	Jerseys, pullovers, cardigans, waistcoats and similar articles of other textiles materials	74,895,187	0.2
24	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	60,397,684	0.2
25	48194000	Sacks and bags, including cones of paper, paperboard; NES	59,314,968	0.2
26	05071000	Ivory, its powder and waste, unworked	58,479,170	0.2
27	72042900	Waste and scrap of alloy steel (excl. stainless)	53,252,775	0.2

28	62045900	Skirts and divided skirts of other textiles; NES	52,916,132	0.2
29	74011000	Copper mattes	52,321,804	0.2
30	24022000	Cigarettes containing tobacco	52,044,488	0.2
31	27011200	Bituminous coal, not agglomerated	50,269,242	0.2
32	87032390	Other vehicles of a cylinder capacity exceeding 1500cm³ but not exceeding 3000cm³; NES	46,687,250	0.1
33	62063000	Women's or girls' blouses, shirts, etc, of cotton	45,931,885	0.1
34	84314990	Other parts of boring or sinking machinery of subheading no. 8430.41 or 8430.49; NES	40,667,036	0.1
35	30032000	Medicaments of other antibiotics, not for retail sale	39,397,971	0.1
36	39172190	Other tubes, pipes and hoses, rigid of polymers of ethylene	38,377,908	0.1
37	25232900	Portland cement (excl. white)	37,825,232	0.1
38	99990000	Used personal effects	37,094,613	0.1
39	30023000	Vaccines for veterinary medicine	36,857,869	0.1
40	62034200	Men's or boys' trousers, breeches, etc, of cotton	34,535,523	0.1
41	63026090	Toilet linen	34,475,093	0.1
42	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	34,066,257	0.1
43	84305000	Self-propelled earth moving, grading, excavating... machinery; NES	32,266,220	0.1
44	22030000	Traditional African beer	32,010,529	0.1
45	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	31,450,787	0.1
46	85071000	Lead-acid accumulators for starting piston engines	30,005,324	0.1
47	84291100	Self-propelled bulldozers and angle dozers, track laying	29,967,359	0.1
48	19053100	Sweet biscuits	28,760,646	0.1
49	84295900	Self-propelled bulldozers, excavators...; NES	28,641,954	0.1
50	74040000	Copper waste and scrap	25,378,923	0.1
		Top 50 Exported Commodities	**31,240,015,918**	**95**
		Other Goods	**1,649,075,166**	**5**
		Total Exports	**32,889,091,084**	**100**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2008*

Table 6: Top 50 Exported Commodities, 2009 (Pula)

Rank	Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	13,683,276,746	56.3
2	75011000	Nickel mattes	2,991,795,859	12.3
3	71023900	Non-industrial diamonds, not mounted or set; NES	1,530,429,905	6.3
4	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	531,987,755	2.2
5	26030000	Copper ores and concentrates	529,606,514	2.2
6	02013000	Fresh or chilled boneless bovine meat	449,570,845	1.8
7	02023000	Frozen boneless bovine meat	341,954,403	1.4
8	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	322,455,391	1.3
9	28362000	Disodium carbonate	199,967,258	0.8
10	62034900	Men's or boys' trousers, breeches of other textiles; NES	174,666,711	0.7
11	61102020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets and jumpers	166,338,533	0.7
12	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	144,454,745	0.6
13	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	112,059,479	0.5
14	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	111,596,654	0.5
15	87012020	Of a vehicle mass exceeding 1600KG	109,809,165	0.5
16	17041000	Chewing gum	98,888,520	0.4
17	87041090	Other dumpers designed for off-highway use;, NES	85,135,159	0.4
18	87163900	Trailers and semi-trailers for the transport of goods; NES	72,265,545	0.3
19	26040000	Nickel ores and concentrates	70,486,522	0.3
20	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	69,849,152	0.3
21	48194000	Sacks and bags, including cones of paper, paperboard; NES	65,096,930	0.3
22	30023000	Vaccines for veterinary medicine	55,120,467	0.2
23	24022000	Cigarettes containing tobacco	50,253,169	0.2
24	99990000	Used personal effects	47,901,095	0.2
25	22029090	Other non-alcoholic beverages; NES	47,555,853	0.2
26	39172190	Other tubes, pipes and hoses, rigid of polymers of ethylene	46,955,355	0.2
27	62043900	Women's or girls' jackets and blazers of other textiles; NES	46,157,864	0.2
28	63014000	Blankets (excl. electric blankets), etc, of synthetic fibres	40,324,070	0.2
29	85071000	Lead-acid accumulators for starting piston engines	39,328,254	0.2

30	62059000	Men's or boys' shirts of other textiles; NES	38,391,963	0.2
31	72012000	Non-alloy pig iron containing, >0.5% phosphorus, in pigs, blocks	37,870,651	0.2
32	87032390	Other vehicles of a cylinder capacity exceeding 1500cm3 but not exceeding 3000cm3; NES	34,885,358	0.1
33	62045900	Skirts and divided skirts of other textiles; NES	34,745,131	0.1
34	63026090	Toilet linen	32,840,163	0.1
35	85369090	Other elec. apparatus for switching or protecting elec. Circuits; NES	32,419,946	0.1
36	27011200	Bituminous coal, not agglomerated	31,947,990	0.1
37	61069000	Women's or girls' blouses, etc, of other textiles NES; knitted or crocheted	31,902,966	0.1
38	19053100	Sweet biscuits	29,297,085	0.1
39	62046200	Women's or girls' trousers, breeches, etc, of cotton	27,223,698	0.1
40	84071000	Aircraft spark-ignition piston engines	27,203,423	0.1
41	26203000	Ash and residues containing mainly copper	26,226,676	0.1
42	62033900	Men's or boys' jackets and blazers of other textiles; NES	24,861,493	0.1
43	61102090	Other similar articles of cotton; NES	24,299,838	0.1
44	22030090	Other beer made from malt	23,036,253	0.1
45	11031300	Groats and meal of maize (corn)	22,659,672	0.1
46	87082900	Parts and accessories of bodies (incl. cabs); NES	21,815,883	0.1
47	61034900	Men's or boys' trousers, etc, of other textiles, knitted or crocheted	21,715,728	0.1
48	27101102	Petrol	21,618,099	0.1
49	72042900	Waste and scrap of alloy steel (excl.. stainless)	21,560,991	0.1
50	88033000	Parts of aero planes or helicopters; NES	21,513,351	0.1
		Top 50 Exported Commodities	**22,823,324,276**	**93.9**
		Other Goods	**1,494,238,792**	**6.1**
		Total Exports	**24,317,563,068**	**100**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2009*

Table 7: Top 50 Exported Commodities, 2010 (Pula)

Rank	Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	18,569,799,030	58.0
2	75011000	Nickel mattes	3,488,194,662	10.9
3	71023900	Non-industrial diamonds, not mounted or set; NES	3,100,090,204	9.7
4	02013000	Fresh or chilled boneless bovine meat	628,419,346	2.0
5	28362000	Disodium carbonate	491,295,641	1.5
6	26040000	Nickel ores and concentrates	448,609,363	1.4
7	02023000	Frozen boneless bovine meat	410,888,105	1.3
8	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	384,482,031	1.2
9	26030000	Copper ores and concentrates	294,440,432	0.9
10	62034900	Men's or boys' trousers, breeches of other textiles; NES	267,359,573	0.8
11	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	266,282,837	0.8
12	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	255,916,098	0.8
13	17041000	Chewing gum	147,867,484	0.5
14	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	135,714,047	0.4
15	87012020	Of a vehicle mass exceeding 1600KG	134,731,037	0.4
16	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	111,472,017	0.3
17	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	109,995,907	0.3
18	71081300	Semi-manufactured gold (incl. gold plated with platinum), non-monetary	109,329,965	0.3
19	87163900	Trailers and semi-trailers for the transport of goods; NES	99,220,350	0.3
20	48194000	Sacks and bags, including cones of paper, paperboard; NES	74,761,347	0.2
21	22029090	Other non-alcoholic beverages; NES	62,454,061	0.2
22	85071000	Lead-acid accumulators for starting piston engines	59,349,382	0.2
23	87032390	Other vehicles of a cylinder capacity 1500cm3 ≤≥3000cm3; NES	55,703,314	0.2
24	11031300	Groats and meal of maize (corn)	55,700,201	0.2
25	63026090	Toilet linen	53,480,924	0.2
26	39172190	Other tubes, pipes and hoses, rigid of polymers of ethylene	50,415,805	0.2
27	27011200	Bituminous coal, not agglomerated	48,034,033	0.2
28	72042100	Waste and scrap of stainless steel	46,907,475	0.1

29	61059000	Men's or boys' shirts of other textiles, NES, knitted or crocheted	46,792,955	0.1
30	99990000	Used personal effects	45,693,104	0.1
31	73102100	Cans closed by soldering or crimping of capacity <50l of iron/steel	40,963,125	0.1
32	27101126	Illuminating kerosene	39,435,292	0.1
33	30023000	Vaccines for veterinary medicine	37,920,705	0.1
34	12060000	Sunflower seeds	34,814,293	0.1
35	02011000	Fresh or chilled bovine carcasses and half carcasses	34,111,081	0.1
36	39011000	Polyethylene having a specific gravity <0.94, in primary forms	32,226,644	0.1
37	61069000	Women's or girls' blouses, etc, of other textiles; NES, knitted or crocheted	29,023,800	0.1
38	85281290	Other colour reception apparatus for television; NES	28,559,392	0.1
39	61101020	Jerseys, pullovers, slip-overs, cardigans, twinsets, bed jackets, jumpers of wool	28,415,402	0.1
40	61102020	Jerseys, pullovers, slip-overs, cardigans, twinsets, bed jackets and jumpers of cotton	24,777,808	0.1
41	87041090	Other dumpers designed for off-highway use; NES	24,231,272	0.1
42	62045900	Skirts and divided skirts of other textiles; NES	23,272,310	0.1
43	62046200	Women's or girls' trousers, breeches, etc, of cotton	20,762,272	0.1
44	72042900	Waste and scrap of alloy steel (excl. stainless)	20,507,209	0.1
45	62033900	Men's or boys' jackets and blazers of other textilesl NES	20,287,320	0.1
46	22030090	Other beer made from malt	19,863,241	0.1
47	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	19,858,067	0.1
48	74040000	Copper waste and scrap	18,755,178	0.1
49	19053100	Sweet biscuits	18,153,973	0.1
50	62069000	Women's or girls' blouses, shirts, etc, of other textiles; NES	17,964,901	0.1
		Top 50 Exported Commodities	**30,587,304,015**	**95.6**
		Other Goods	**1,414,703,014**	**4.4**
		Total Exports	**32,002,007,029**	**100.0**

NB: *NES= Not Elsewhere Specified*. **Source:** *External Trade Statistics, 2010*

Table 8: Top 50 Exported Commodities, 2011 (Pula)

Rank	HS code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	25,281,358,003	63.1
2	71023900	Non-industrial diamonds, not mounted or set; NES	4,856,882,136	12.1
3	75011000	Nickel mattes	2,412,660,631	6.0
4	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	544,262,124	1.4
5	26030000	Copper ores and concentrates	506,852,873	1.3
6	62034900	Men's or boys' trousers, breeches of other textiles; NES	483,185,146	1.2
7	62046900	Women's or girls' trousers, breeches, etc, of other textiles; NES	336,488,885	0.8
8	28362000	Disodium carbonate	323,179,812	0.8
9	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	299,566,733	0.7
10	87032390	Other vehicles of a cylinder capacity exceeding 1500cmcb but not exceeding 3000cmcb	206,089,245	0.5
11	02023000	Frozen boneless bovine meat	185,065,590	0.5
12	17041000	Chewing gum	156,746,495	0.4
13	88024000	Aeroplanes and other aircraft; NES, of an unladen weight >15000kg	140,351,400	0.4
14	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	137,928,465	0.3
15	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	137,869,865	0.3
16	61059000	Men's or boys' shirts of other textiles; NES, knitted or crocheted	110,541,024	0.3
17	02013000	Fresh or chilled boneless bovine meat	108,488,035	0.3
18	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	108,055,659	0.3
19	48194000	Sacks and bags, including cones of paper, paperboard; NES	90,538,244	0.2
20	87041090	Other dumpers designed for off-highway use not elsewhere specified	82,885,390	0.2
21	30023000	Vaccines for veterinary medicine	76,553,532	0.2
22	62069000	Women's or girls' blouses, shirts, etc, of other textile; NES	76,450,780	0.2
23	27101115	Illuminating kerosene as defined in additional note 1(e), marked	72,164,998	0.2
24	72042900	Waste and scrap of alloy steel (excl. stainless)	71,795,781	0.2
25	63026090	Toilet linen	69,851,997	0.2

26	85071000	Lead-acid accumulators for starting piston engines	66,206,877	0.2
27	84295900	Self-propelled bulldozers, excavators...; NES	65,119,976	0.2
28	84314990	Other parts of boring or sinking machinery of subheading no.8430.41 or 8430.49; NES	61,369,177	0.2
29	87012020	Of a vehicle mass exceeding 1600kg	61,188,867	0.2
30	01021000	Live pure-bred breeding bovine animals	61,127,198	0.2
31	62046200	Women's or girls' trousers, breeches, etc, of cotton	58,751,660	0.1
32	22029090	Other non-alcoholic beverages not elsewhere specified	57,580,638	0.1
33	61069000	Women's or girls' blouses, etc, of other textiles; NES, knitted or crocheted	57,439,811	0.1
34	58081010	Elastic braids	54,095,036	0.1
35	99990000	Used personal effects	52,126,699	0.1
36	62045900	Skirts and divided skirts of other textiles; NES	48,753,117	0.1
37	27011200	Bituminous coal, not agglomerated	47,403,896	0.1
38	87041025	Of G.V.M. not exceeding 50t	45,653,179	0.1
39	61101020	Jerseys, pullovers, slip-overs, cardigans, twinsets, bed jackets and jumpers	44,826,214	0.1
40	39011000	Polyethylene having a specific gravity <0.94, in primary forms	41,399,247	0.1
41	87163900	Trailers and semi-trailers for the transport of goods; NES	39,878,099	0.1
42	62044900	Dresses of other textiles; NES	35,712,710	0.1
43	87042190	Other dumpers for off highway use with G.V.M not exceeding 5t, NES	35,430,849	0.1
44	12060000	Sunflower seeds	33,018,440	0.1
45	72042100	Waste and scrap of stainless steel	32,740,104	0.1
46	87051000	Crane lorries	32,382,183	0.1
47	61102020	Jerseys, pullovers, slipovers, cardigans, twinsets, bed jackets and jumpers	32,102,055	0.1
48	84082000	Engines of a kind used for the propulsion of vehicles of chapter 87	31,968,827	0.1
49	87042110	Shuttle cars for use in underground mines; low construction flame-proof...	30,516,230	0.1
50	22030090	Other	30,421,035	0.1
		Top 50 Exported Commodities	**38,033,024,967**	**94.9**
		Other Goods	**2,048,534,552**	**5.1**
		Total Exports	**40,081,559,519**	**100.0**

NB: *NES = Not Elsewhere Specified*. **Source:** *CSO, Trade Database, 2011*

Table 9: Top 50 Exported Commodities, 2012 (Pula)

Rank	HS Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	30,516,856,128	67.1
2	71023900	Non-industrial diamonds, not mounted or set; NES	5,388,626,782	11.8
3	75011000	Nickel mattes	2,537,600,159	5.6
4	26030000	Copper ores and concentrates	734,652,304	1.6
5	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	632,194,478	1.4
6	02023000	Frozen boneless bovine meat	351,958,219	0.8
7	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	328,559,804	0.7
8	28362000	Disodium carbonate	275,654,710	0.6
9	87032390	Other vehicles of a cylinder capacity exc. 1500cmcb but not exceeding 3000cmcb; NES	251,307,917	0.6
10	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	199,788,989	0.4
11	72042100	Waste and scrap of stainless steel	149,513,938	0.3
12	17041000	Chewing gum	139,993,198	0.3
13	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	138,535,124	0.3
14	02013000	Fresh or chilled boneless bovine meat	127,054,401	0.3
15	27100026	Illuminating kerosene, as defined in additional note 1(f), unmarked	121,752,920	0.3
16	88022000	Aeroplanes and other aircraft; NES, of an unladen weight =<2000kg	110,497,276	0.2
17	88021200	Helicopters of an unladen weight >2000kg	94,215,050	0.2
18	63026090	Toilet linen	78,475,885	0.2
19	88023000	Aeroplanes and other aircraft; NES, of an unladen weight 2000-15000kg	75,642,530	0.2
20	30023000	Vaccines for veterinary medicine	73,629,794	0.2
21	62034900	Men's or boys' trousers, breeches of other textiles; NES	71,550,373	0.2
22	39172300	Tubes, pipes and hoses, rigid, of polymers of vinyl chloride	62,507,596	0.1
23	58081010	Elastic braids	59,940,843	0.1
24	87042190	Other dumpers for off highway use with G.V.M not exceeding 5t; NES	59,499,655	0.1
25	85071000	Lead-acid accumulators for starting piston engines	54,923,300	0.1
26	12060000	Sunflower seeds	53,048,163	0.1
27	48194000	Sacks and bags, including cones of paper, paperboard; NES	52,570,563	0.1

28	62046900	Women's or girls' trousers, breeches, etc, of other textiles: NES	47,040,128	0.1
29	39172200	Tubes, pipes and hoses, rigid, of polymers of propylene	41,760,862	0.1
30	72042900	Waste and scrap of alloy steel (excl. stainless)	41,471,184	0.1
31	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	39,703,455	0.1
32	71021000	Unsorted diamonds	37,742,479	0.1
33	84314990	Other parts of boring or sinking machinery of subheading no.8430.41 or 8430.49; NES	35,809,825	0.1
34	87041090	Other dumpers designed for off-highway use not elsewhere specified	35,601,907	0.1
35	27011200	Bituminous coal, not agglomerated	33,915,472	0.1
36	39011000	Polyethylene having a specific gravity <0.94, in primary forms	33,126,214	0.1
37	62046220	Breeches and shorts	32,461,422	0.1
38	84295900	Self-propelled bulldozers, excavators..., NES	30,620,824	0.1
39	87059000	Special purpose motor vehicles, NES (eg breakdown lorries, etc)	29,810,684	0.1
40	74040000	Copper waste and scrap	27,724,334	0.1
41	61099000	T-shirts, singlets, etc, of other textiles; NES, knitted or crocheted	27,484,697	0.1
42	27011900	Other coal, not agglomerated; NES	27,228,217	0.1
43	85171210	Designed for use when carried in the hand or on the person	26,436,587	0.1
44	13021990	Other goods of heading 13.02; NES	25,811,810	0.1
45	61109020	Jerseys, pullovers, slip-overs, cardigans, twinsets, bed jackets	24,964,163	0.1
46	73084090	Other scaffolding, shuttering, propping/pit propping equipment	24,518,334	0.1
47	88039000	Parts of aircraft (excl. aeroplanes/helicopters)	24,244,483	0.1
48	84128000	Engines and motors; NES	24,177,483	0.1
49	39189090	Other floor coverings of other plastic not elsewhere specified	23,986,956	0.1
50	84292000	Graders and levellers	23,742,935	0.1
		Top 50 Exported Commodities	**43,459,934,554**	**95.5**
		Other Goods	**2,035,058,156**	**4.5**
		Total Exports	**45,494,992,710**	**100.0**

NB: *NES = Not Elsewhere Specified*. **Source:** *CSO, Trade Database, 2012*

Table 10: Top 50 Exported Commodities, 2011 (Pula)

Rank	HS Code	Description	Value	%
1	71023100	Non-industrial diamonds unworked or simply sawn, cleaved or bruted	46,895,065,998	71.9
2	71023900	Non-industrial diamonds, not mounted or set; NES	6,632,445,241	10.2
3	75011000	Nickel mattes	3,538,159,758	5.4
4	26030000	Copper ores and concentrates	1,077,262,002	1.7
5	71022100	Industrial diamonds unworked or simply sawn, cleaved or bruted	709,744,128	1.1
6	02023000	Frozen boneless bovine meat	629,753,007	1.0
7	71081200	Unwrought gold (incl. gold plated with platinum), non-monetary	470,245,981	0.7
8	02013000	Fresh or chilled boneless bovine meat	349,273,714	0.5
9	28362000	Disodium carbonate	304,834,144	0.5
10	85443000	Ignition wiring sets and other wiring sets for vehicles, aircraft...	291,674,794	0.4
11	72042100	Waste and scrap of stainless steel	277,646,404	0.4
12	25010000	Salt and pure sodium chloride, whether or not cont. anti-caking agents...; sea water	194,373,085	0.3
13	87032390	Other vehicles of a cylinder capacity exceeding 1500cmcb but not exceeding 3000cmcb; NES	159,832,145	0.2
14	10063000	Semi-milled or wholly milled rice	136,378,630	0.2
15	27100026	Illuminating kerosene, as defined in additional note 1(f), unmarked	136,248,907	0.2
16	17041000	Chewing gum	127,000,286	0.2
17	84295900	Self-propelled bulldozers, excavators...; NES	90,937,548	0.1
18	85444100	Electric conductors, nes, for a voltage <=80V, fitted with connectors	90,338,927	0.1
19	63026090	Toilet linen	85,848,393	0.1
20	30023000	Vaccines for veterinary medicine	76,729,232	0.1
21	48194000	Sacks and bags, including cones of paper, paperboard; NES	70,071,809	0.1
22	58081010	Elastic braids	65,177,103	0.1
23	39173990	Other tubes, pipes, hoses of plastic not elsewhere specified	64,964,767	0.1
24	84071000	Aircraft spark-ignition piston engines	61,575,323	0.1
25	27011200	Bituminous coal, not agglomerated	60,484,150	0.1
26	41012900	Hides and skins of bovine animals, fresh or wet-salted; NES	59,506,509	0.1
27	39172300	Tubes, pipes and hoses, rigid, of polymers of vinyl chloride	57,505,530	0.1
28	85071000	Lead-acid accumulators for starting piston engines	57,081,700	0.1

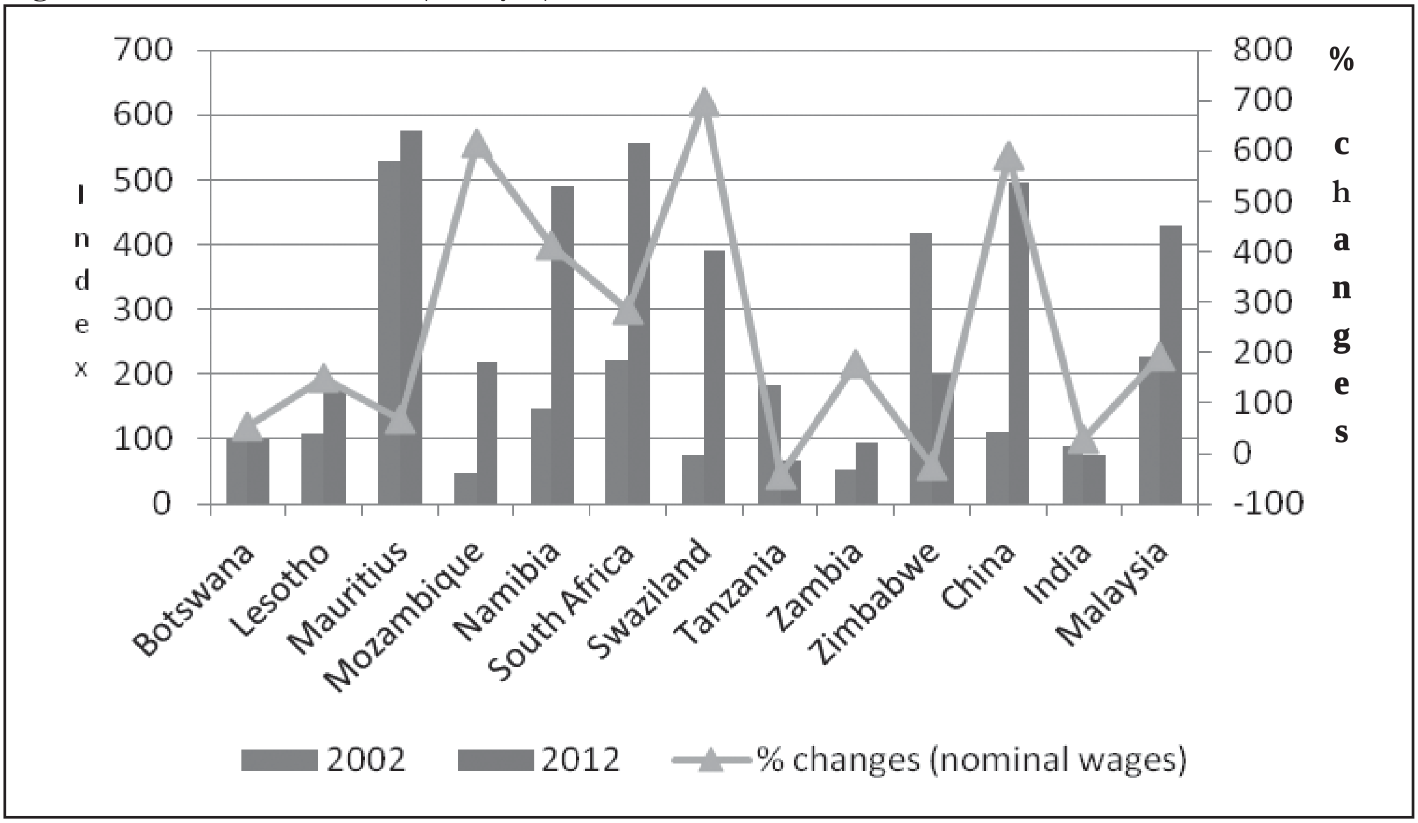
29	88023000	Aeroplanes and other aircraft; NES, of an unladen weight 2000-15000kg	55,643,349	0.1
30	62034990	Other	48,588,643	0.1
31	87041090	Other dumpers designed for off-highway use not elsewhere specified	48,552,849	0.1
32	71022900	Industrial diamonds, not mounted or set; NES	41,270,286	0.1
33	01029000	Live bovine animals, other than pure-bred breeding	39,644,738	0.1
34	84314990	Other parts of boring or sinking machinery of subheading no. 8430.41 or 8430.49, NES	37,921,091	0.1
35	73269090	Other articles of iron or steel wire not elsewhere specified	35,305,723	0.1
36	87042190	Other dumpers for off highway use with G.V.M not exceeding 5t; NES	34,902,231	0.1
37	74040000	Copper waste and scrap	33,468,594	0.1
38	39172200	Tubes, pipes and hoses, rigid, of polymers of propylene	33,260,490	0.1
39	87052000	Mobile drilling derricks	31,903,863	0.0
40	27101202	Petrol, as defined in Additional note (b)	30,386,918	0.0
41	84312090	Other parts of machinery of heading no. 84.27 not elsewhere specified	28,569,270	0.0
42	62046210	Trousers	28,403,680	0.0
43	71021000	Unsorted diamonds	27,004,113	0.0
44	84592900	Drilling machines for removing metal; NES	26,895,783	0.0
45	73089090	Other structures of steel/iron not elsewhere specified	26,352,555	0.0
46	87051000	Crane lorries	22,441,957	0.0
47	39011000	Polyethylene having a specific gravity <0.94, in primary forms	22,178,725	0.0
48	02109000	Other meat; NES, salted... or smoked; flours and meals of meat or offal	22,109,035	0.0
49	13021990	Other goods of heading 13.02; NES	22,091,675	0.0
50	84831000	Transmission shafts (incl. cam and crank shafts) and cranks	21,901,096	0.0
		Top 50 Exported Commodities	**63,488,955,879**	**97.3**
		Other Goods	**1,761,539,277**	**2.7**
		Total Exports	**65,250,495,156**	**100.0**

NB: *NES = Not Elsewhere Specified*. **Source:** *SO, Trade Database, 2012*

ANNEX IV: Costs of Production in Botswana, SADC and Various Emerging Economies

The figures below show the costs comparisons between Botswana and nine SADC countries and three low-cost Asian comparator countries – China, India and Malaysia – in 2012. An index is used to show these comparisons where Botswana is represented by an index of 100. The data is based on the custom survey that has been conducted by the Economist Intelligence Unit between May and September of 2012.

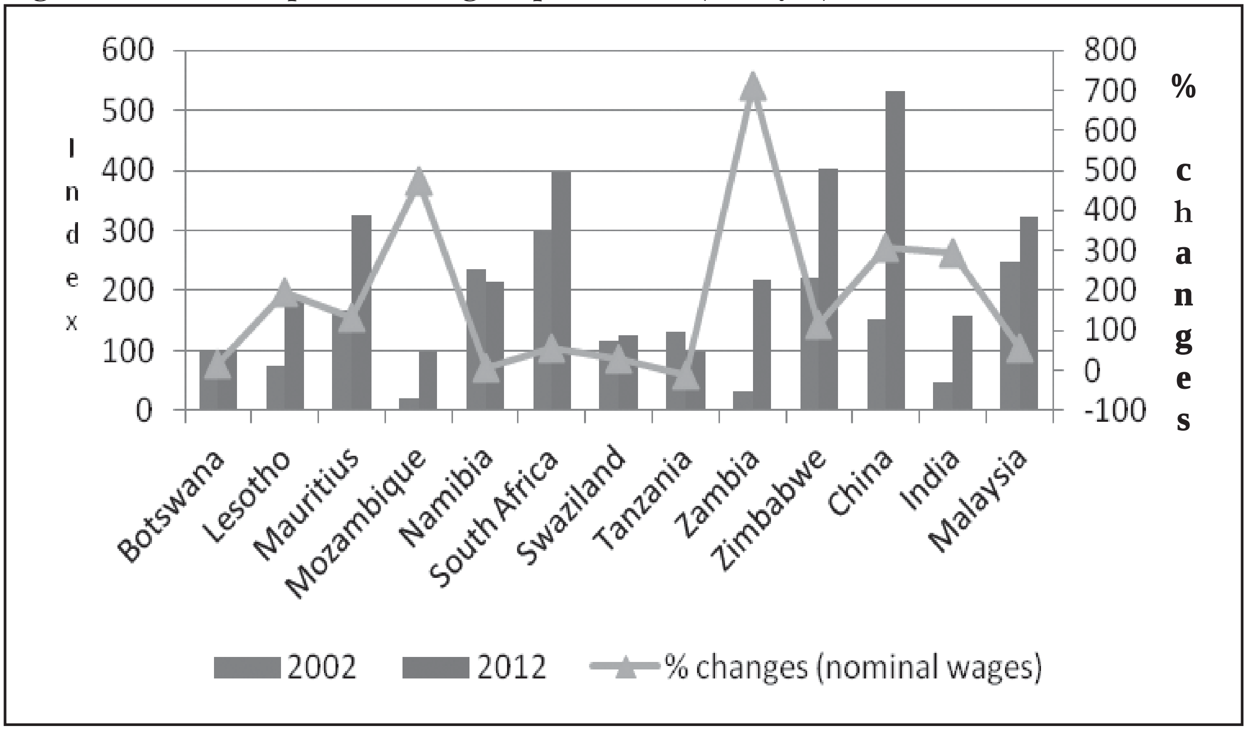
Figure 1: Construction worker (hourly, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

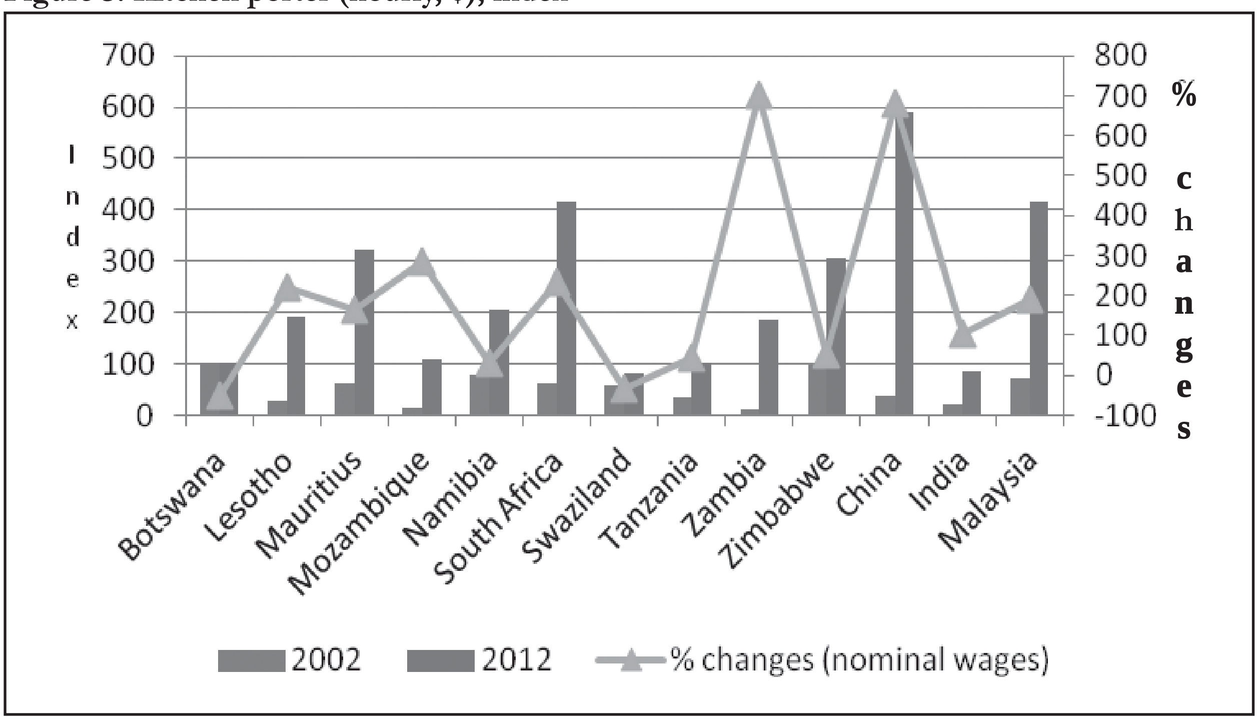
Figure 2: Checkout operator in large supermarkets (hourly, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

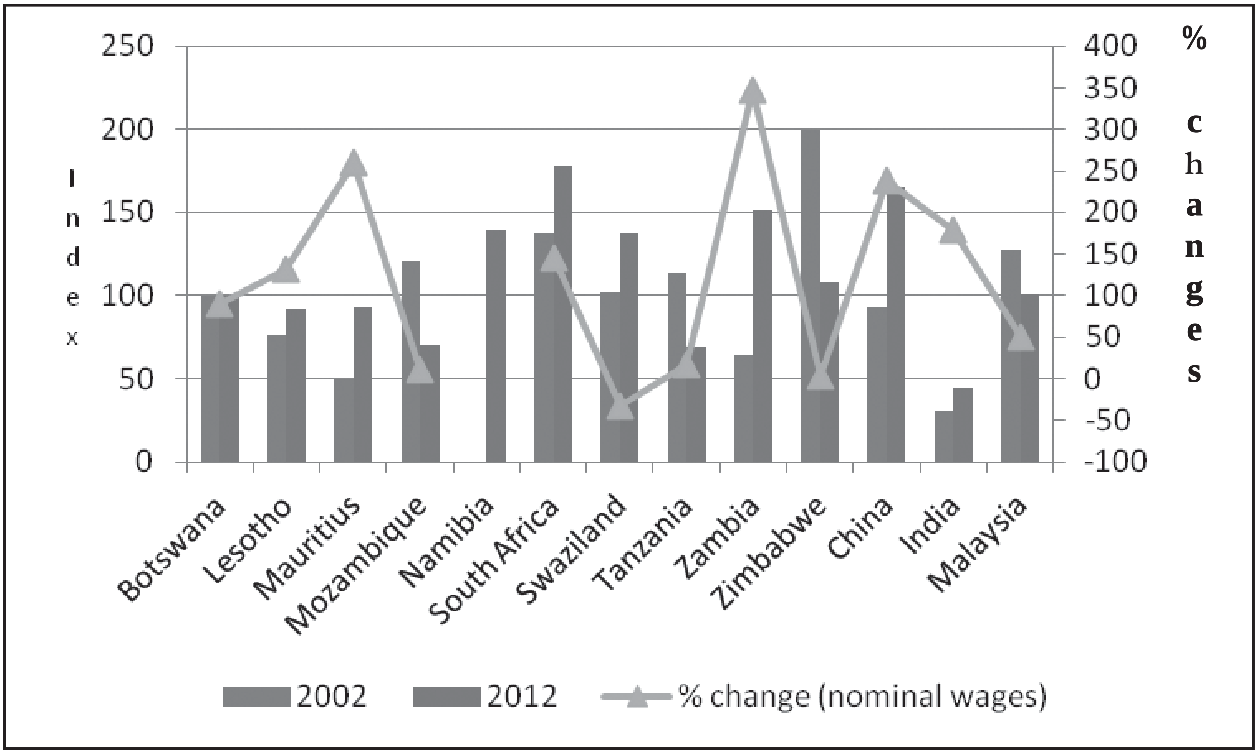
Figure 3: Kitchen porter (hourly, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

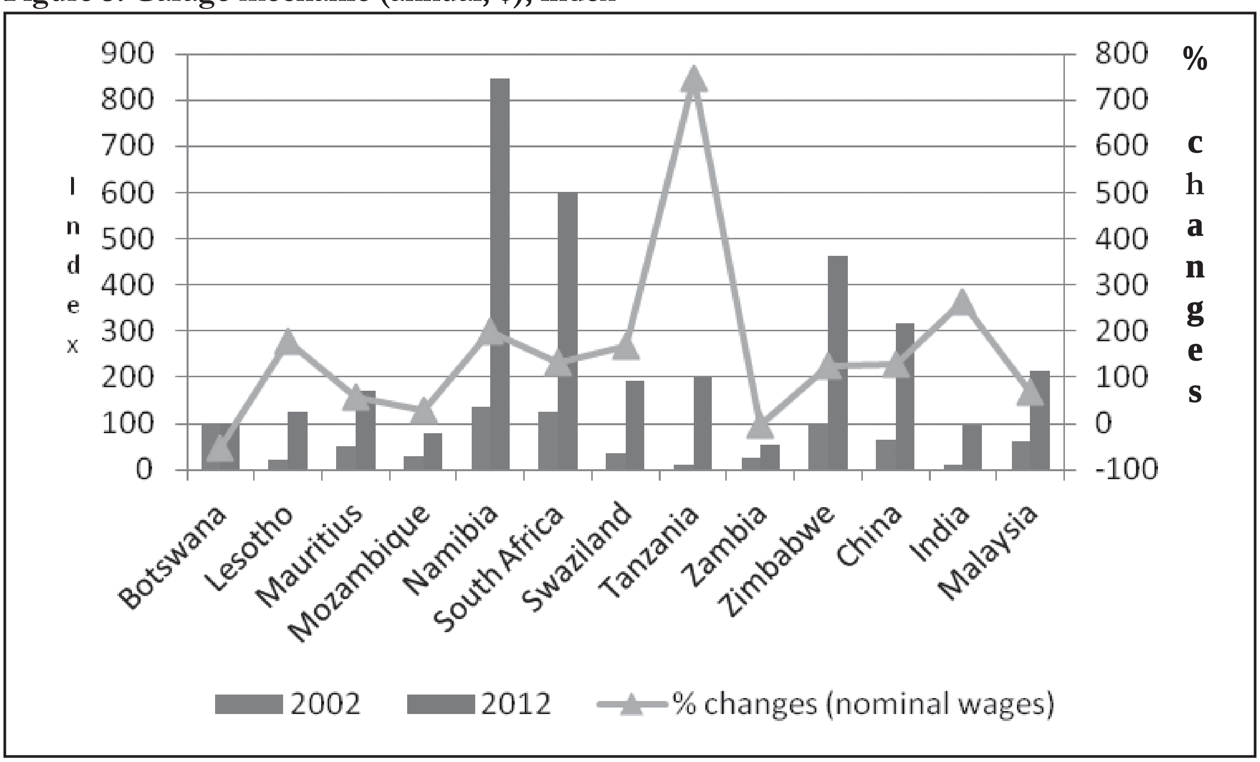
NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 4: Bank clerk or teller (annual, $), index



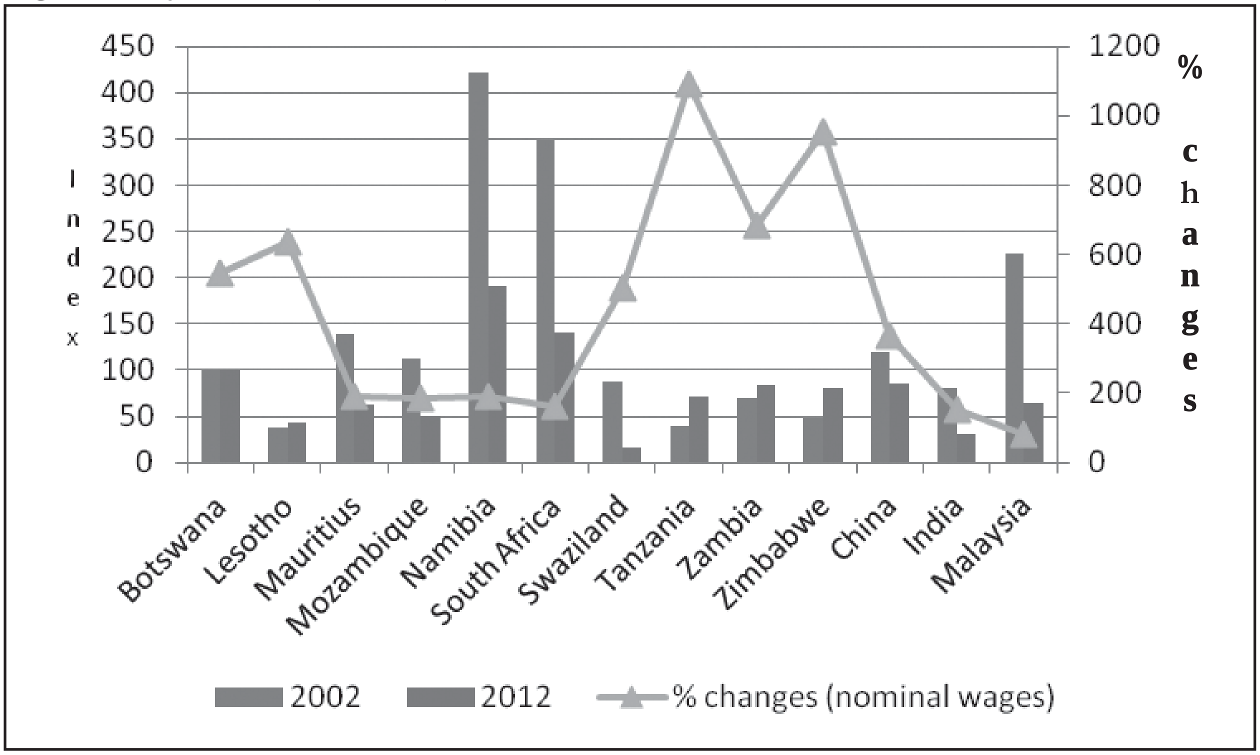
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 5: Garage mechanic (annual, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

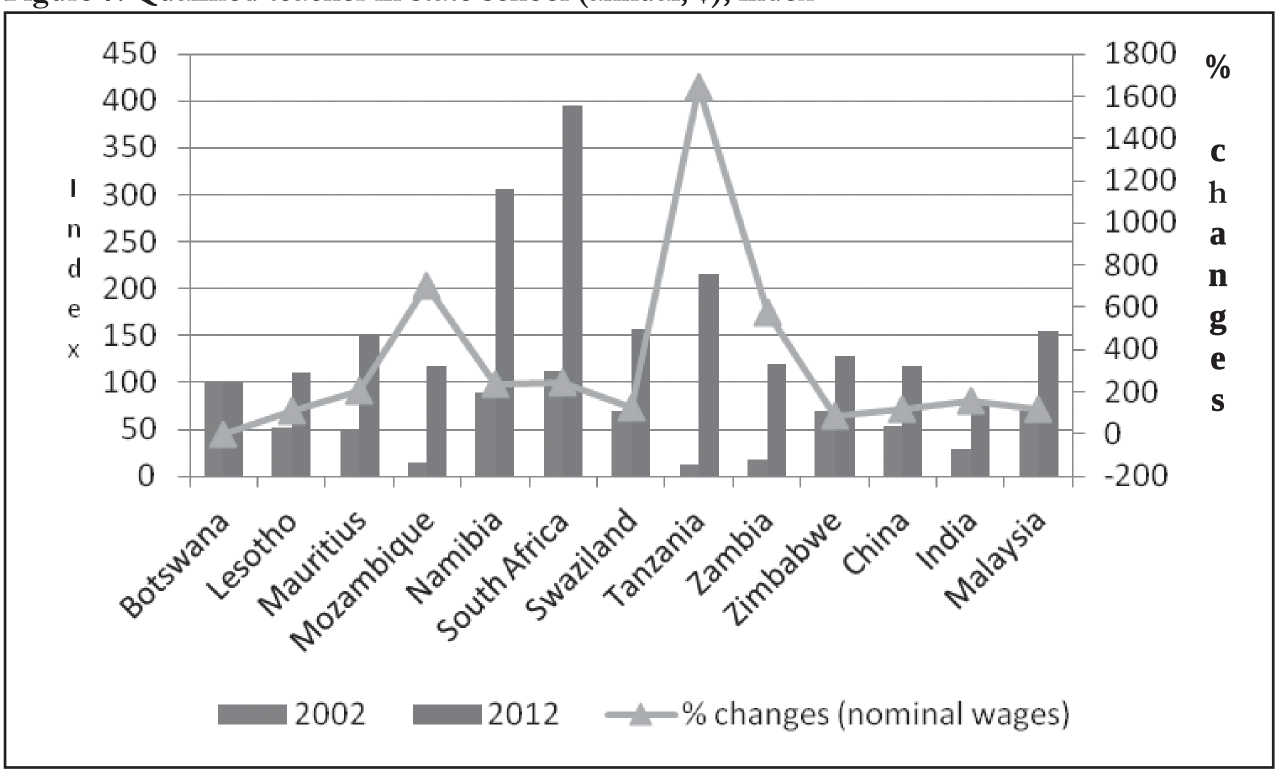
Figure 6: Payroll clerk (annual, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

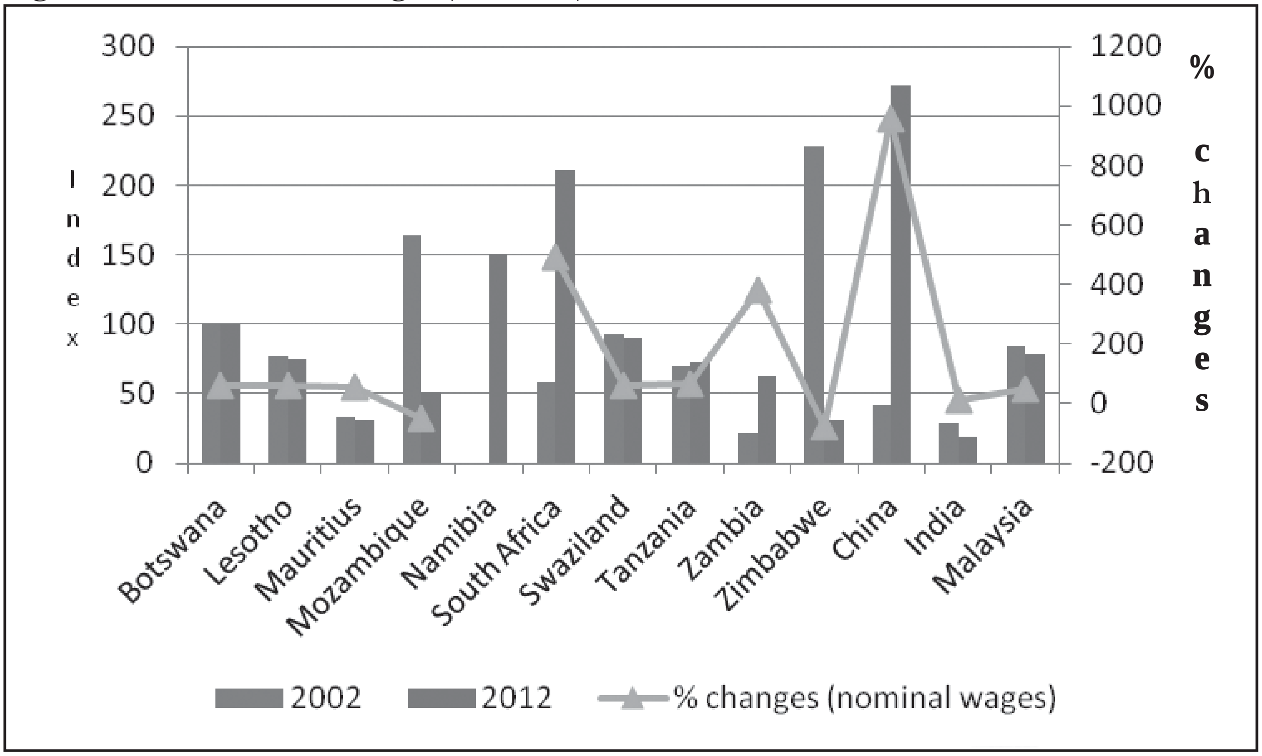
Figure 7: Qualified teacher in state school (annual, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100 and percentage changes between 2002 and 2012.

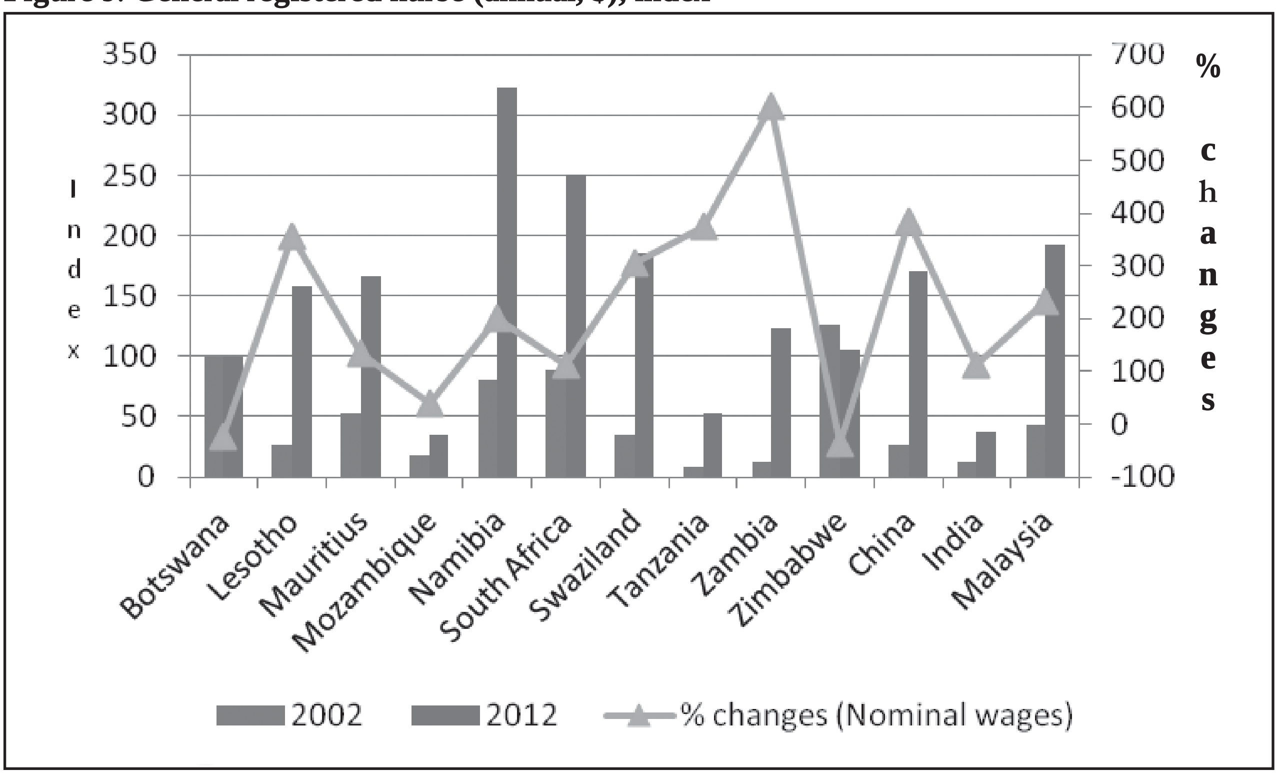
Figure 8: Bank branch manager (annual, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

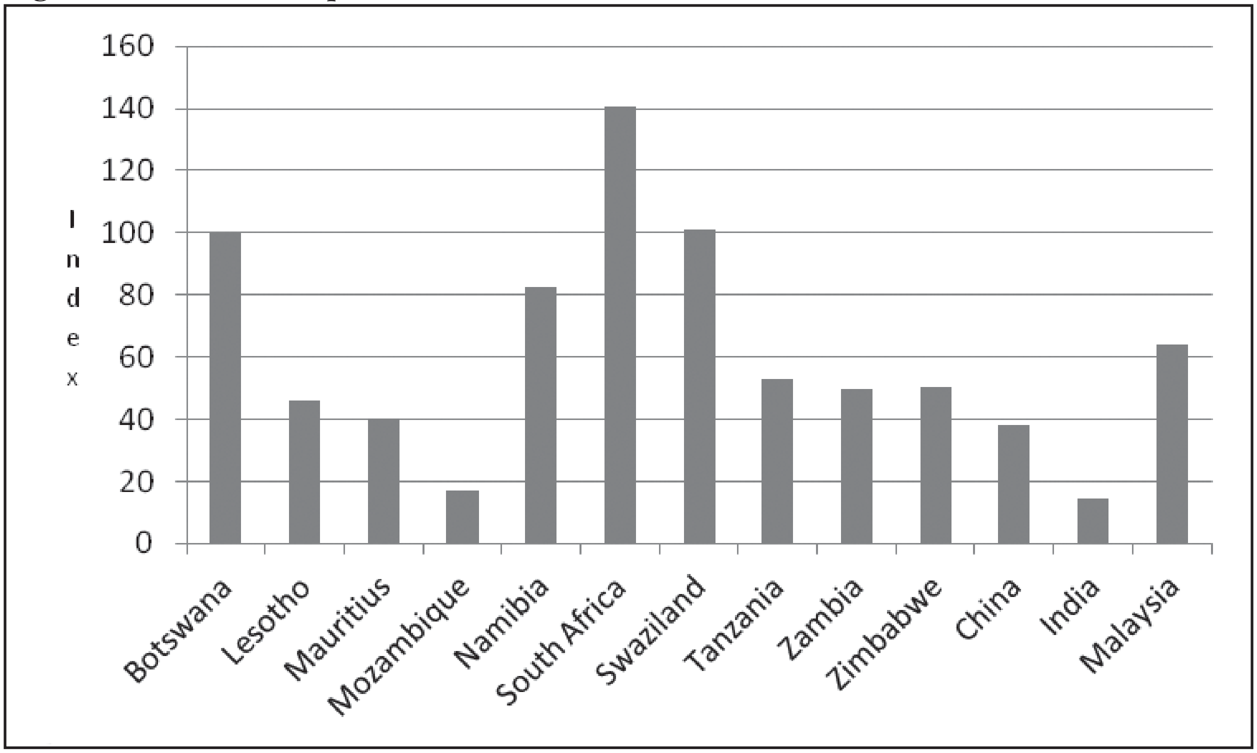
Figure 9: General registered nurse (annual, $), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

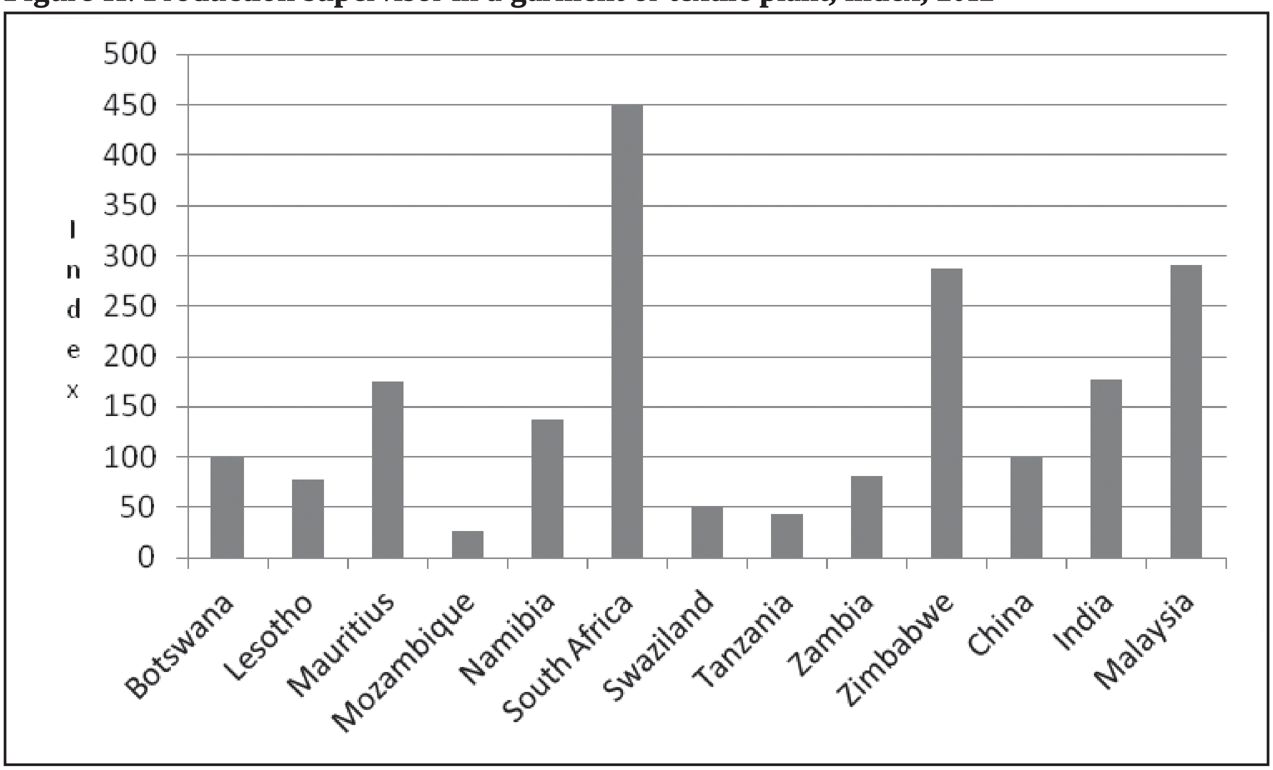
NB: Index of wages; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 10: Accountant, qualified, index, 2012



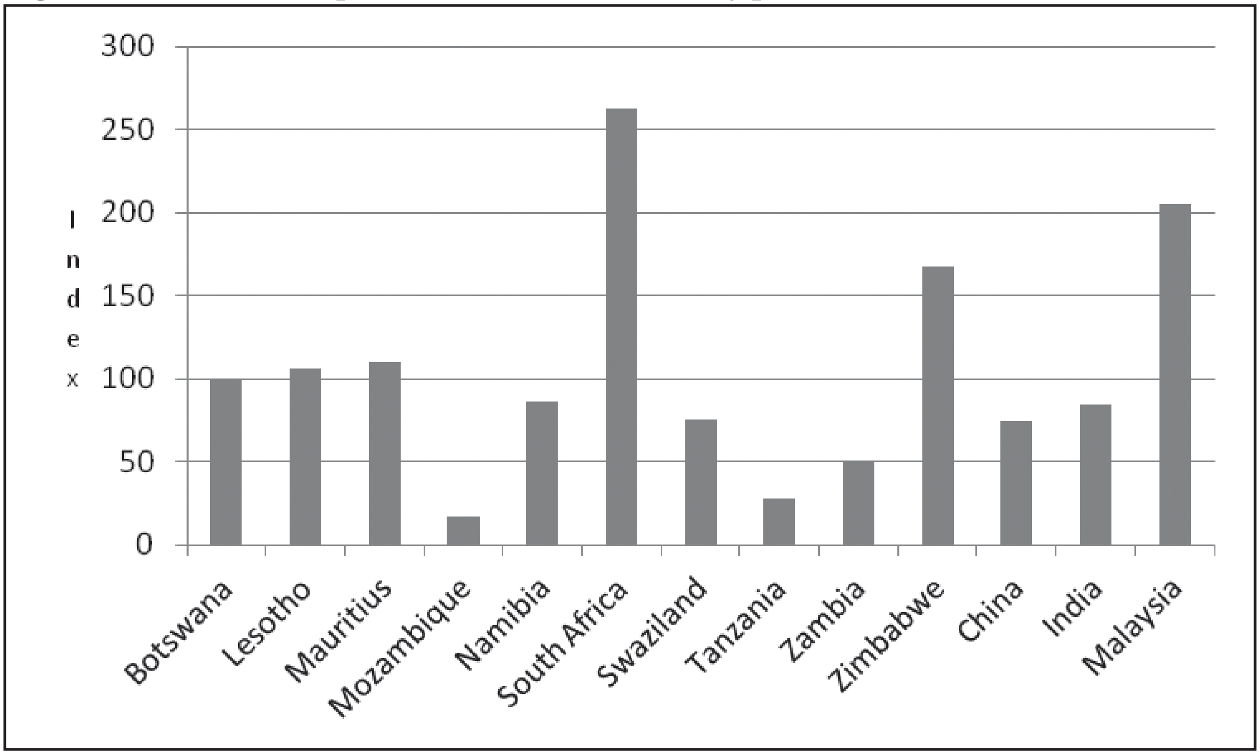
Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index of wages; Botswana equals 100.

Figure 11: Production supervisor in a garment or textile plant, index, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index of wages; Botswana equals 100.

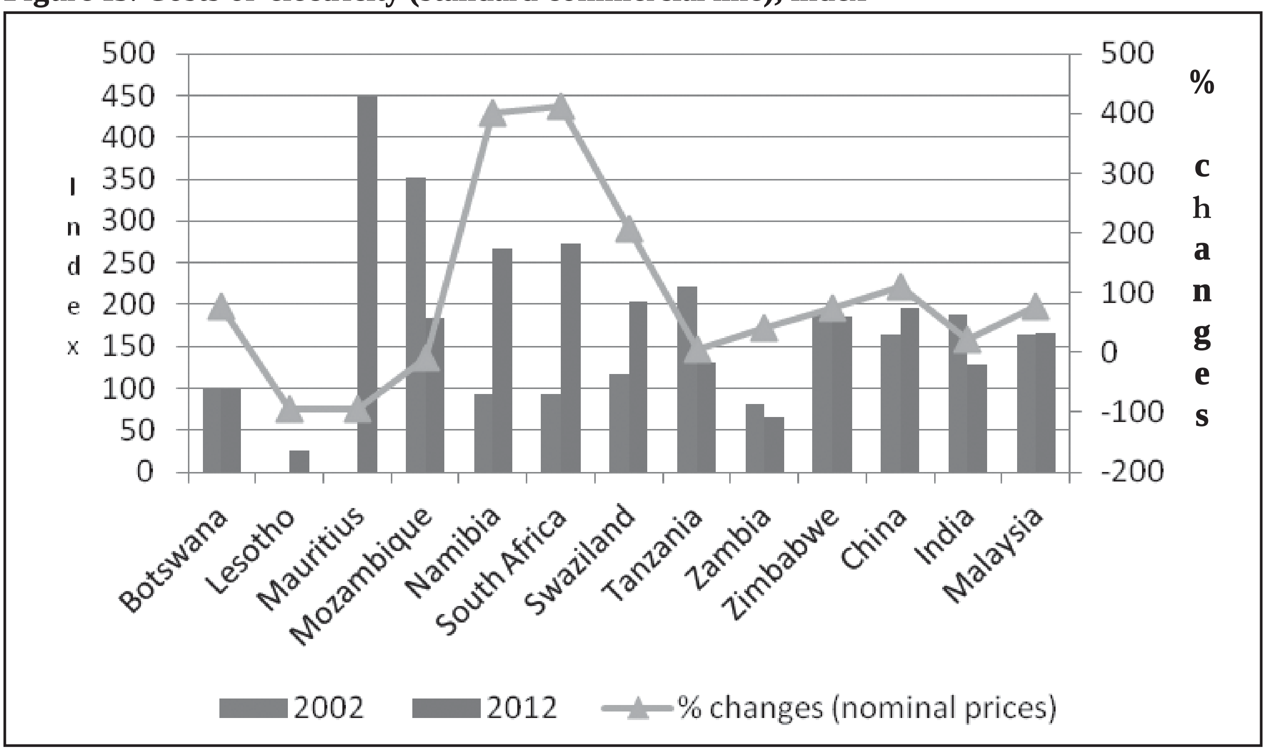
Figure 12: Production supervisor in electrical assembly plant, index, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index of wages; Botswana equals 100.

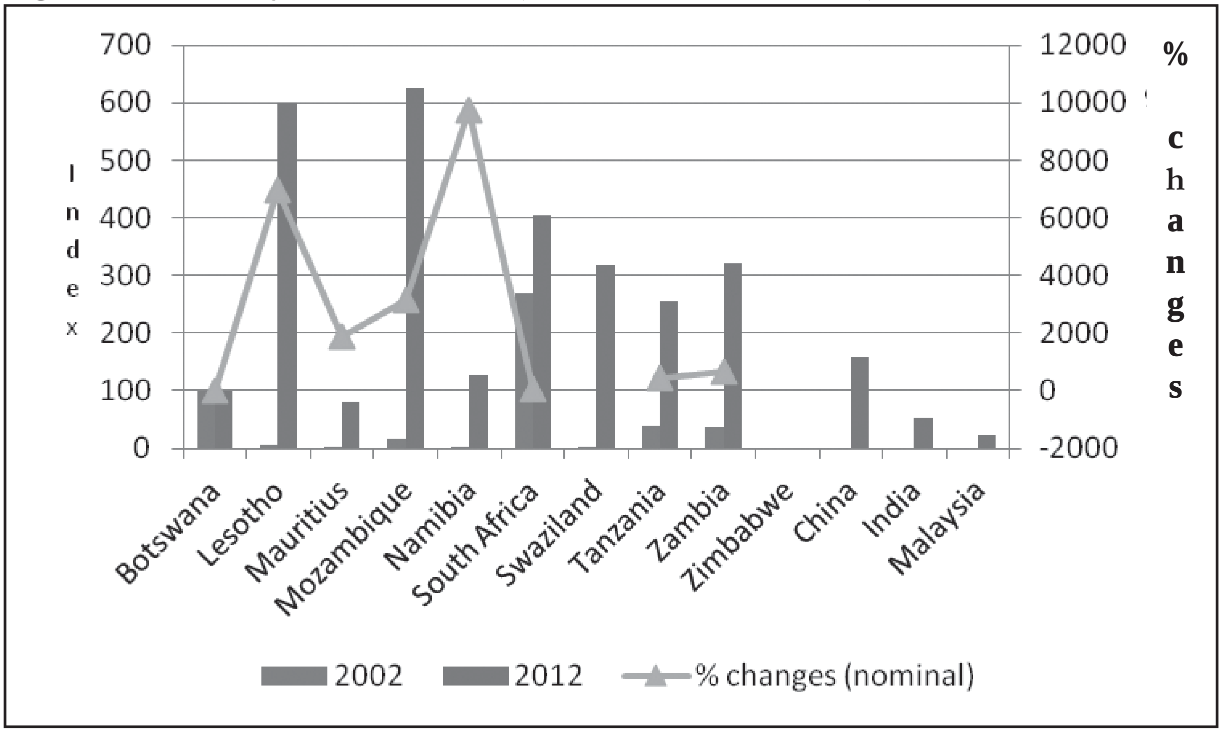
Figure 13: Costs of electricity (standard commercial line), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012. The 2002 values for Lesotho and Mauritius were not included in the graph.

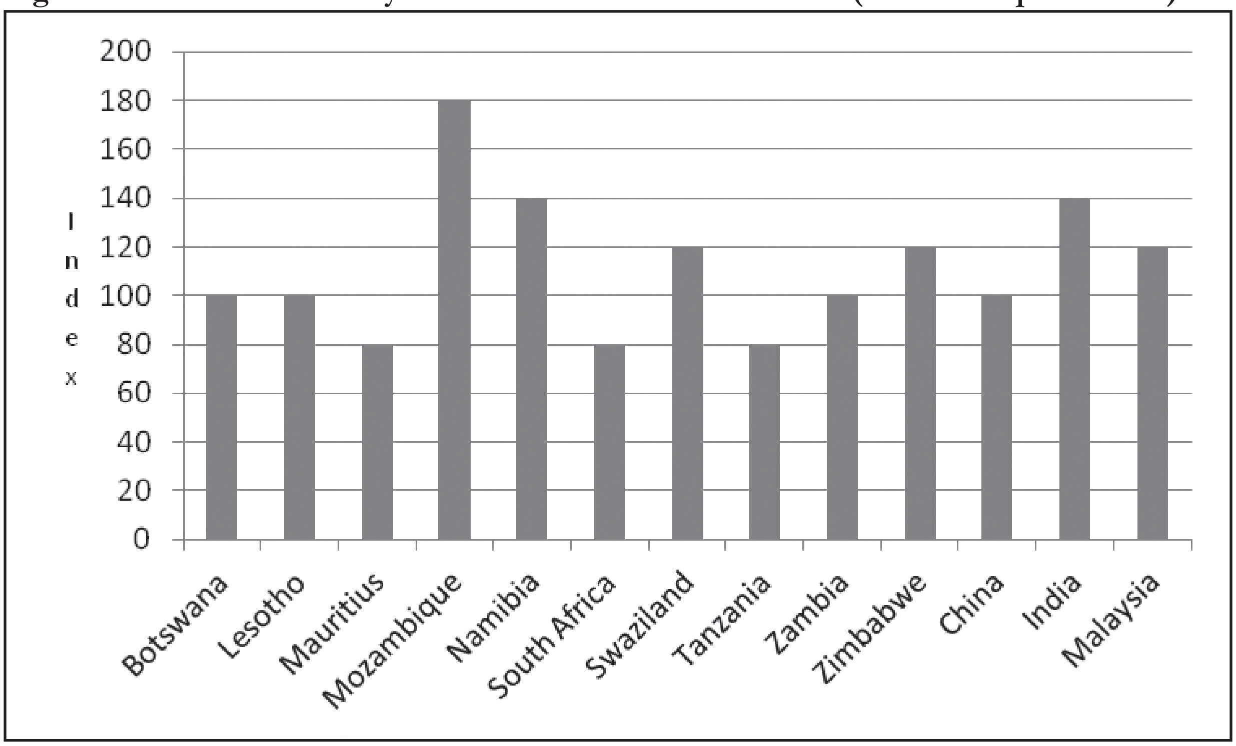
Figure 14: Electricity connection fees (standard commercial line), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012. Index for Zimbabwe was 1298 and it was not included in the figure and the 5 changes for Swaziland was 22043 and was not included in the figure because it is too big.

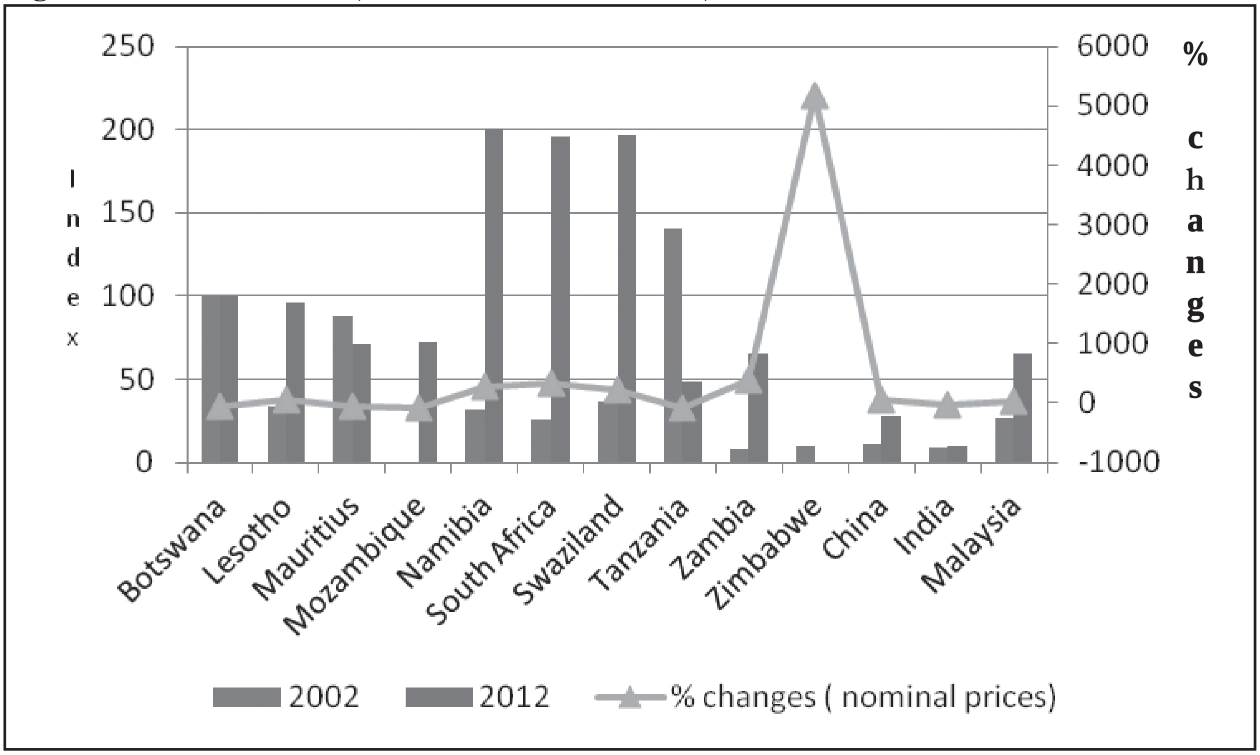
Figure 15: Is a new electricity connection available on demand (number of procedures)



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and percentage changes between 2002 and 2012.

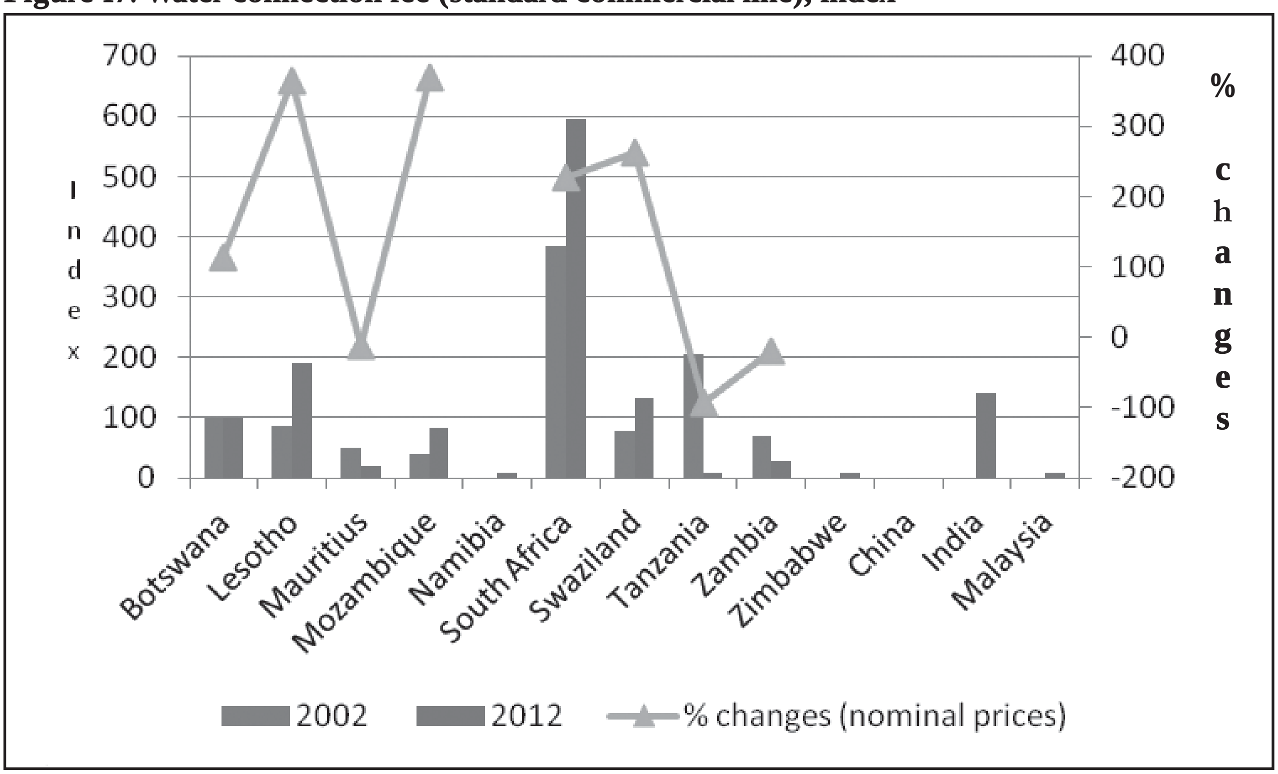
Figure 16: Costs of water (standard commercial line), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012. The indexes for Mozambique 2002 and Zimbabwe 2012 were 700 and 900 respectively and were not included in the graph.

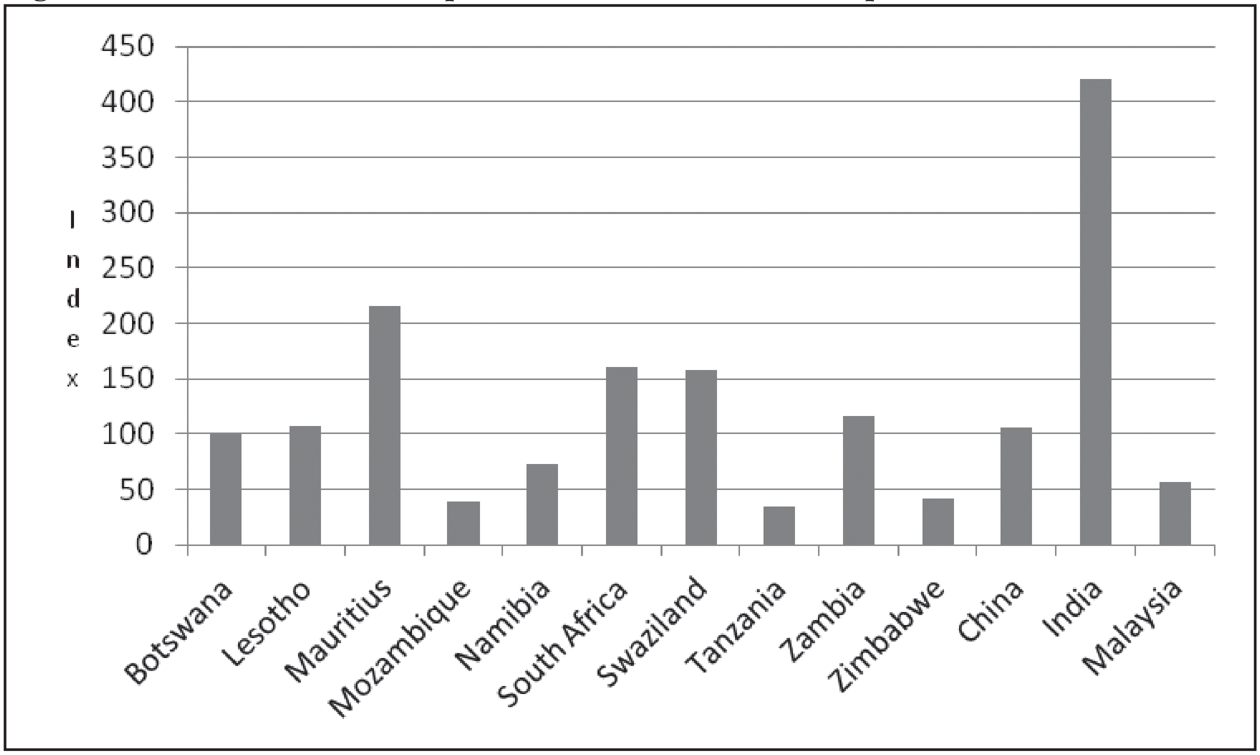
Figure 17: Water connection fee (standard commercial line), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

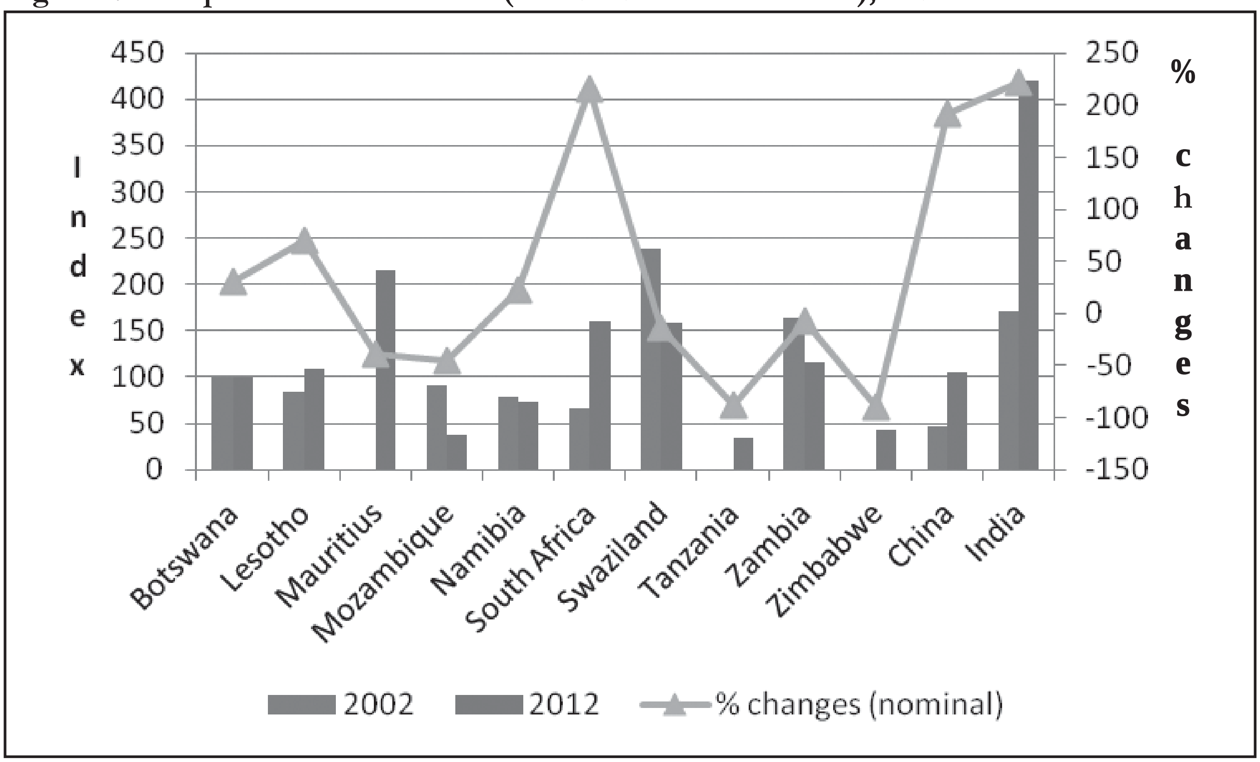
Figure 18: Cost of a commercial phone line at the standard rate per month



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100.

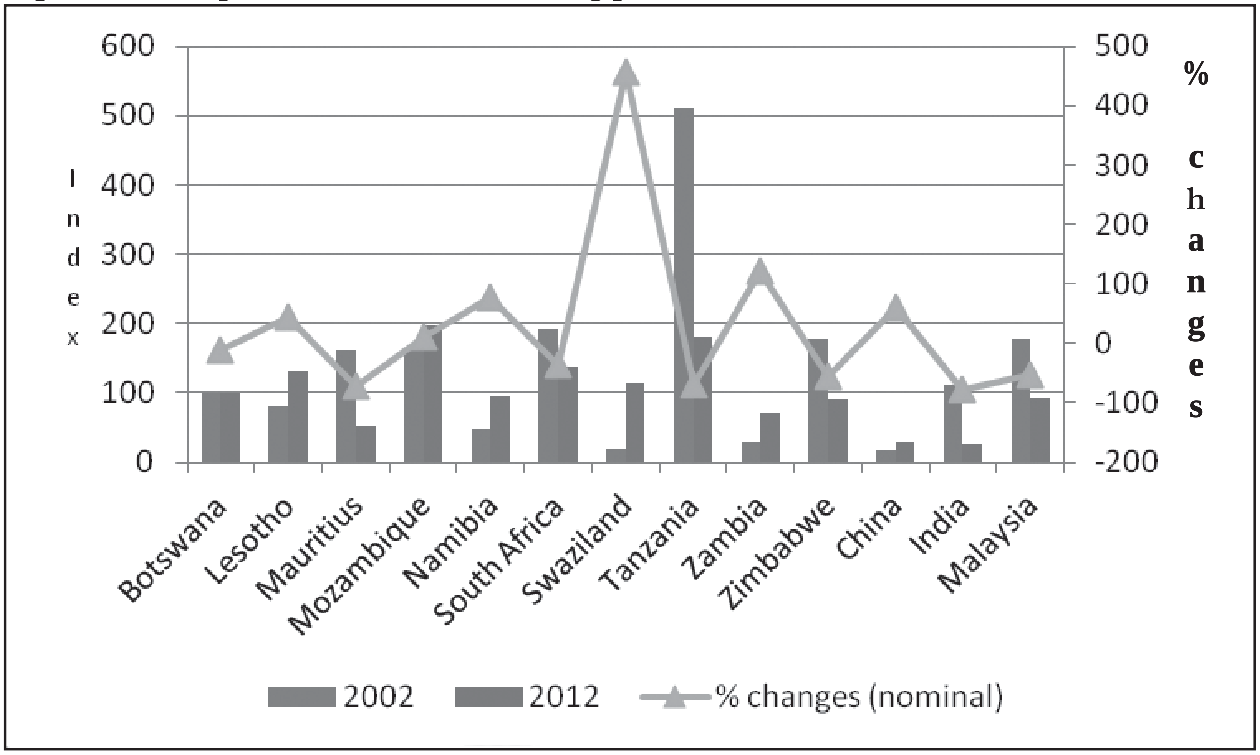
Figure 19: Telephone installation fee (standard commercial line), index



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012. Indexes for Tanzania, Mauritius and Zimbabwe for 2002 were not included in the graph.

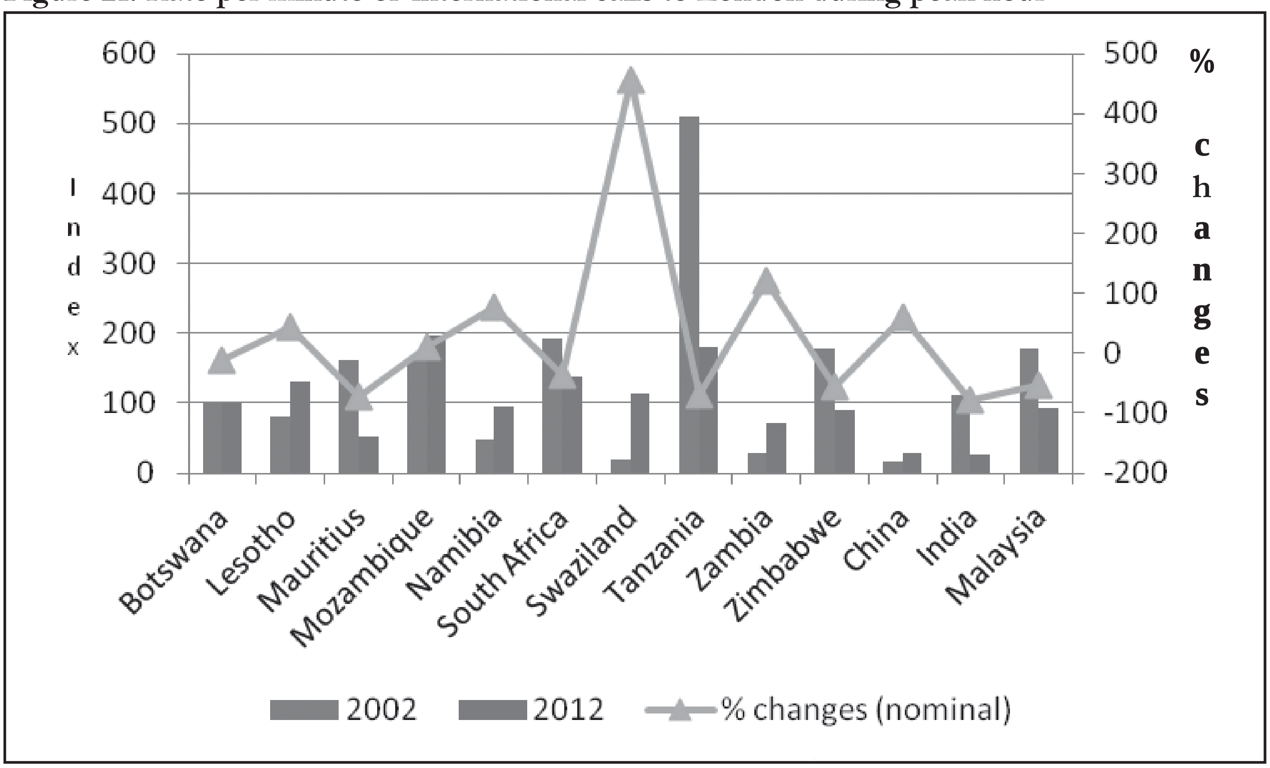
Figure 20: Rate per minute local calls during peak hour



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

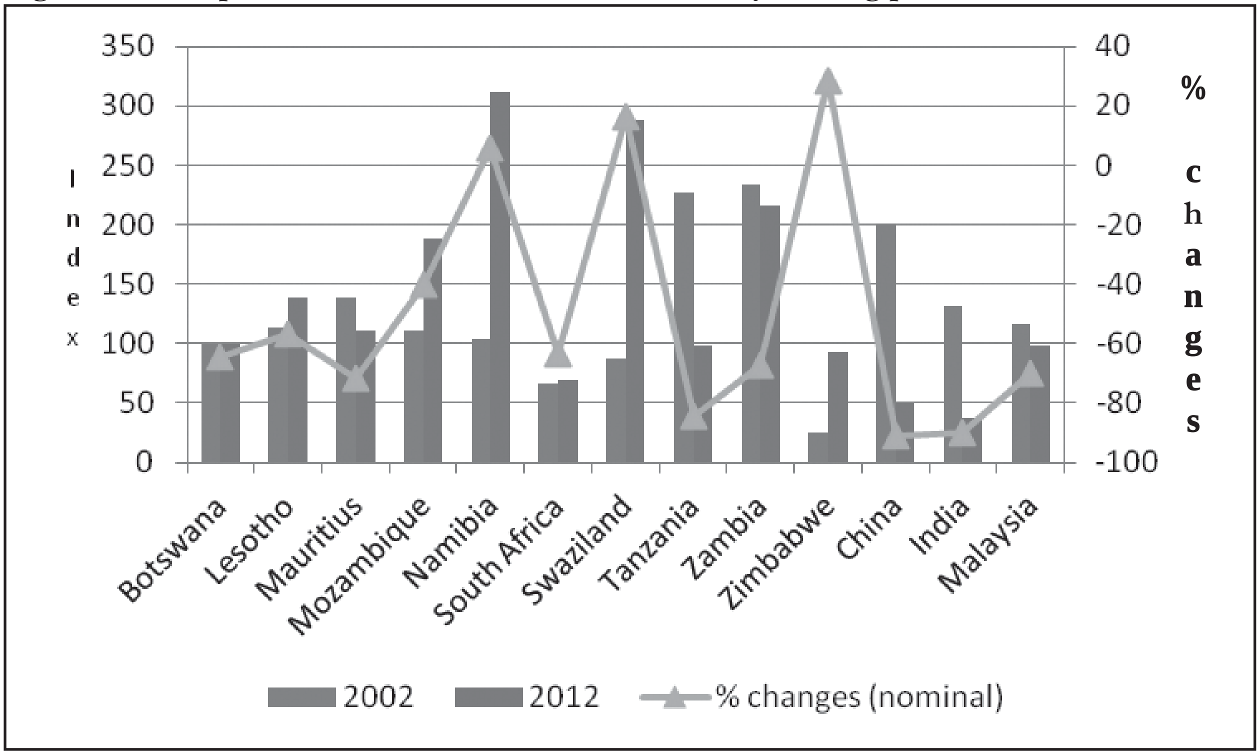
Figure 21: Rate per minute of international calls to London during peak hour



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

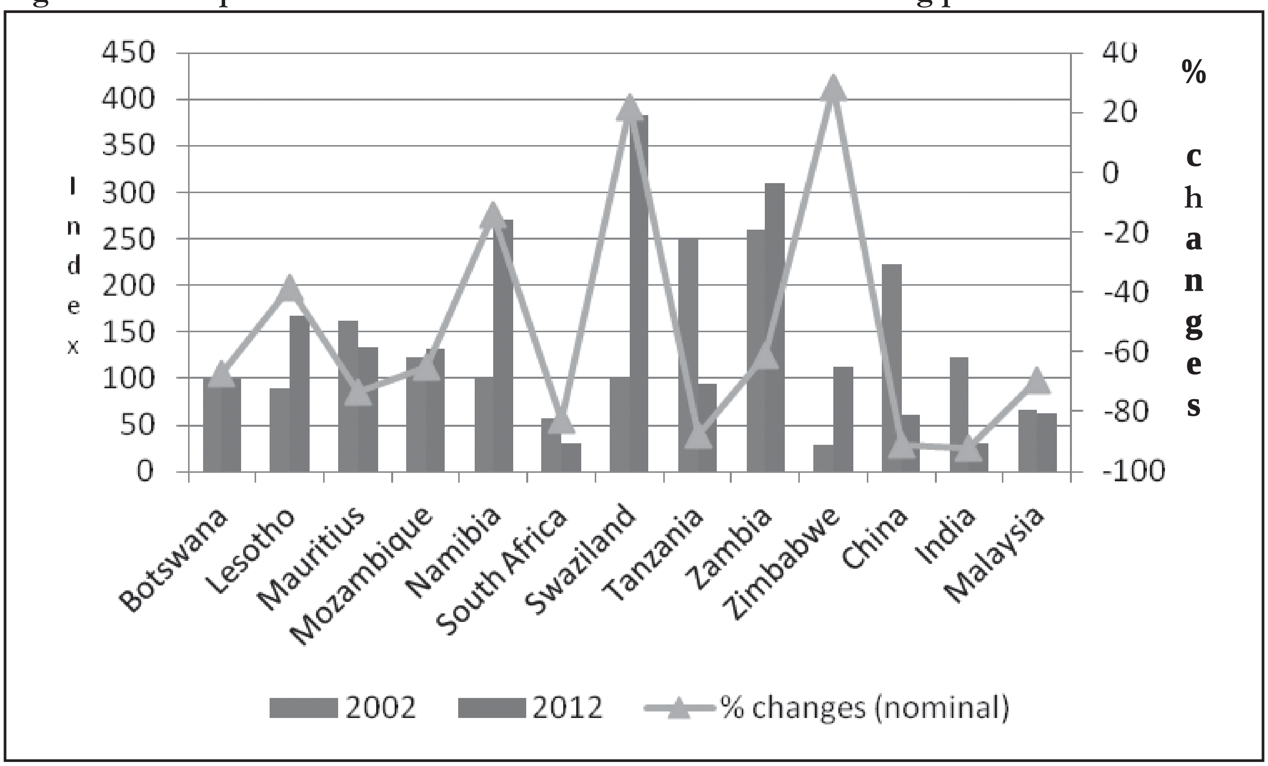
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 22: Rate per minute of international calls to Tokyo during peak hour



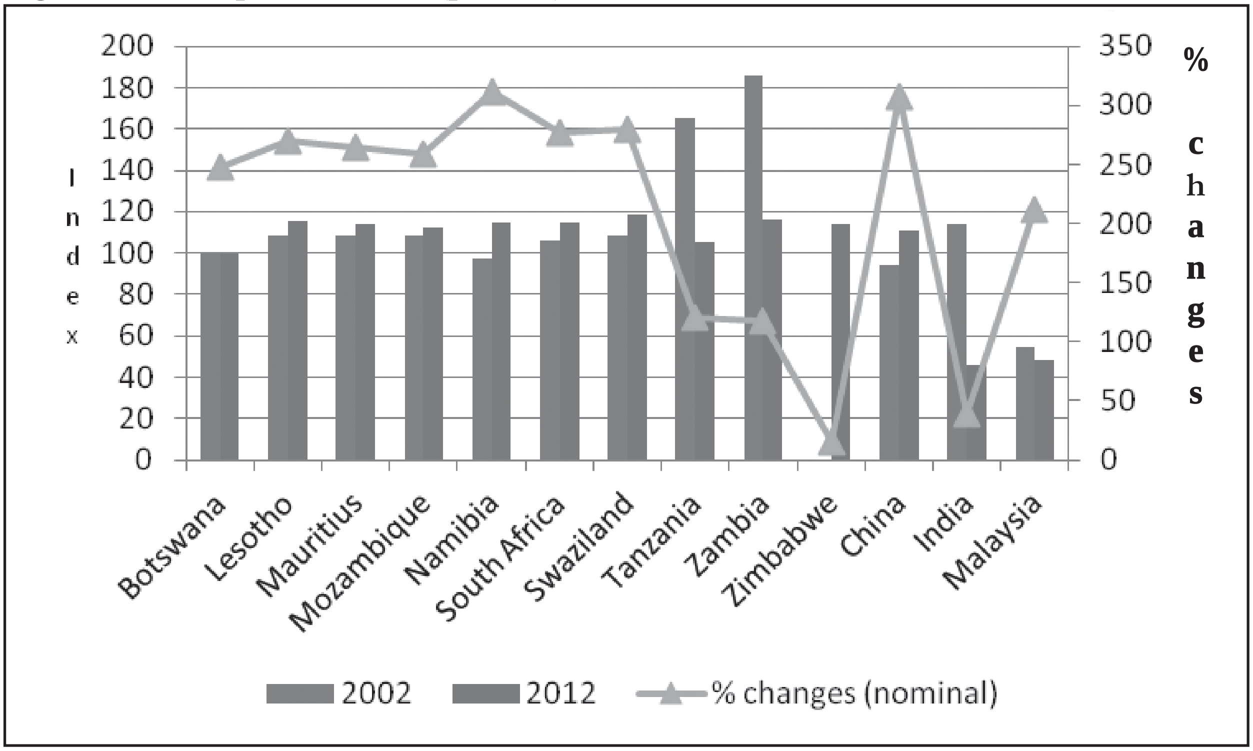
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 23: Rate per minute of international calls to New York during peak hour



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

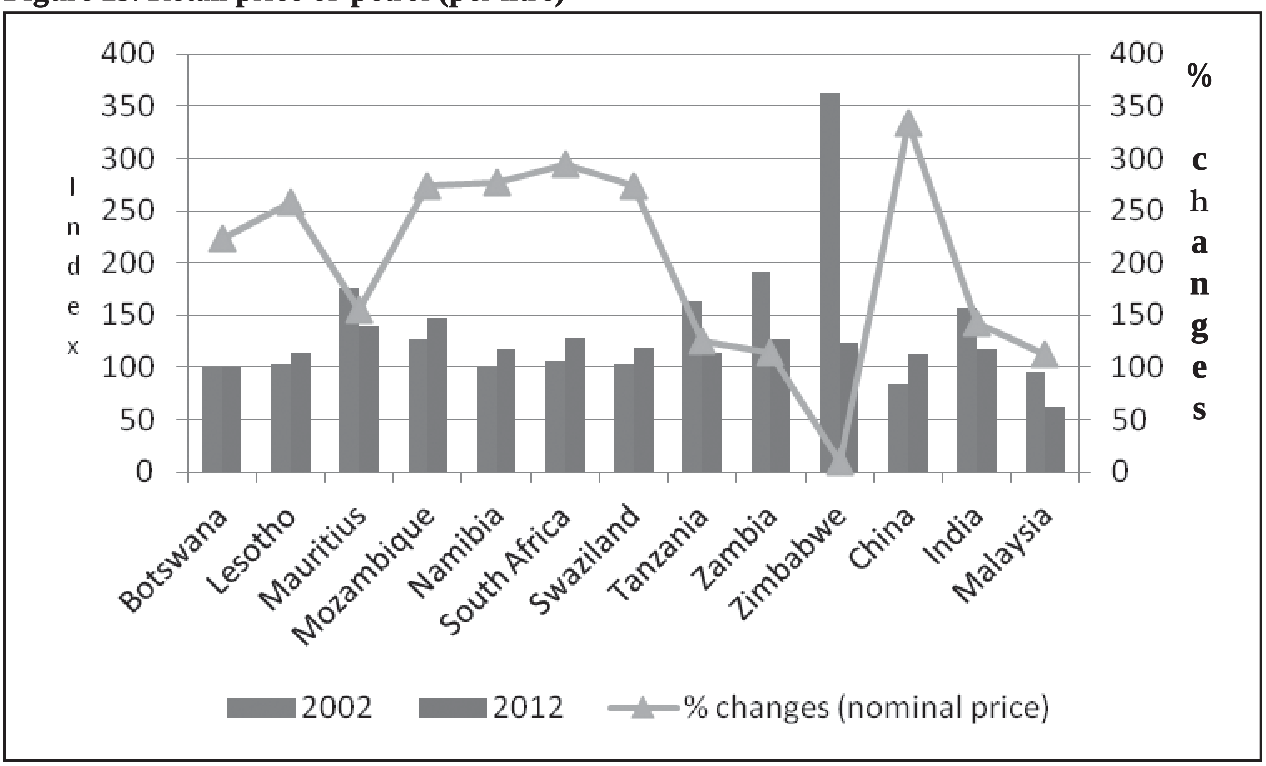
Figure 24: Retail price of diesel (per litre)



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012. The 2002 index for Zimbabwe was not included in the graph.

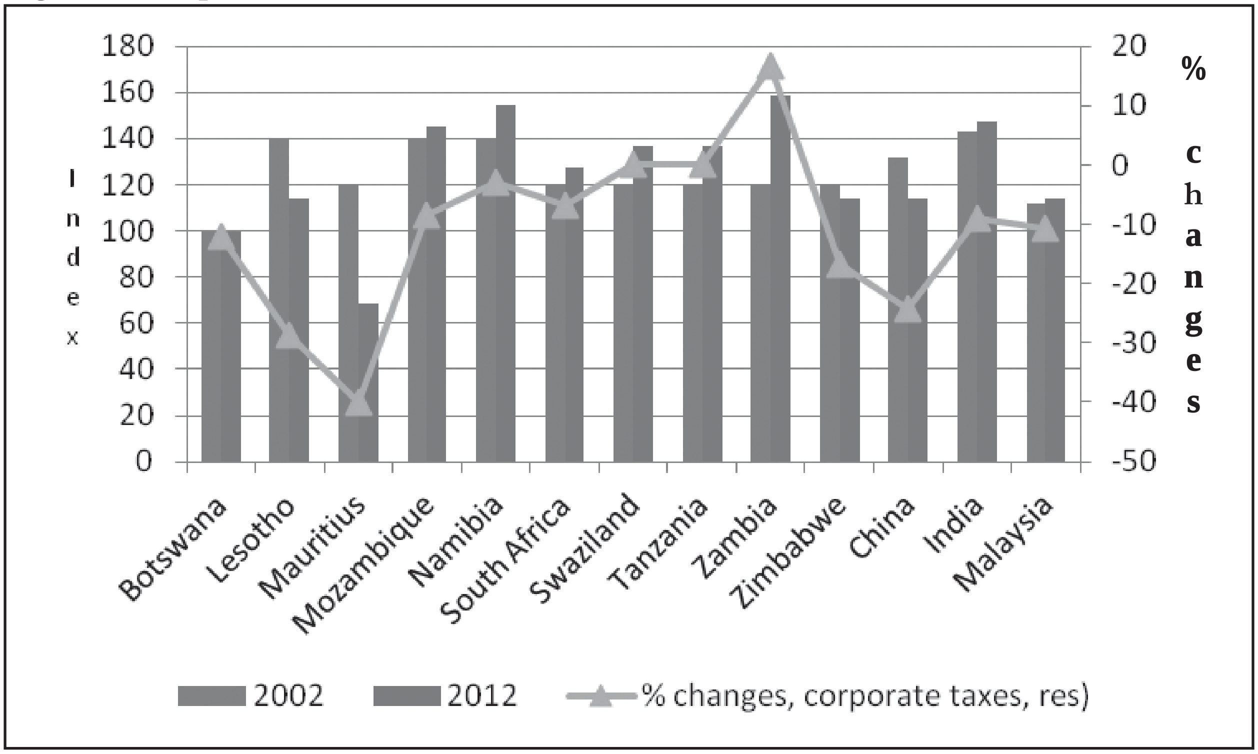
Figure 25: Retail price of petrol (per litre)



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

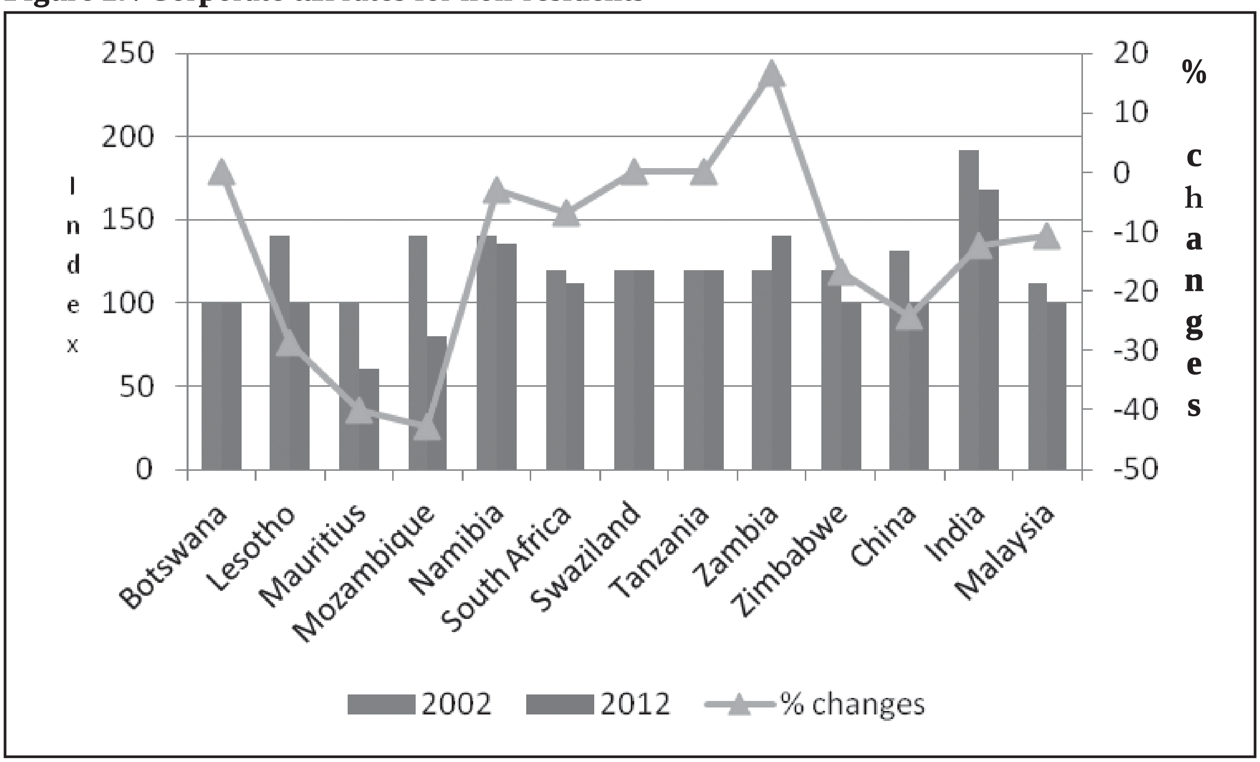
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 26: Corporate tax rates for residents



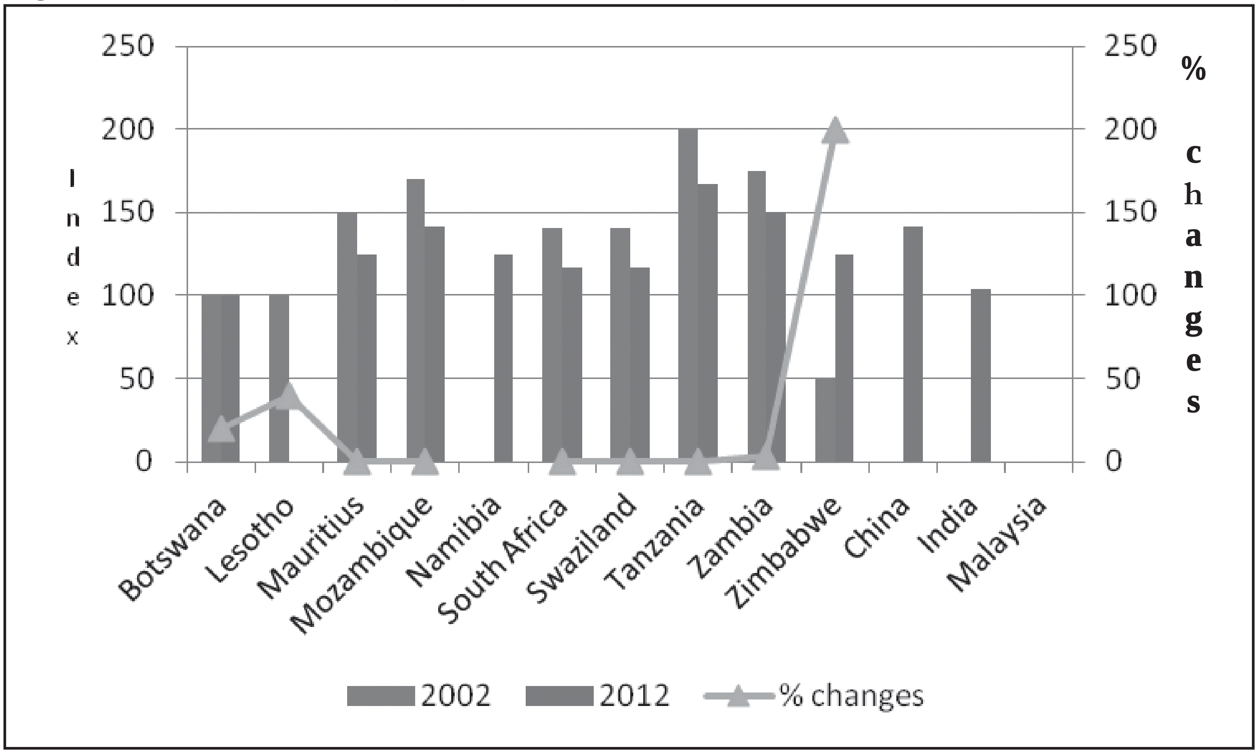
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 27: Corporate tax rates for non-residents



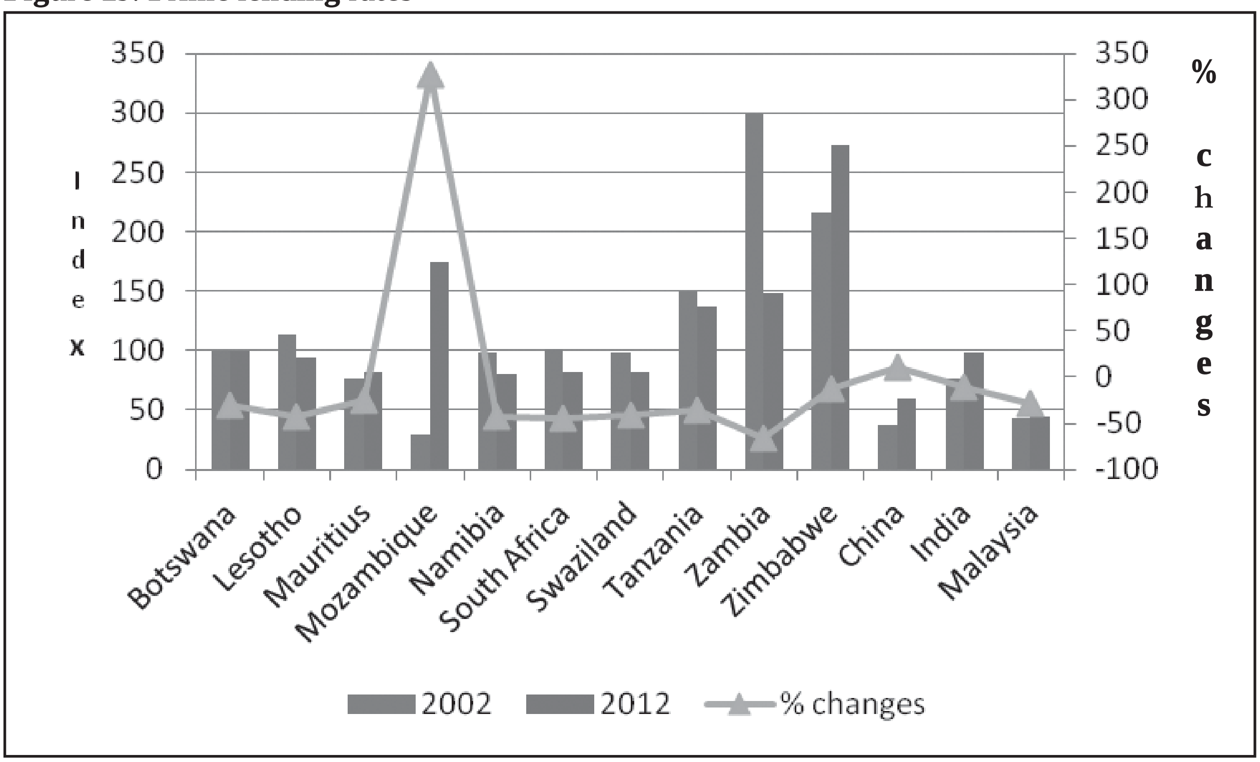
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 28: Value Added Tax (VAT) or sales tax



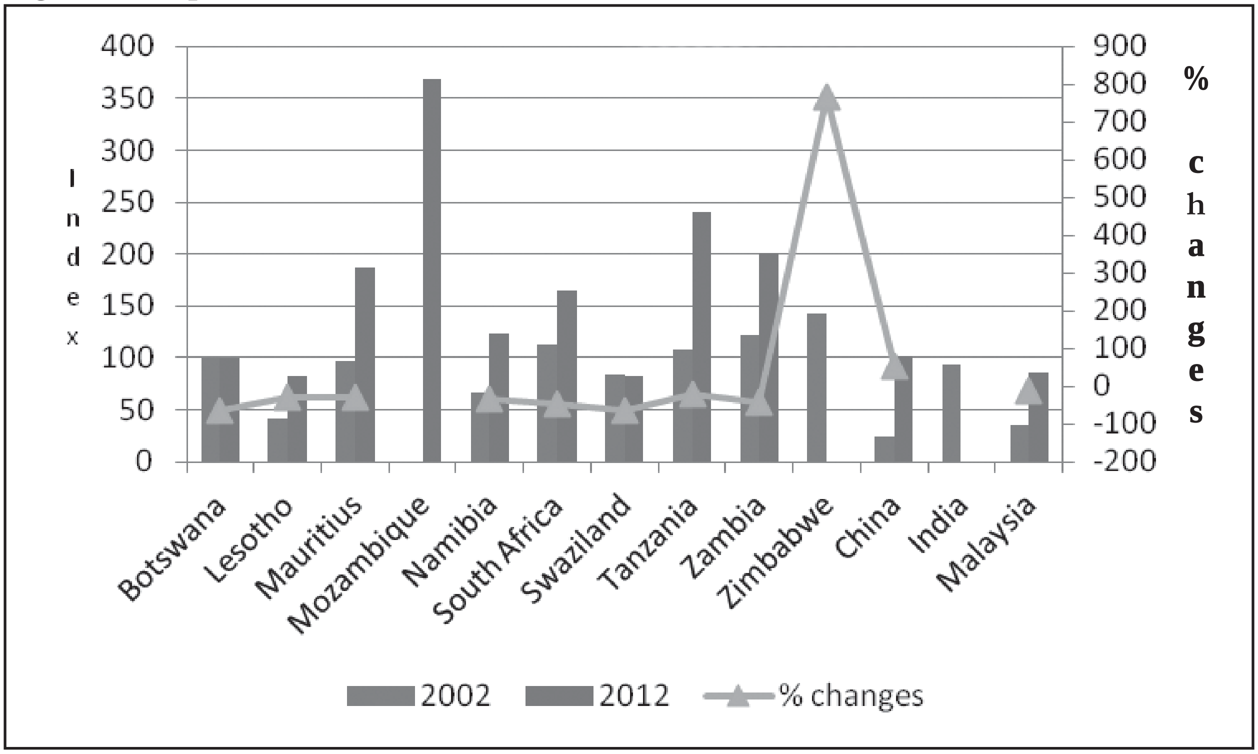
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 29: Prime lending rates



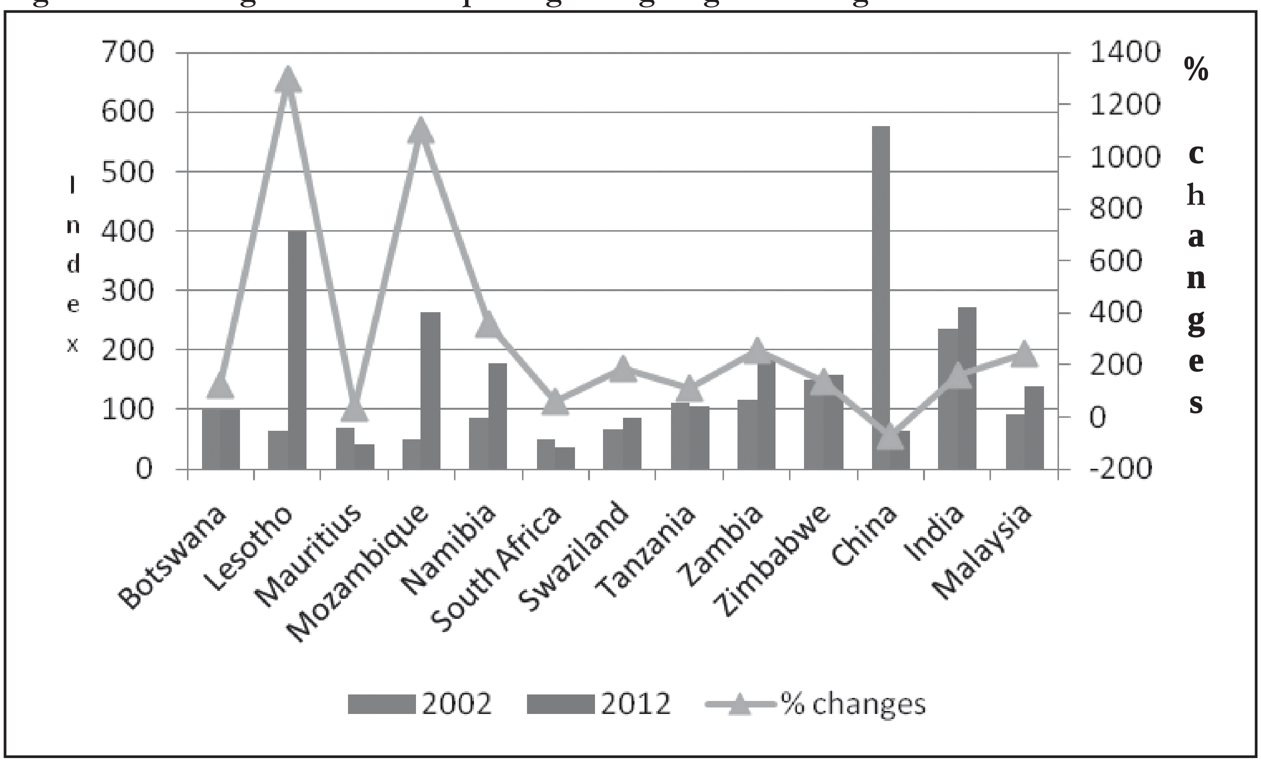
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 30: Deposit rate



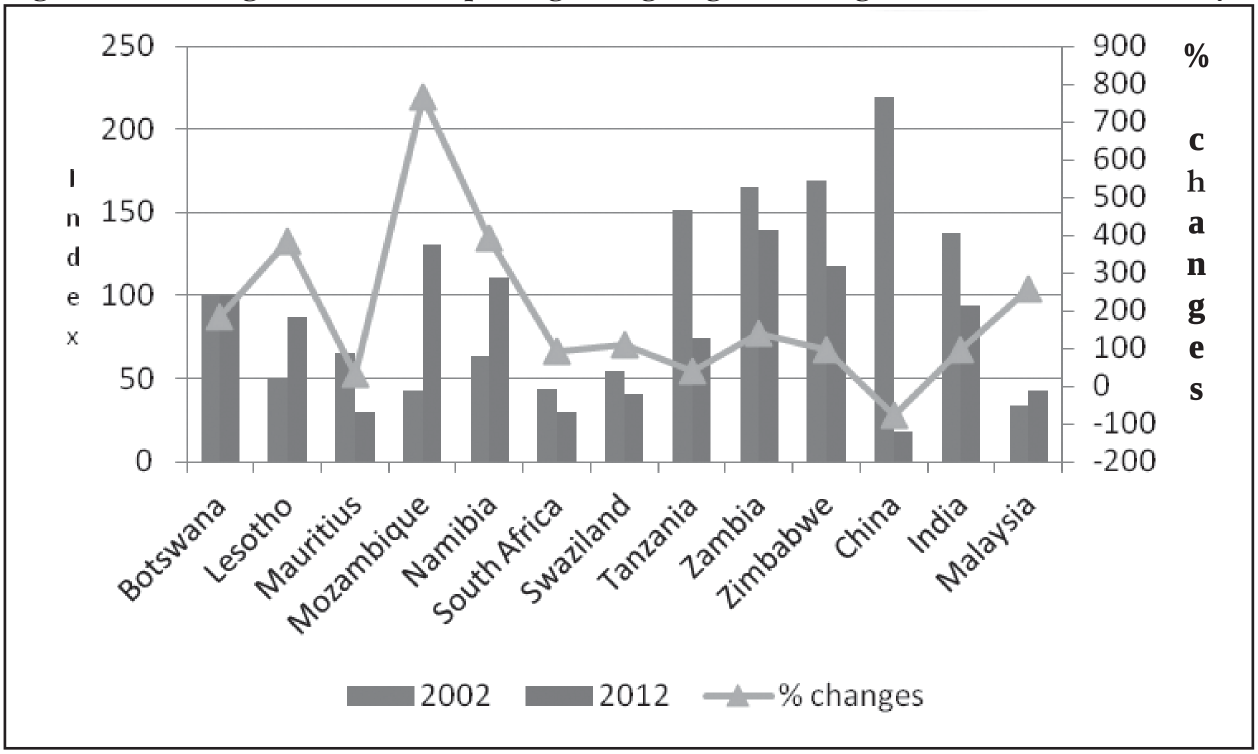
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 31: Air freight cost of transporting 100 kg of general cargo from destination to London



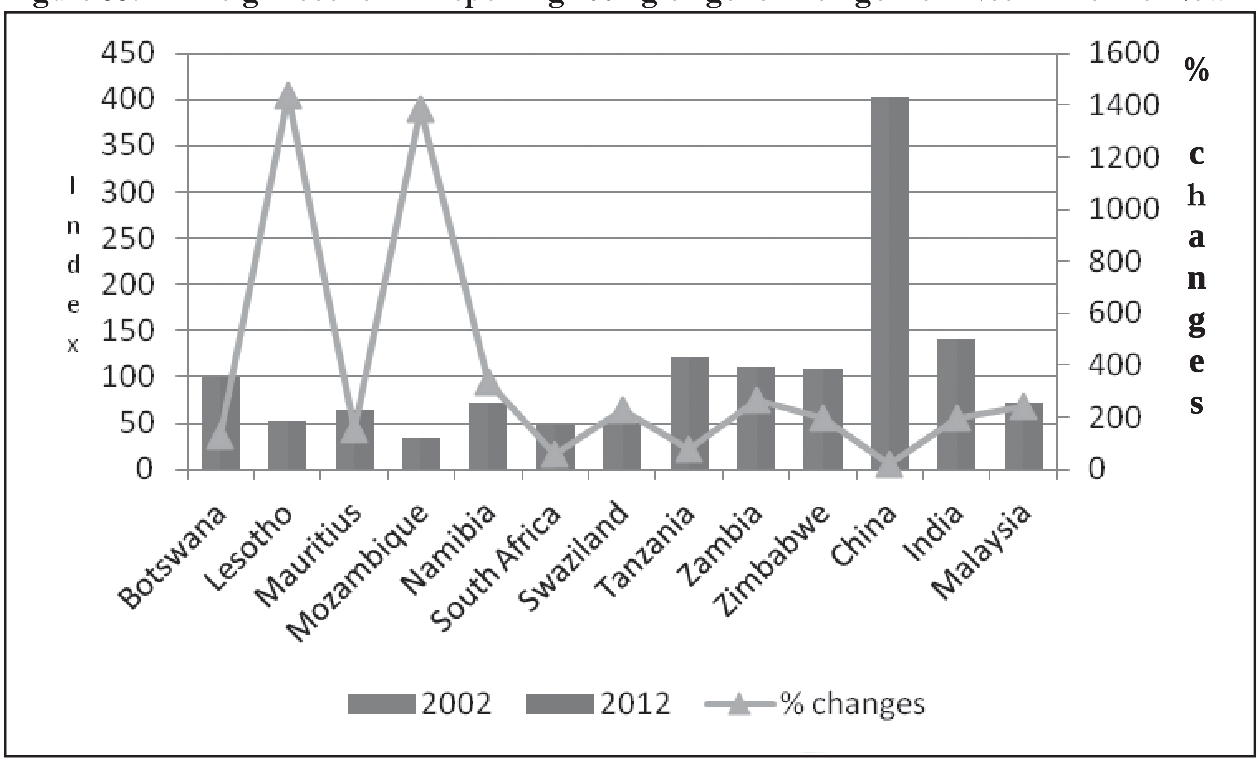
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 32: Air freight cost of transporting 100 kg of general cargo from destination to Tokyo



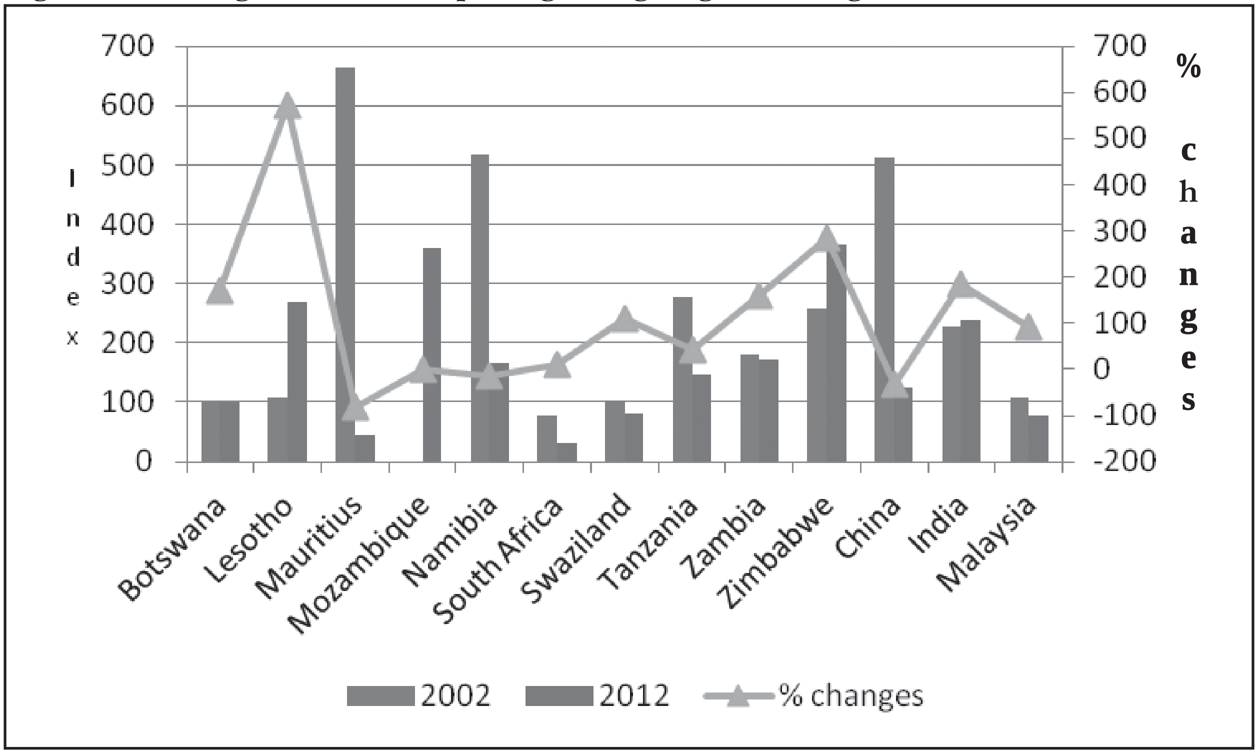
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 33: Air freight cost of transporting 100 kg of general cargo from destination to New York



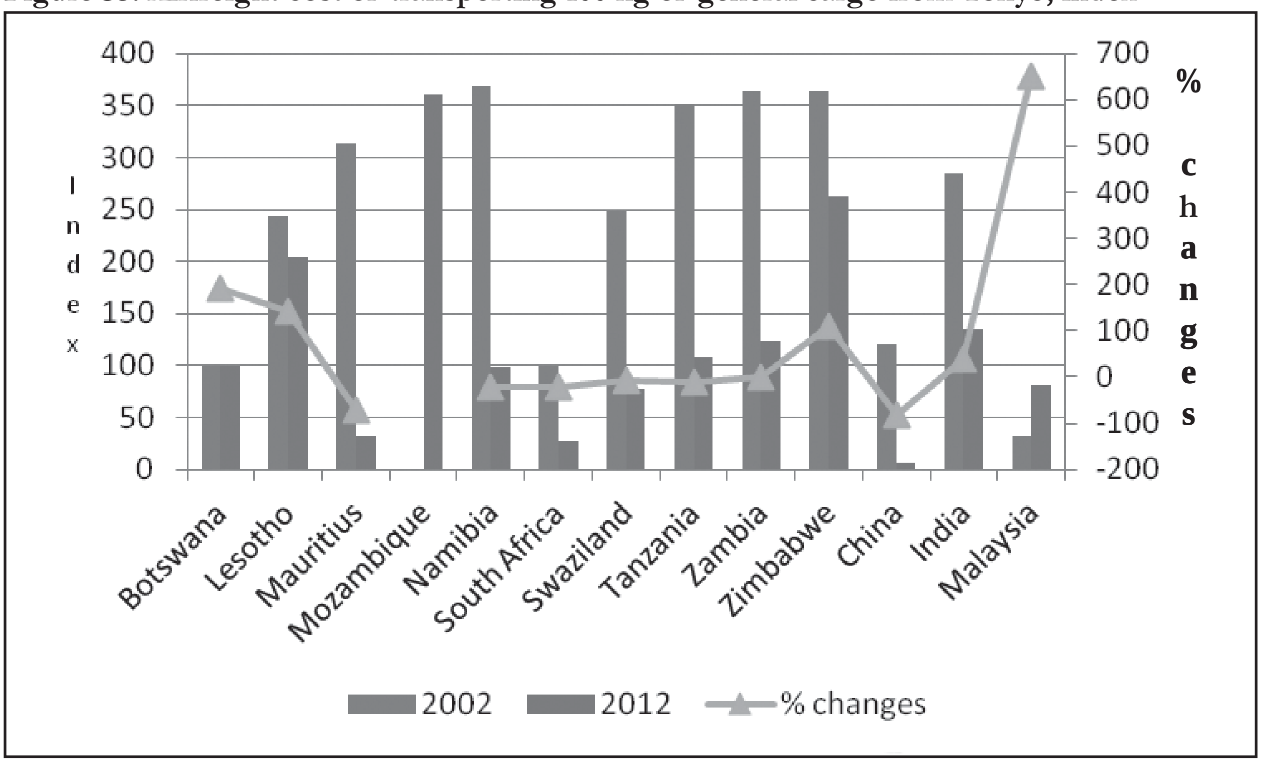
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index; Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 34: Airfreight cost of transporting 100 kg of general cargo from London, index



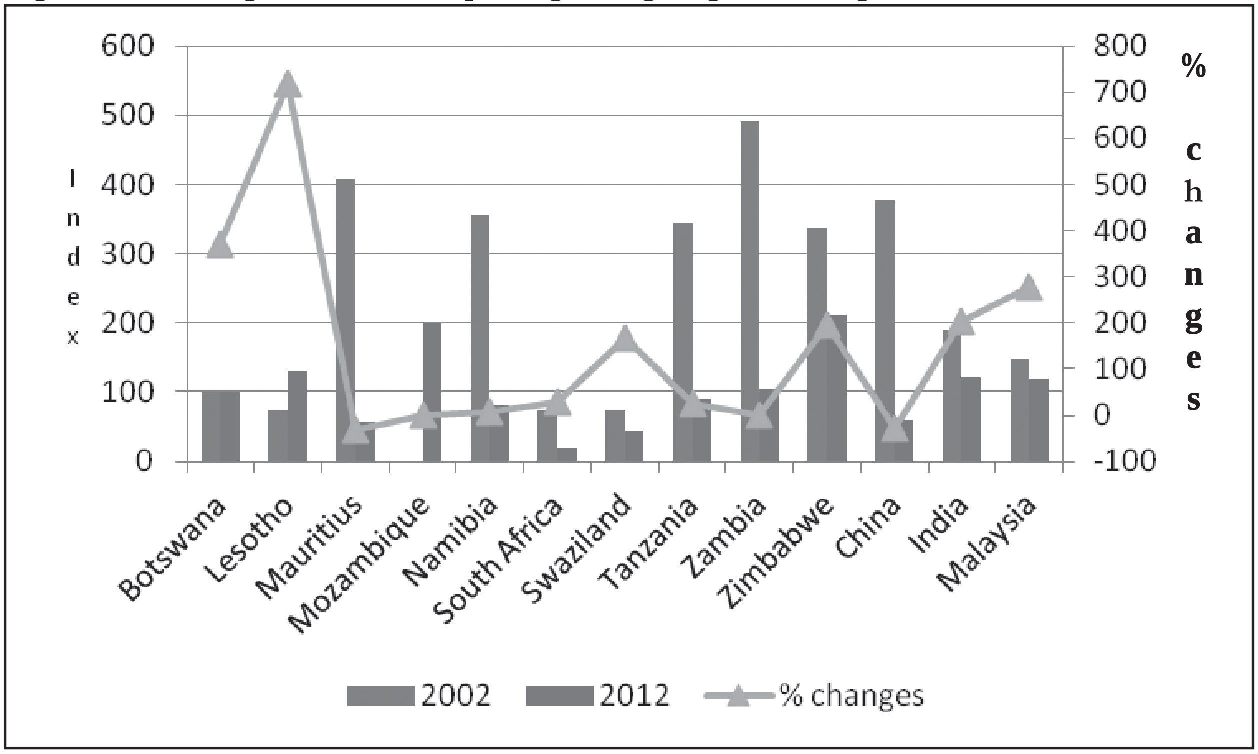
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 35: Airfreight cost of transporting 100 kg of general cargo from Tokyo, index



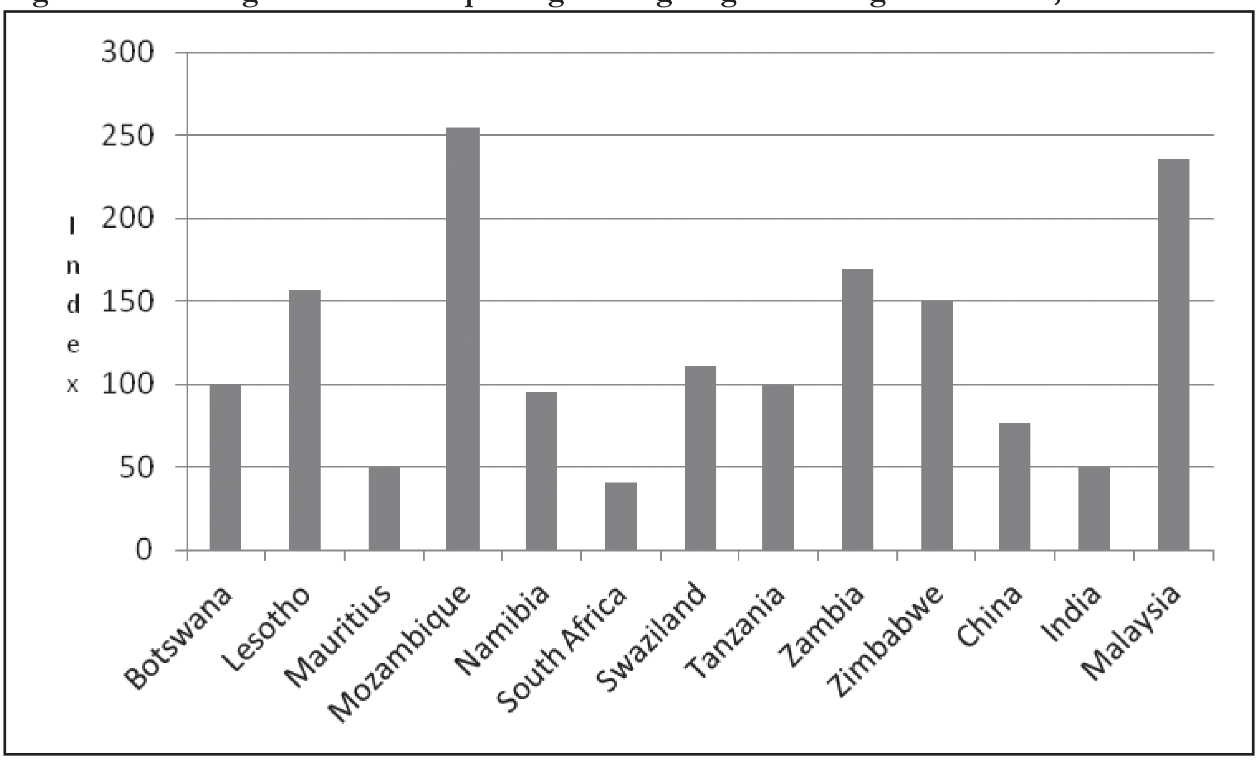
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 36: Air freight cost of transporting 100 kg of general cargo from New York, index



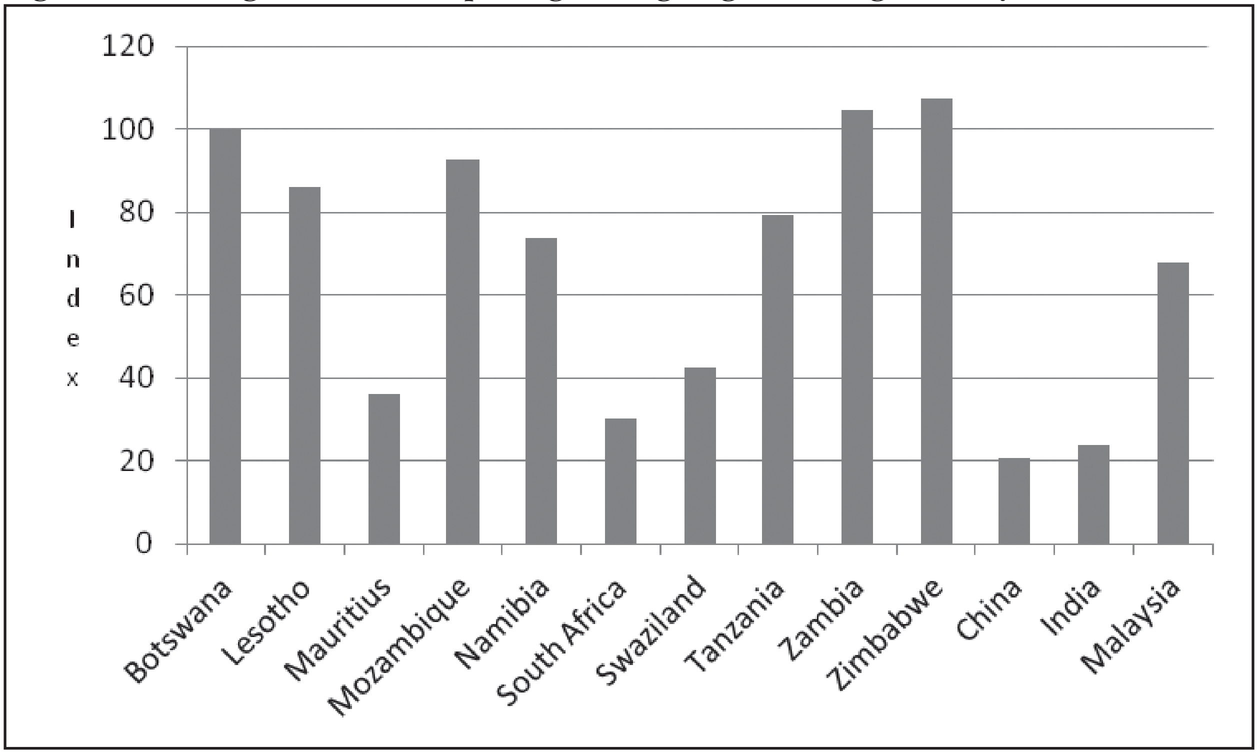
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 37: Air freight cost of transporting 1000 kg of general cargo to London, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100

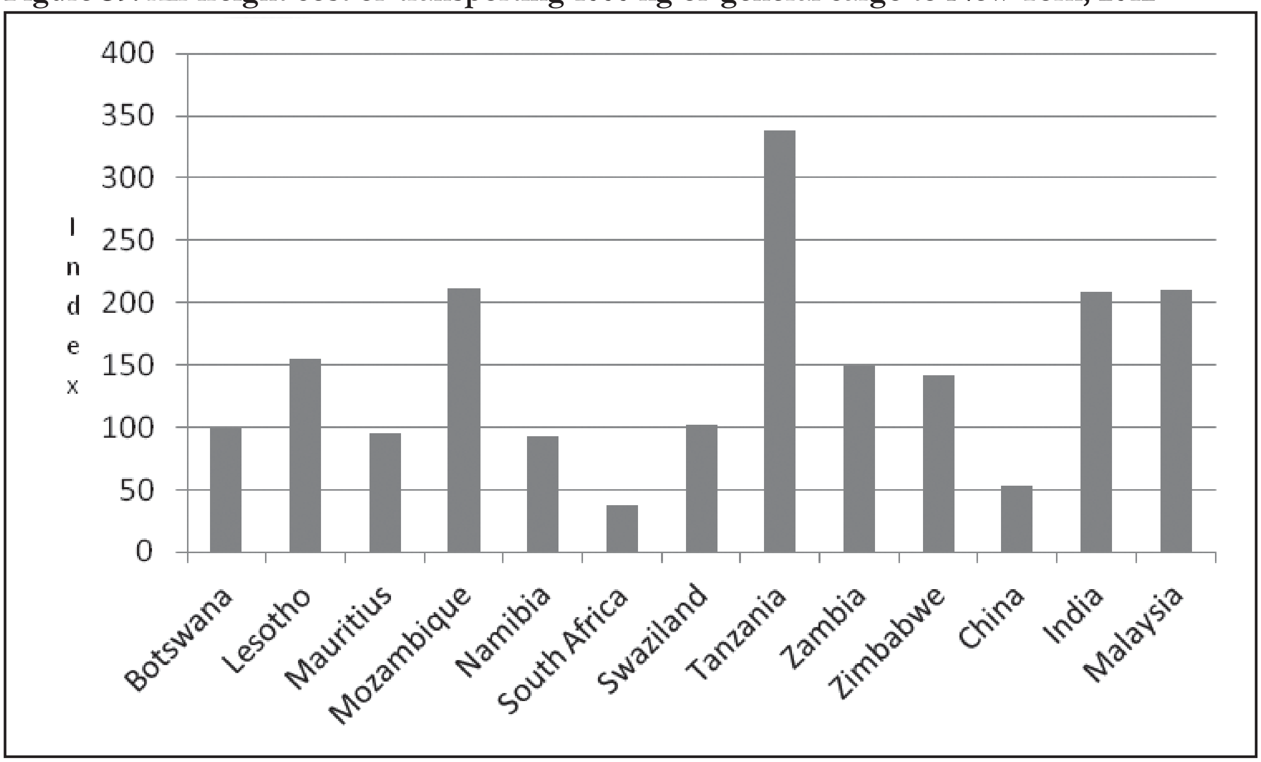
Figure 38: Air freight cost of transporting 1000 kg of general cargo to Tokyo, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100

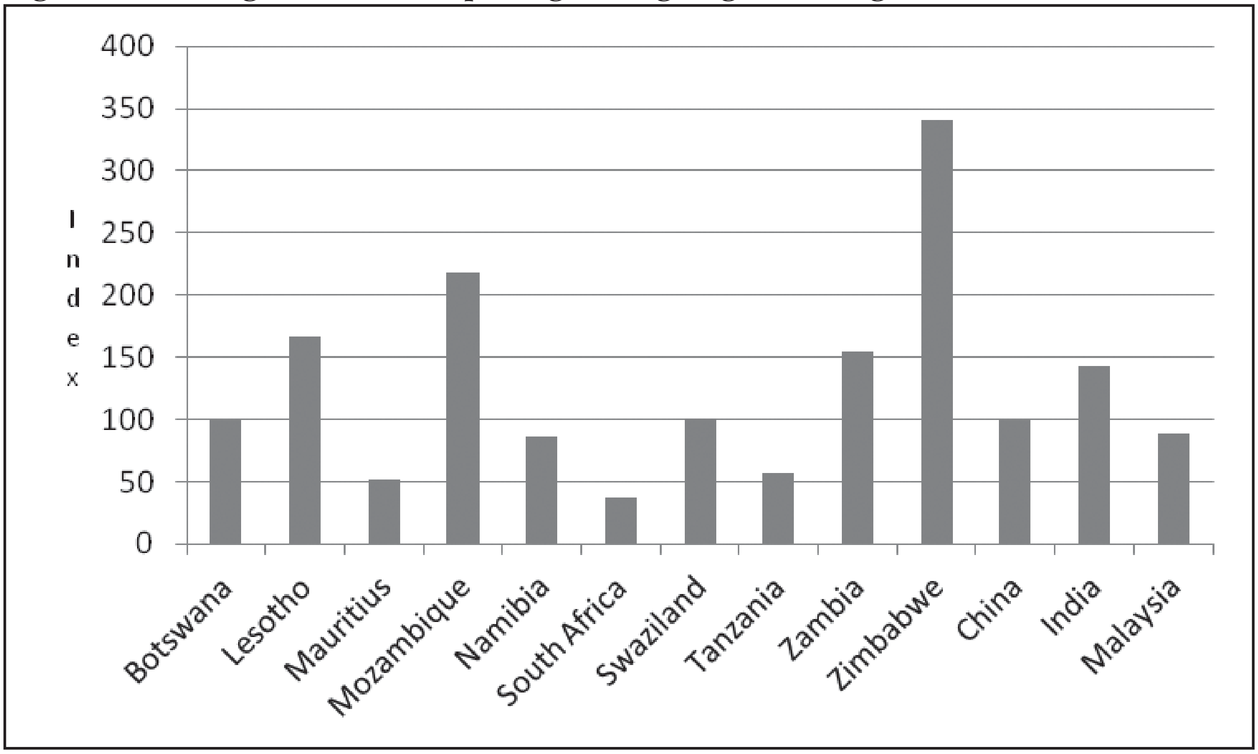
Figure 39: Air freight cost of transporting 1000 kg of general cargo to New York, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100

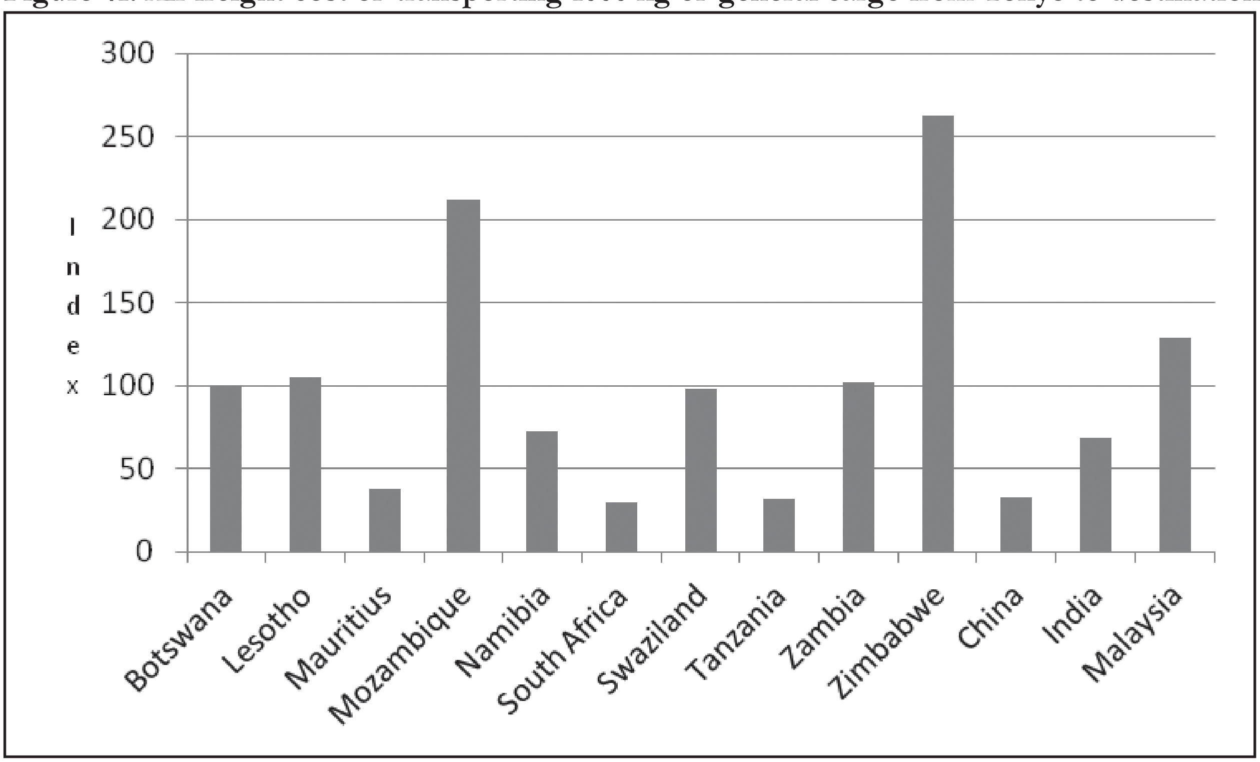
Figure 40: Air freight cost of transporting 1000 kg of general cargo from London to destination, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100

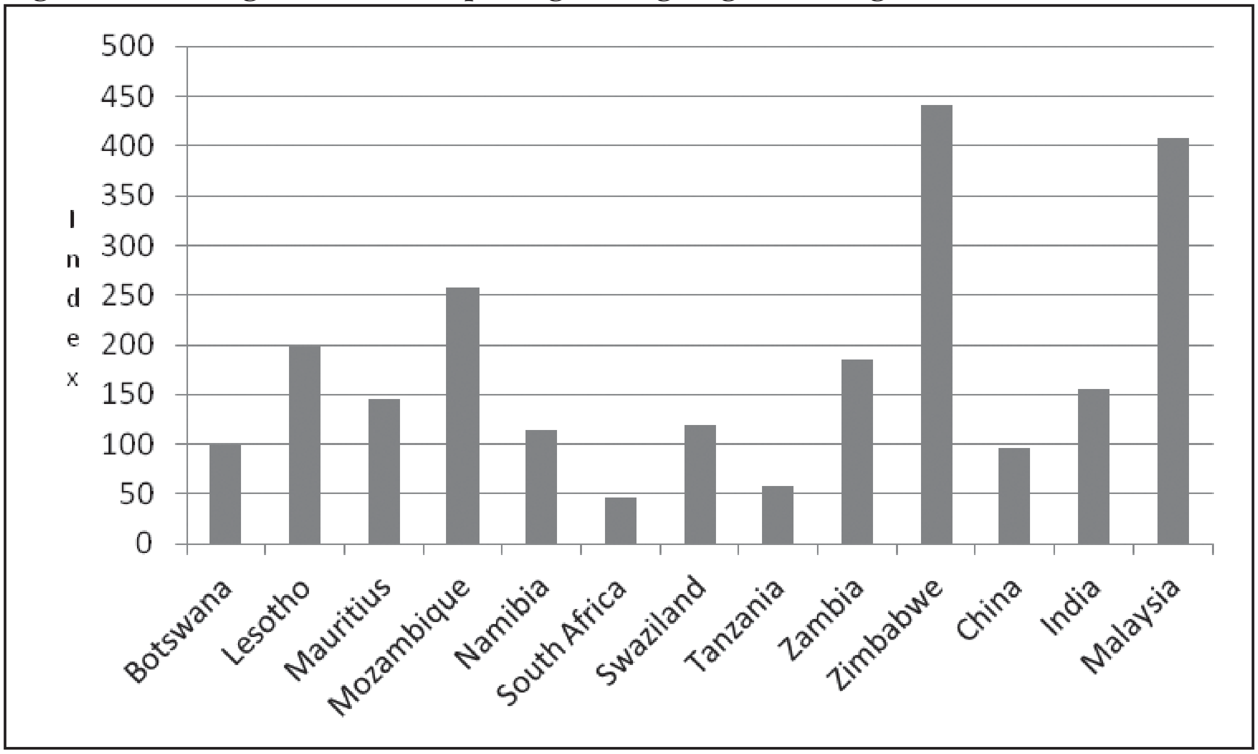
Figure 41: Air freight cost of transporting 1000 kg of general cargo from Tokyo to destination, 2012



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

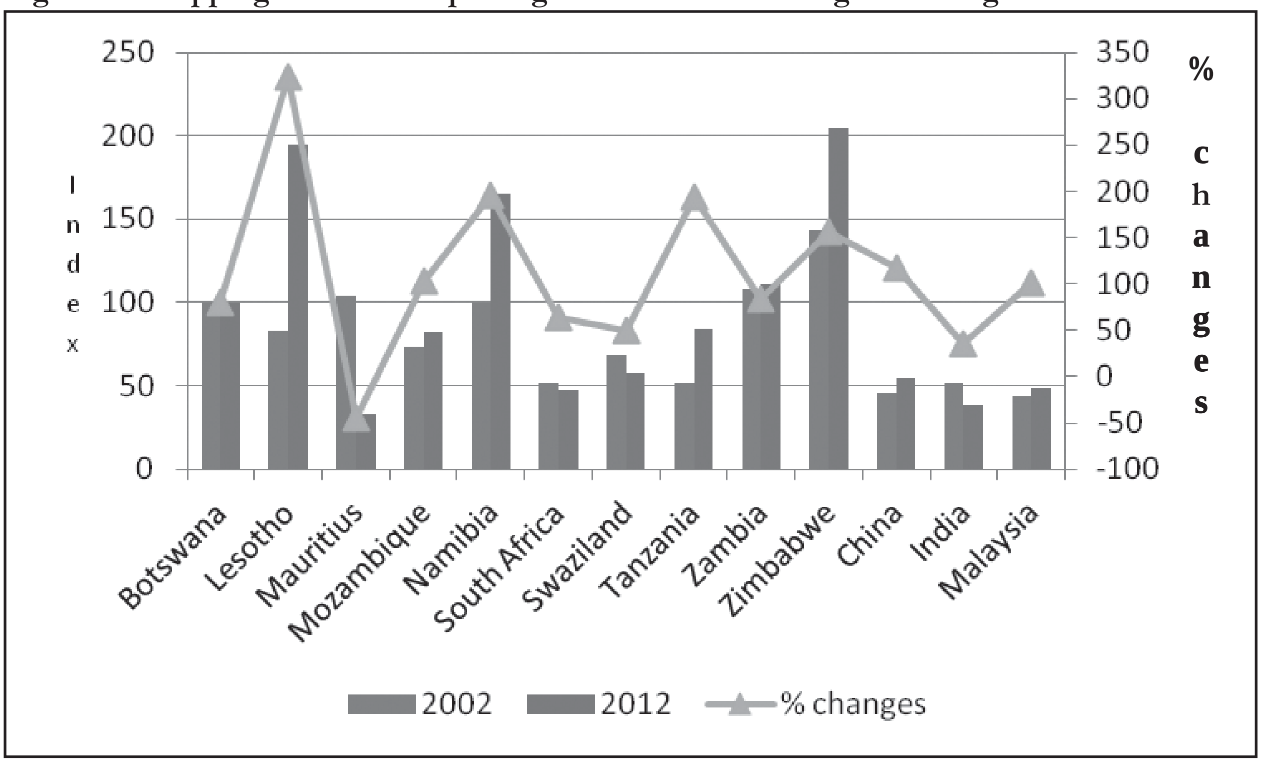
NB: Index: Botswana equals 100

Figure 42: Air freight cost of transporting 1000 kg of general cargo from New York to destination, 2012



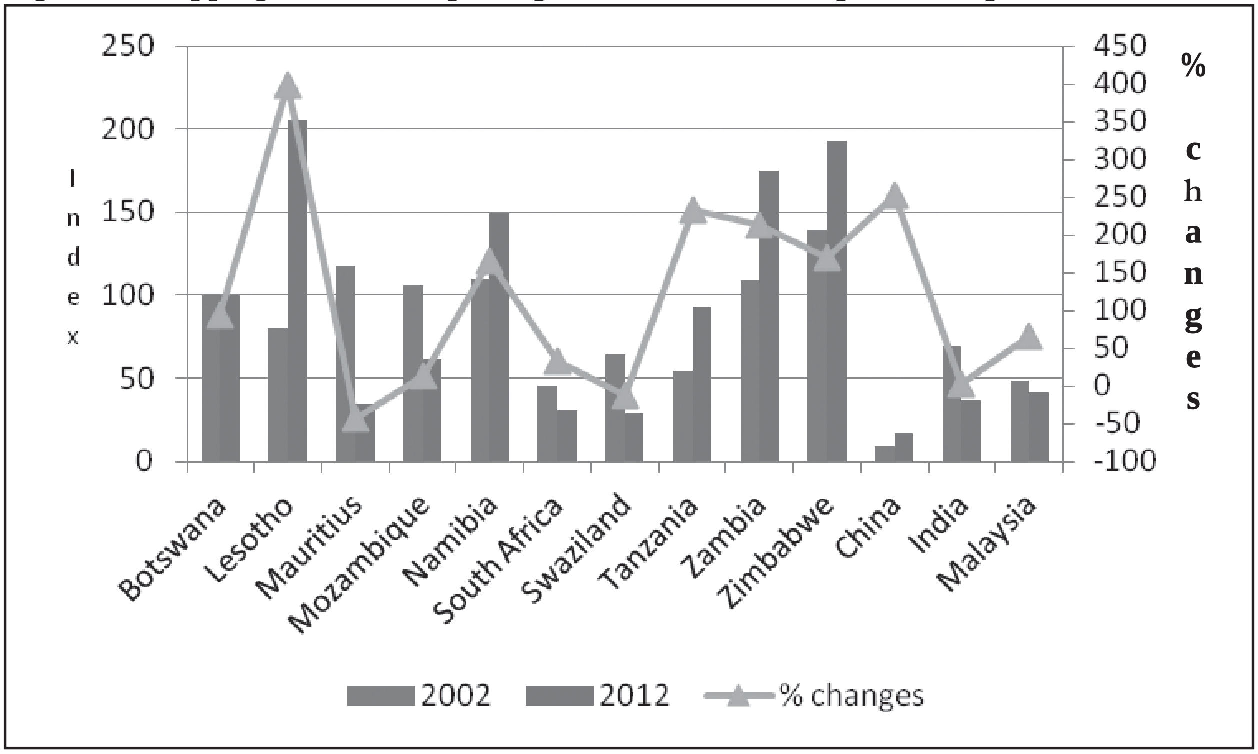
Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100

Figure 43: Shipping cost of transporting a standard 20ft FCL general cargo to Rotterdam



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

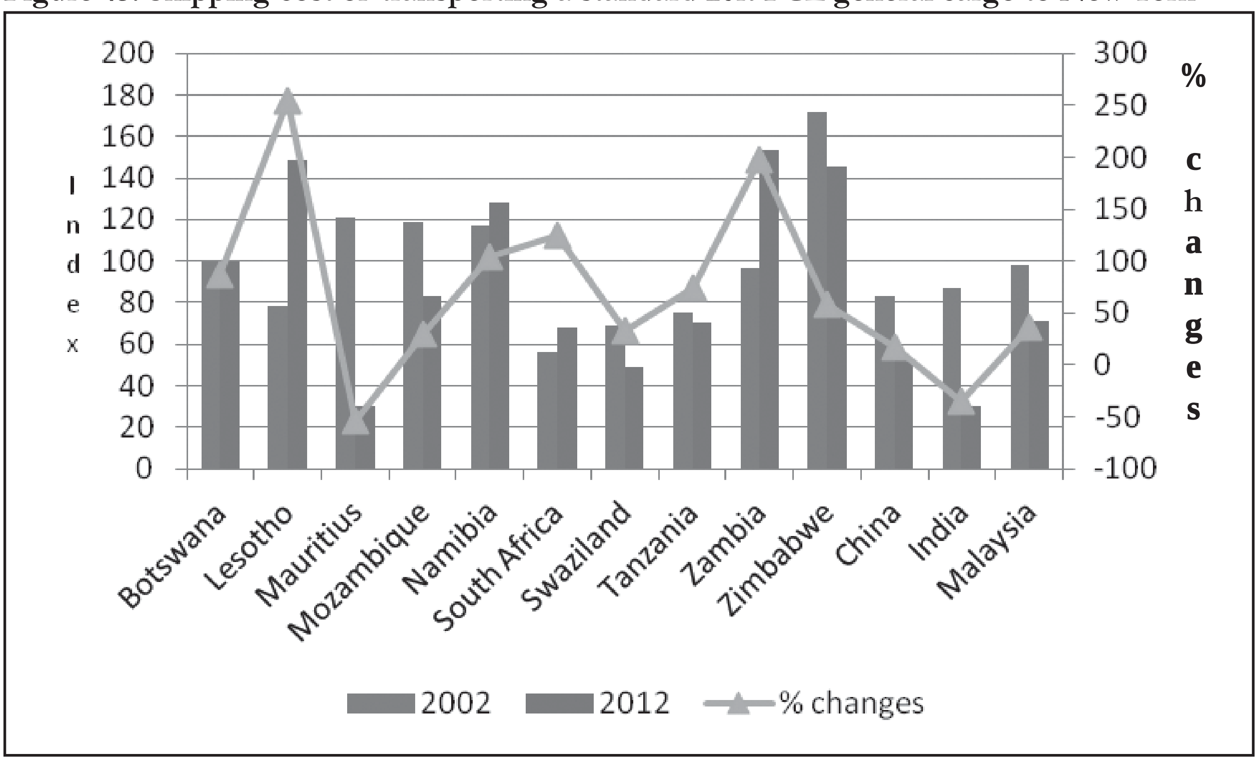
Figure 44: Shipping cost of transporting a standard 20ft FCL general cargo to Yokohama



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

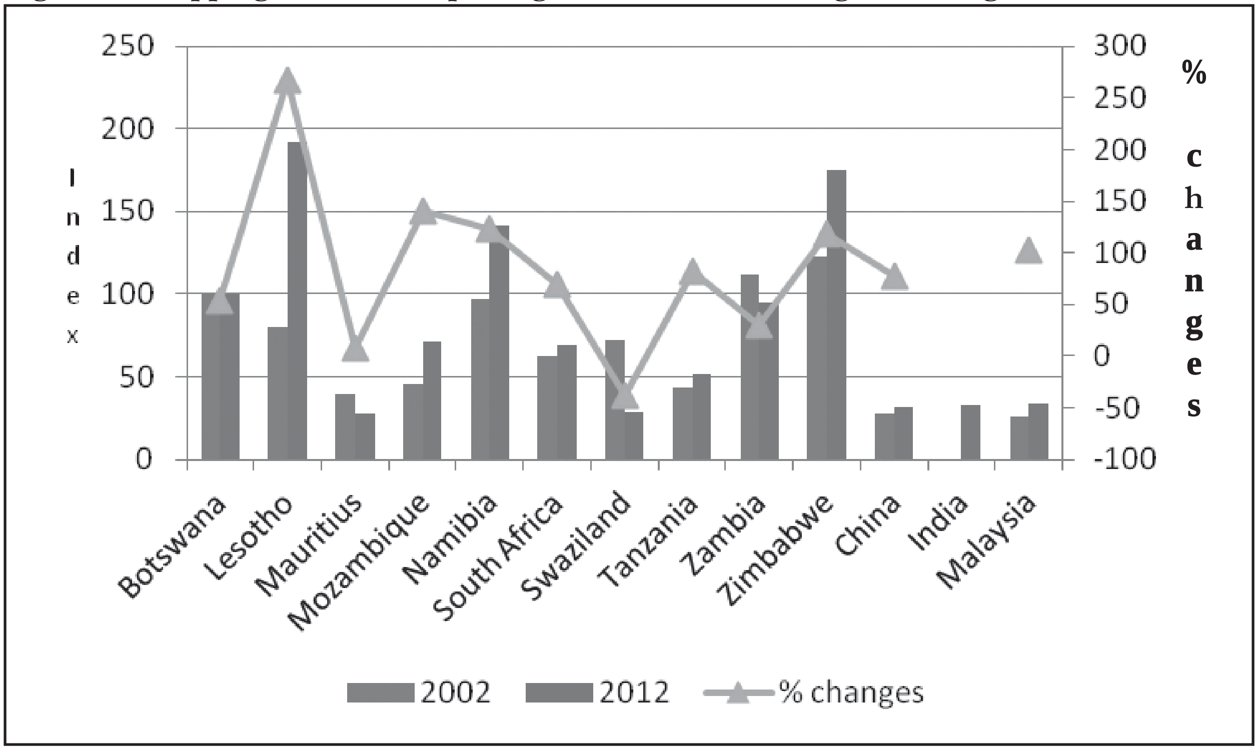
Figure 45: Shipping cost of transporting a standard 20ft FCL general cargo to New York



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

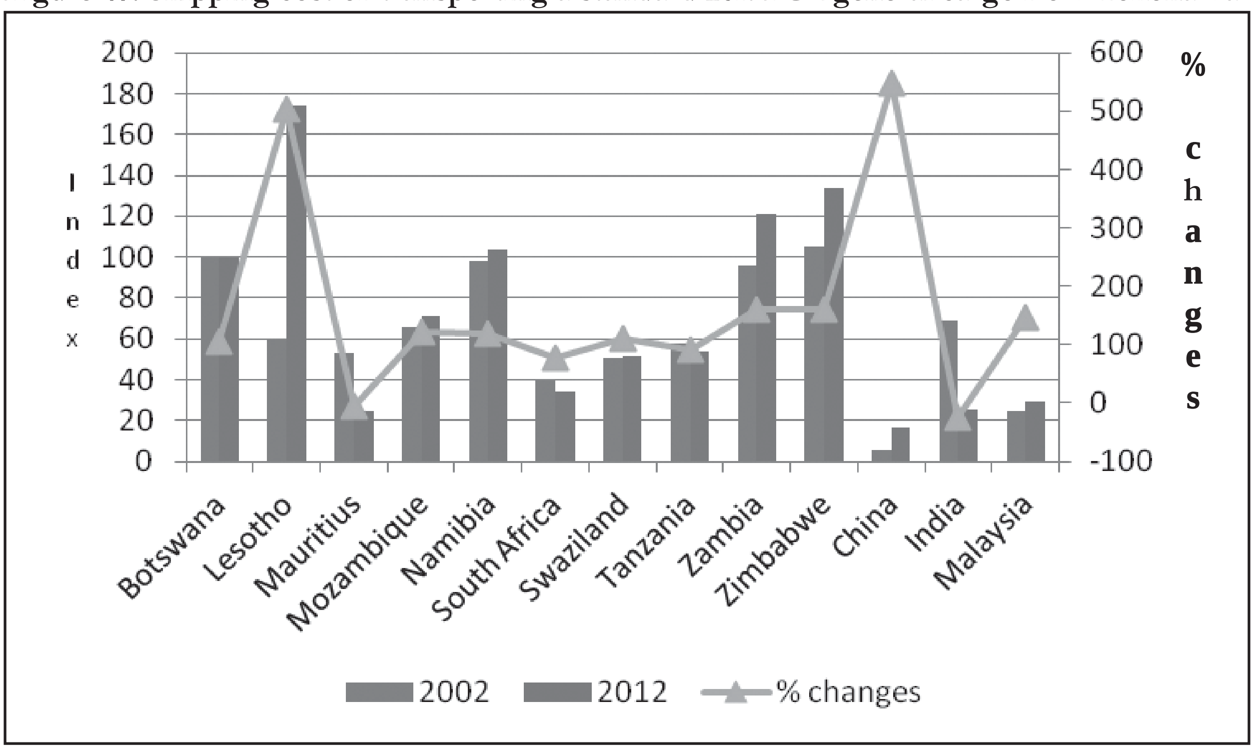
NB: *Index: Botswana equals 100 and Percentage changes between 2002 and 2012.*

Figure 46: Shipping cost of transporting a standard 20ft FCL general cargo from Rotterdam



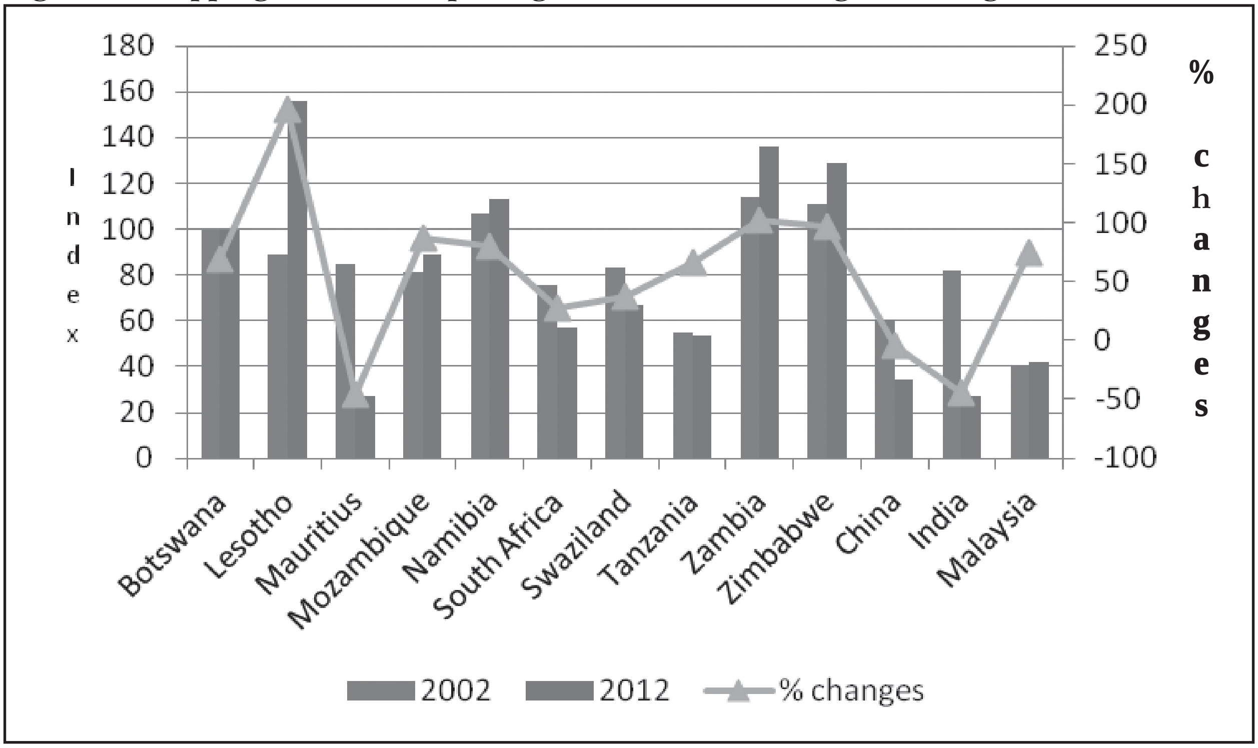
Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 47: Shipping cost of transporting a standard 20ft FCL general cargo from Yokohama



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*
NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

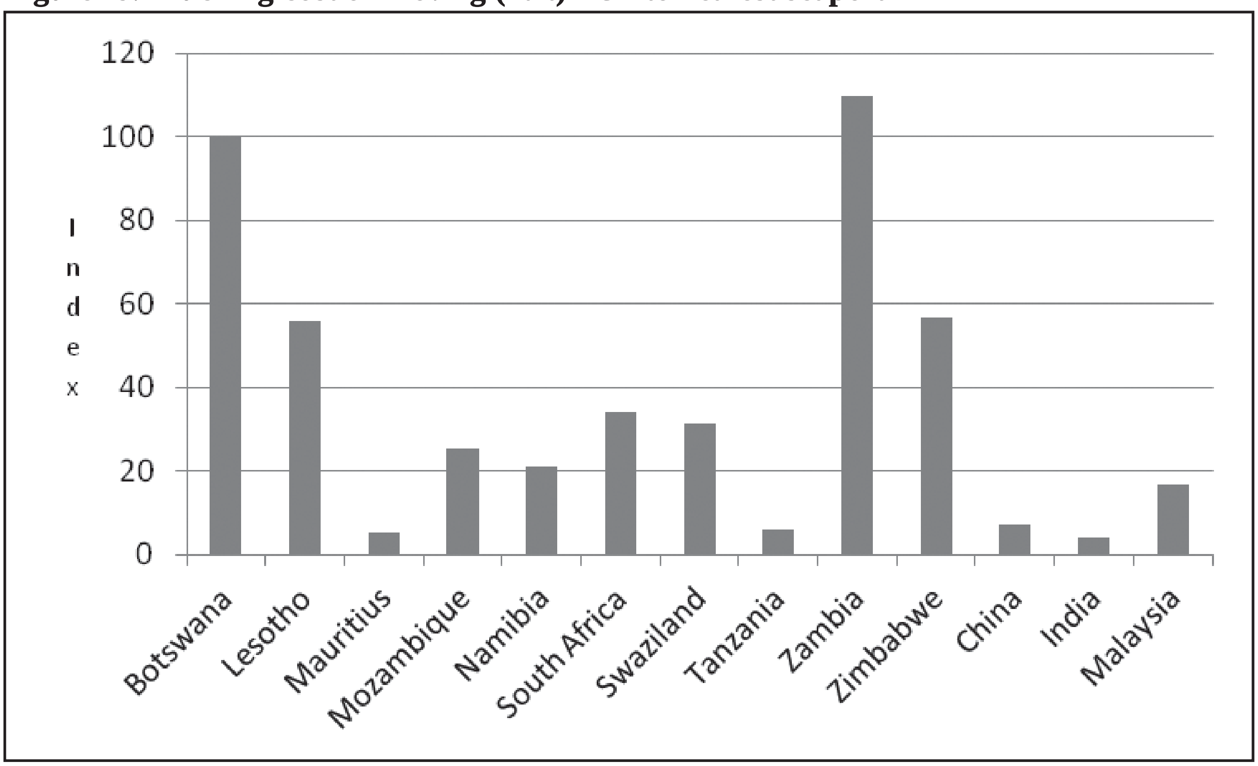
Figure 48: Shipping cost of transporting a standard 20ft FCL general cargo from New York



Source: *Commonwealth, 2002 and Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100 and Percentage changes between 2002 and 2012.

Figure 49: Trucking cost of moving (20ft) FCL to nearest seaport



Source: *Economist Intelligence Unit (Custom Research) Survey, May 2012*

NB: Index: Botswana equals 100

Botswana's Boat Exports

One of the great commercial ironies of Botswana is that an arid, landlocked country exports boats from the edge of the Kalahari Desert to many of its SADC trade partners. There is one medium-sized firm based in Maun, Aliboats, on the edge of the Okavango Delta which exports aluminium boats to Namibia as well as to Zambia and Mozambique which is one of the world's largest producers of aluminium but imports from Botswana. The reason it has survived and has something of a commercial advantage is that being based on the Okavango Delta for many years it has developed considerable skills in producing low-draft, sturdy, aluminium boats which are not generally produced in other countries in the SADC. South Africa produces fibreglass boats for recreational consumers and hence the company has a virtual regional monopoly on 'industrial boats'. Fibreglass boats cannot be repaired easily on site and hence are of greater use for recreational purposes. In 2010 the company exported Pula 7.8 million to neighbouring countries and in the past as far as Seychelles. It also exports boats to Mozambique which is amongst the world's largest producers of aluminium. However, by virtue of both its location and relative smallness it has been necessary for the company to maintain a stock of aluminium that will last two years as its aluminium supplier is 2,000 km away in Richards Bay in South Africa.

Botswana Institute for
Development Policy Analysis

BOTSWANA AFTER DIAMONDS:
A Study into the Consequences of and Responses to the Depletion of Botswana's Diamonds.

Since 1972 when mining operations started at Orapa, Botswana's economy has been heavily reliant on the revenue earned from mining particularly diamonds.Subsequently the opening of the Jwaneng mine further increased Botswana's revenue from diamonds. As a result, during the 1980s and 1990s the economy of Botswana grew much faster than that of most countries in the continent. However, the world economic downturn that began in 2008 posed serious questions on the future financial health of the country.

This book explores Botswana's economic situation post the diamond era. The authors have through their research, established that within the foreseeable future the profitability of diamond mining will begin to decline and Botswana will face serious economic challenges. The book is divided in to three parts which deal with the following:

- Part I "Minerals and Energy Export and Revenue Projections" focuses on defining the most likely extent and timing of the anticipated decline in mineral revenues
- Part II "Life After Diamonds" looks at the impact the decline in diamond sales will have on the economy of Botswana.
- Part III "Export Diversification Policies for Export Success in Botswana" focuses on the reasons why after so many years Botswana has not been able to diversify its exports and reduce its dependence on diamonds.

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