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IFPRI Discussion Paper No. 00693

March 2007

**Regional Disparities in Ghana:  
Policy Options and Public Investment Implications**

Ramatu M. Al-Hassan, University of Ghana  
Xinshen Diao, International Food Policy Research Institute

Development Strategy and Governance Division

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## CONTENTS

Acknowledgements.....	v
Abstract .....	vi
I. Introduction .....	1
II. Identifying the route to growth with reduced inequality .....	6
III. Methods and Data.....	7
IV. Simulations.....	10
V. Summary and Conclusions.....	19

## TABLES

Table 1. Poverty changes by region, model results from business-as-usual growth .....	11
Table 2. Poverty rate in northern Ghana from different sector growth (2015).....	12
Table 3. Poverty rate for the poorest three regions: Staple-led growth vs. export-led growth scenarios .....	13
Table 4. Effects of growth in productivity of staples on absolute poverty incidence by 2015.....	15
Table 5. Supply and demand for cowpeas in selected countries of West and Central Africa (1990 – 1999).....	17

## FIGURES

Figure 1.	Mean annual rainfall, Burkina Faso .....	2
Figure 2.	Poverty Incidences by Administrative Region .....	4
Figure 3.	Poverty reductions in agriculture-led and nonagriculture-led growth scenarios .....	12
Figure 4.	Poverty reductions in staple-led and agricultural export-led growth scenarios.....	14
Figure 5.	Poverty reduction in Northern Region under different scenarios.....	15
Figure 6.	Poverty reduction in Upper East Region under different scenarios .....	16
Figure 7.	Poverty reduction in Upper West Region under different scenarios .....	16

## **ACKNOWLEDGMENTS**

This study was undertaken under IFPRI's Ghana Strategy Support Program (GSSP) with financial support of the United States Agency for International Development (USAID). The authors acknowledge the research assistance provided by Marc Rockmore. The authors also thank participants at the International Conference on Poverty Reduction held in Beijing on 23-24 May, 2006 and the workshop held in Accra on 19-20 November, 2006 for their comments and suggestions. They also thank Shashidhara Kolavalli, Shenggen Fan and the reviewer of the paper for their valuable suggestions.

## ABSTRACT

The development pattern in Ghana is characterised by a north-south divide in which the north lags far behind the south. Ghana has achieved sustained growth and poverty reduction during the 1990s, but such growth did not benefit the three poor northern regions and the development gap has increased between the south and north. One of the most important reasons is that much of the growth has been generated by export agriculture in which northern Ghana has little contribution if any.

This paper sets out to identify avenues for pro-poor growth in Ghana, focussing on agricultural opportunities, particularly in northern Ghana. Using an economywide, multimarket model and based on time series production data between 1991 and 2000 and Ghana Living Standards Survey data of 1991/92 and 1998/99, this paper analyzes the possible poverty reduction trends up to 2015 by assuming different patterns of growth. The results show that agriculture-led growth has a larger poverty reducing effect than nonagriculture-led growth. Within agriculture, growth in staple crop production reduces poverty more than export crops. In northern Ghana, the staple crops whose growth exerts the largest effect on poverty reduction are groundnut, cassava and cowpea. However, despite the large effects of the agriculture-led growth, the projections of poverty rates in the regions, particularly Upper East are still high implying a need for complementary avenues for poverty reduction. A review of the literature shows that while the north generally is a net migration area, the rewards of migration have been limited because people who migrate have no skills and are, therefore, limited to entering the informal job market where wages are low. The implication is to enhance this labour with education and skills. Ultimately, the regions must attract production investment to boost economic activity and generate local growth. The state must play a leading role in investing in productive and social infrastructure as a way of facilitating the environment for private sector operators.

**Key Words:** Ghana, Regional inequality, Poverty reduction, Agricultural growth, Economywide modeling



# 1. Introduction

Despite rapid economic growths for the last decade, northern Ghana continues to lag behind the rest of the country in most development indicators (GSS, 2000); this is a source of concern in terms of inequality in the country and its moral implications, as well as a challenge for achieving significant poverty reduction in the country. The regional inequality deserves special attention as Ghana pursues the attainment of the Millennium Development Goals (MDGs), particularly those on reducing poverty and hunger. The attainment of the MDGs is consistent with the country's developmental goal of raising per capita income of Ghanaians to US\$1,000 by 2015 (Republic of Ghana, 2005). The relevance of broad based growth, complemented with appropriate social spending in poverty reduction, is the most obvious and some researchers have already called for different policies which focus on excluded regions and groups (Aryeetey and McKay, 2000).

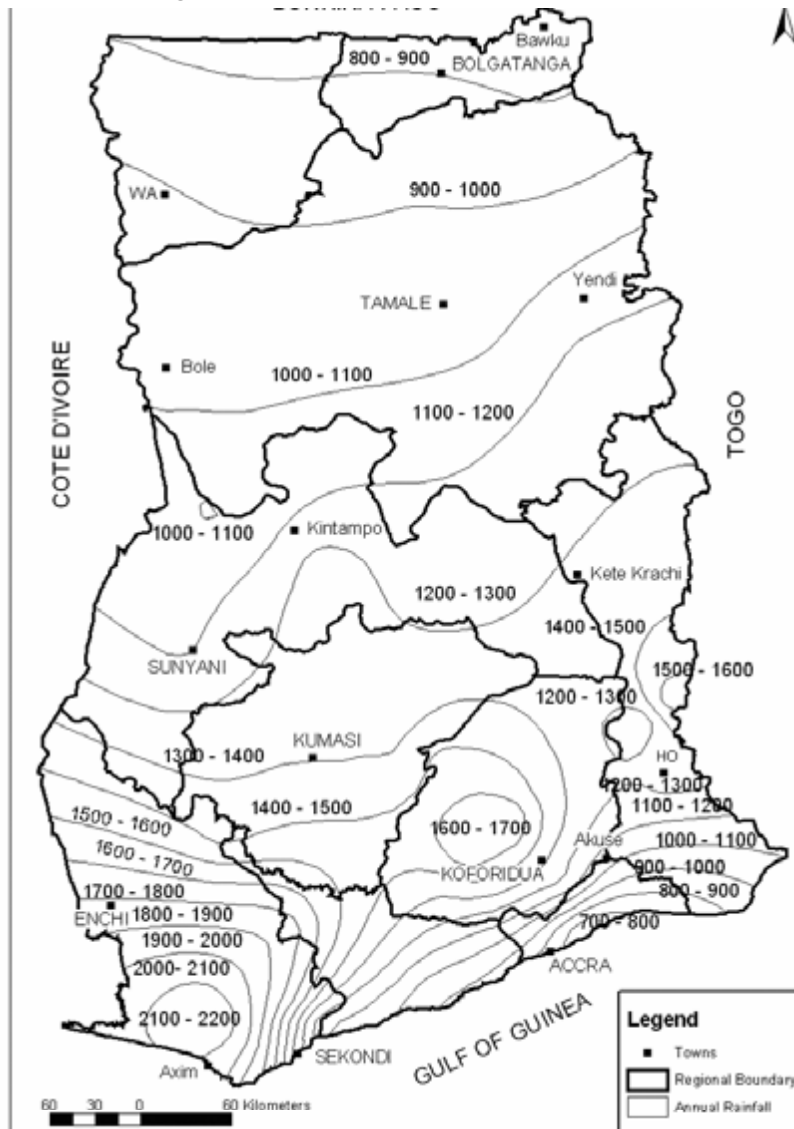
Reasons often put forward to explain the poverty and underdevelopment of northern Ghana compared to southern Ghana have included history, unfavourable climate and agricultural production conditions, and post independence political neglect (ODI and CEPA, 2005). The historical underpinnings of the north-south divide lies in the colonial policy which made northern Ghana subordinate to the south in terms of economics and politics by actively promoting labour migration, and preventing investment. The colonial government also "adopted a 'protective' attitude towards the population, which kept northerners apart from the development which colonisation brought elsewhere [in the country]" (Shepherd and Gyimah-Boadi, 2004, p.2).

The import substitution policies of the immediate post-independence period (1957-1966) and the military regime of National Redemption Council (1972- 1979) made positive impacts on northern Ghana's development through capital investments, development of education, infrastructure, agricultural production and processing. The latter regime is credited with the expansion of the cotton and rice industry subsidies. However, these efforts did not transform the north largely because the import-substitution policies and the supporting subsidy policies were themselves not sustainable. Also, a shift in targeting from smallholders to large scale elite farmers in the rice and cotton interventions created inequalities within the region.

From the late 1980s through the 1990s, extension of the electricity grid to the north, the establishment of the University for Development Studies (with campuses spread throughout the three northern regions), rehabilitation and development of physical and social infrastructure, and considerable project aid from official donor agencies and international NGOs have been implemented. However, the impacts of these efforts are limited because there has not been a concerted strategy and policy to create regional balance in Ghana's development (Shepherd et al, 2004).

Although agriculture is the main component of livelihood strategies, conditions for agricultural production in many parts of northern Ghana are not the best, particularly when compared to the south. Rainfall levels are lower (Figure 1), soils are poor in organic matter, and runoffs are high because of concentration of rains in short periods (torrential rains). As Chamberlin puts it, ‘While there is variation occasioned by both natural factors such as soil and topography, as well as human factors, such as land use practices, the general trend is a south-to-north agro-climatic gradient corresponding with increasingly arid environments offering fewer production potentials’ (Chamberlin, 2005, p.5).

**Figure 1. Mean annual rainfall, Burkina Faso**



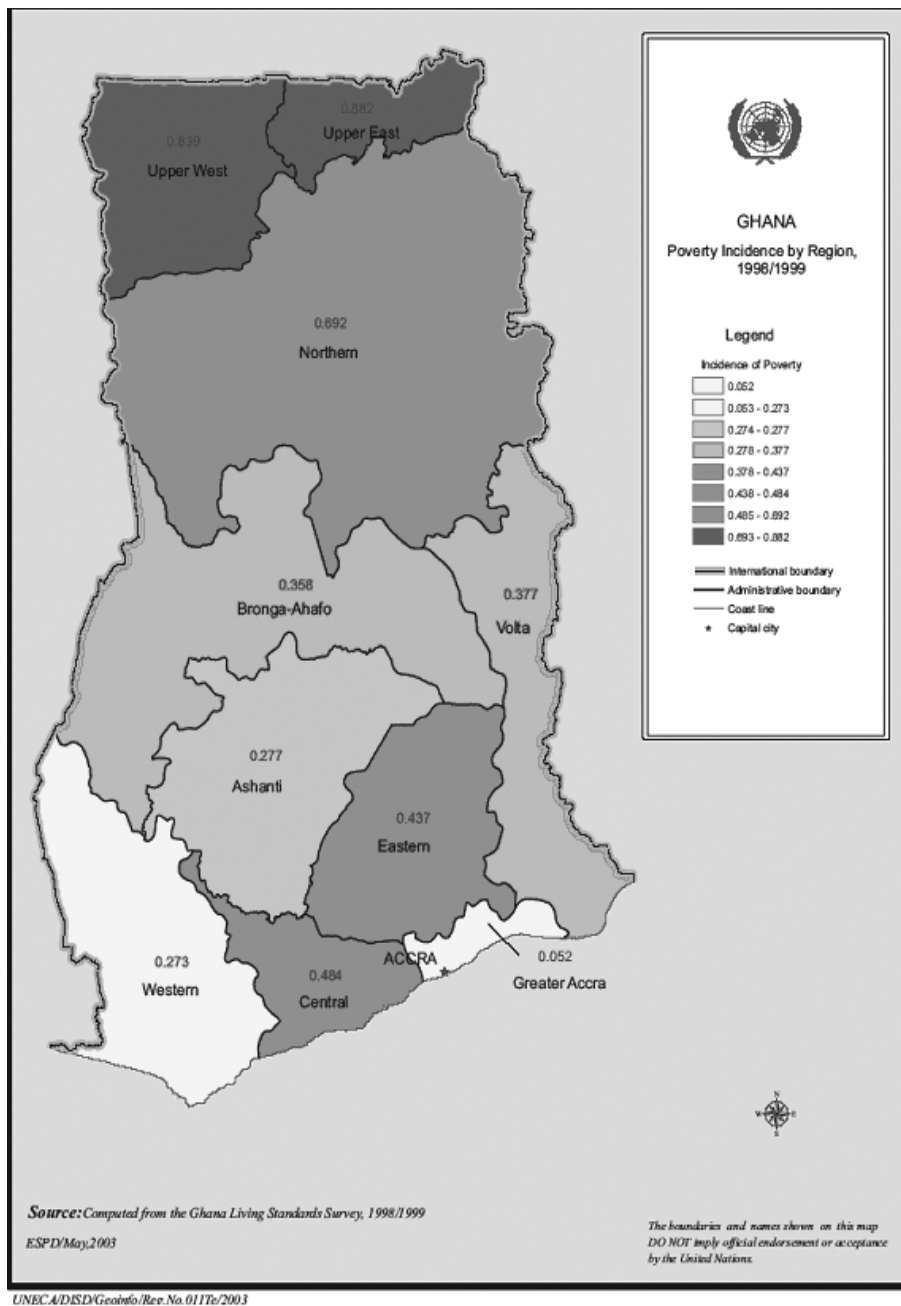
Source: Centre for Geographic Information Systems, University of Ghana, Legon

Since neither history nor the natural climatic endowment can be changed, what is important today is to identify the geographical capital of northern Ghana, and how this capital can be engineered for growth. Agriculture is the mainstay of the Ghanaian economy and this is more so for northern Ghana where over 70% of the population is in agriculture compared to a national average of 56%. The sector therefore holds the key to poverty reduction in the region. The main source of growth and poverty reduction in Ghana during the 1990s was expanded trade. However northern Ghana did not benefit from this growth and poverty reduction because of the low representation of the region's production in international trade.

The living standards surveys of the 1990s showed significant decline in poverty at the national level from a poverty incidence of 52% in 1992 to 40% in 1999 (GSS, 2000). The indicators of depth and severity of poverty both declined by 25%. Disaggregation of the data by administrative region and agro-ecological locality, however, reveals wide discrepancies between regions in poverty levels and the progress made in poverty reduction during this period. In the three administrative regions of northern Ghana (Upper East, Northern and Upper West regions), the head count poverty index either increased or changed marginally. Moreover, poverty is generally high in the three northern regions. 90% of the population in the Upper East region was poor, followed by the Upper West region with 84%, and the Northern region with almost 70% incidence of poverty (GSS, 2000).

The present distribution of poverty in Ghana also portrays extreme inequality between the north and south (Figure 2). For example, the 1999 survey shows that while the three northern regions together had a population share of about 18%, they account for 43.5% of the total poor, and 59.2% to the severity of the poverty index (GSS, 2000).

**Figure 2: Poverty Incidences by Administrative Region**



Another aspect of the unequal poverty distribution is the concentration of the poor in agriculture, particularly food crop farming. With a population share of 39% in 1999, food crop farmers had a poverty incidence of 59%; the average income of the poor in this group was 40% below the poverty line; and the group contributed 58% and 67% to poverty incidence and poverty gap indices, respectively (Aryeetey and McKay, 2000).

There is no question about the role of expanded markets in generating growth. Between 1985 and 2005, exports contributed 40% to the increase in Ghana's GDP. The export growth was mainly through

traditional sources such as cocoa and gold, which means that regions that do not produce these commodities would be unlikely to participate in the growth. Consequently, northern Ghana has benefited much less from trade expansion (ODI and CEPA, 2005). What is not clear is whether the same path of export-led growth can be pursued for the north, or whether a focus on sub-regional markets and internal trade in staple crops can be equally beneficial.

This paper explores the effectiveness of expanding production for domestic and sub-regional trade on the growth in northern Ghana. Expanded traditional staple production will also lead to the achievement of food security faster, by improving the local availability of the food, in a region where poor transport infrastructure makes dependence on external (outside the region) sources rather risky. The specific objectives of this paper are to identify the crops with highest potential to contribute to household income, and to estimate the effects of growth in these crops on paths of poverty reduction. This exposition is most relevant because of the dominance of export-led growth in national development policies. Much of the policy attention in agriculture is on cocoa and horticultural exports.

The poor in poor regions did not benefit from growth of the rest of the country. The common denominator in slow growth and slow progress in poverty reduction has been agriculture, and particularly food crop farming in the Guinea Savannah zone, which encompasses the Northern, Upper East, and Upper West regions (Aryeetey and McKay, 2004). Food crop farming did not perform well from structural adjustment policies, which focused more on raising incentives for export crops (exchange rate liberalization, increased producer prices for cocoa and export incentives such as duty drawback, and foreign exchange retention). On the contrary, food crop and livestock sub-sectors bore a disproportionate share of the burden of removal of agricultural input subsidies. At the same time trade liberalization opened the floodgates for cheap food imports, examples being rice and poultry products.

The high incidence of poverty in northern Ghana is therefore attributed to exclusion from trade (Aryeetey and McKay, 2004; ODI and CEPA, 2005) and the slow down of growth in the staple crop sub-sector.

## 2. Identifying the Route to Growth with Reduced Inequality

Growth decomposition only partially captures the roles of agriculture in the overall economic growth by directly looking at the share of agricultural growth in total increase in GDP. Agriculture and non-agriculture are highly linked in the economy not only through the production process, e.g. agricultural goods are intermediate inputs in non-agriculture and vice versa, but also through income that is allocated to consumption and investment (Johnson and Mellor, 1961). For example, increased farmer incomes will be spent on both agricultural and non-agricultural consumption goods, similar to increased urban income. The linkage effects from agriculture to non-agriculture and from rural to urban also work through price effects. Increases in agricultural productivities generally reduce food prices with increased supply, which benefits urban consumers and rural people who are net buyers of food (Vogel, 1994). Similarly, increases in non-agricultural productivities, especially in agricultural input production, marketing services and other services, benefit farmers by lowering input prices and costs (Hazell and Roell, 1983).

The role of agriculture in poverty reduction differs for different countries, different agricultural structures, and at different stages of development. In general, at the early stages of development, the role of agriculture is more important not only because agriculture accounts for the biggest share of economic activities, but also the linkages effects from agricultural growth to non-agricultural growth and from rural to urban are much stronger (Haggblade et al., 1989). Linkages effects are especially strong in an economy where agricultural growth comes from a broad-base and domestic markets play a critical role in such linkage effect. If a country's agricultural growth is driven by the exportable sector, the linkage effect in the economy would be relatively weak, because of leakage to the rest of the world (Diao et al., 2006).

Even though growth generally benefits the poor by raising a country's per capita income, broad-based growth has a much stronger pro-poor effect due to its participation by a majority of the population, which can reach the poor from both income and consumption sides.

### 3. Methods and Data

The analysis for identifying pro-poor channels of growth in Ghana is based on an economywide, multi market (EMM) model developed for Ghana. The EMM model captures the detailed structure of Ghana's agricultural sectors together with thirteen nonagricultural subsectors. Specifically, there are thirty-three agricultural commodities or commodity groups. Both agricultural and nonagricultural production and consumption are further disaggregated into regions in order to capture the geographic heterogeneity of sectors and households. The disaggregation is based on the ten administrative regions, which are further disaggregated into rural and urban areas in the model. All supply and demand functions thus are defined at the regional level for the rural and urban areas. Most data about agricultural production at the regional level is from MoFA (2005) and GSS (2005), while the nonagricultural data is from IMF (2005) and GSS (2005).

The EMM model is based on neoclassical microeconomic theory. In the model, an aggregate producer represents a specific region's production in either rural or urban location for a specific subsector. There are 460 (forty-six agricultural and nonagricultural subsectors times ten regions) aggregate producers in total. Consistent with the setup of many other multi-market models, the supply function, instead of production function, is used to capture each representative producer's response to market. Specifically, the supply functions are derived under producer profit-maximization and based on the producer prices of all commodities (including the prices for the nonagricultural commodities). Risk factor and market imperfection are not taken into account and therefore do not affect producers' profit-maximization decision.

In the crop subsectors, the supply functions have two components: (1) yield functions that are used to capture supply response to own prices given farm area allocated to this crop; and (2) land allocations that are functions of all prices and hence are responsive to changing profitability across different crops given the total available land within a region. The own-price elasticities employed in the yield functions are the combination of authors' best estimates and results drawn from other studies, while the cross price elasticities in the area functions are calibrated according to the share of each commodity in regional total production (see Appendix for the discussion about the supply elasticities in detail).

The demand function in the EMM model is also disaggregated to the region by rural and urban households and defined at the individual level. A representative consumer's demand for each of these forty-six goods is derived from maximizing a Stone-Geary utility function, and the subsistence level of consumption is calibrated to the households' home consumption by rural and urban locations within each region. Data used to calibrate the demand function are from 1998/99 GLSS IV (GSS, 2004), which is the latest and most comprehensive household survey in Ghana. Income elasticity in the demand function is

estimated using a semi-log inverse function (RSLI) suggested by King and Byerlee (1978). Once we know the income elasticity and subsistent consumption parameter, price elasticities in demand functions (including own and cross price ones) can be derived by imposing homogeneity condition on the LES function (see Appendix for the discussion of the estimation and calculation of the demand elasticities in detail). Estimated income and induced price elasticities for any specific commodity vary across regions and between rural and urban locations due to different consumption patterns and income levels. Such differences not only imply that the aggregate effect of consumers' market responses is often non-linear and much more complicated than that in the case where demand is defined at the national level, but also indicate the possible differential effect on poverty reduction with similar income increases.

Unlike most multimarket models that are usually partial equilibrium, the per capita income for either rural or urban households within a region is an endogenous variable in the EMM model and is determined by the regional production revenue. Because of this setup, the model has a general equilibrium nature, which allows production and consumption decisions linked at the regional level by rural and urban locations. Since intermediate inputs and their prices are not explicitly modelled, producer prices are adjusted to represent value added, and therefore the aggregation of agricultural production at the value added prices equals agricultural GDP (henceforth, AgGDP). For the nonagricultural sectors, the sector level value-added is used to represent production output with unit price. Thus, national GDP (as well as regional level GDP) comprises AgGDP and nonagricultural GDP, both of which are endogenous in the model.

As the name of the model suggests, a multiple market structure is specified. There is perfect substitution between domestically and internationally produced commodities. However, transportation and other market costs distinguish trade in the domestic market from imports and exports. For example, while imported maize is assumed to be perfectly substitutable with domestically produced maize in consumers' demand functions, maize may still not be profitable to import if its domestic price is lower than the import parity price plus transactions costs. Maize imports can only occur when domestic demand for maize grows faster than domestic supply and the local market price rises significantly. A similar situation applies to exported commodities. Even though certain horticultural products are exportable, if domestic production is not competitive in international markets, either due to low productivity or high transactions costs, then exports will not be profitable. Only when domestic producer prices plus market costs are lower than the export parity price of the same product does it become profitable to export.

The base year's import and export data by commodity are from MoFA (2005) and FAO (2005), and there are eight agricultural commodities that are in deficits in the base year and hence with positive import value. There are also thirteen export agricultural commodities of which domestic prices are fully linked with international ones. Besides these twenty-one agricultural commodities, twelve other



agricultural products, including maize, sorghum/millet, cassava, cocoyam, plantain, groundnut, beans, and some cash crops produced mainly for domestic markets, are assumed to be in balance between supply and demand in the base year. When the supply and demand for a specific commodity are balanced in the domestic market without external trade, price for this commodity is endogenously determined by domestic market equilibrium. That is to say, for these twelve agricultural commodities, prices are endogenous at least in the initial years in the model. Thus, an exogenous market margin rate is assumed for these commodities, such that prices for them (including market margins) are both too high to export and too low to import.<sup>1</sup> When either imports or exports occur for a specific commodity, price for this commodity is exogenously linked with the international prices (such as cocoa in the case of exports and rice in the case of imports). However, the assumption about balanced demand and supply in the base year does not imply that imports or exports could not occur in the following years. Similarly, a commodity imported in the base year, for example, rice, can become self-sufficient in terms of domestic supply equal to domestic demand in the following years with increased productivity.

To analyze the growth-poverty effect, the nationally defined poverty line drawn from 1998/99 GLSS IV (GSS, 2004) is adopted in the model. The household level data from GLSS IV is used to further construct a micro-simulation model that links all sample households with their corresponding representative households in the EMM model (by region and rural/urban location). Without detailed information, population growth rate is assumed to be the same across regions, and hence, the sample weight employed in the GLSS IV on each individual sample household augments proportionally with population growth. However, income is an endogenous variable and its growth rate varies across regions in rural or urban; hence, income distribution changes and the population group living within poverty also changes over time.

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<sup>1</sup> Lack of transportation and other transaction data limits us to estimate the real market margins. The model's setup, however, allows us to update the margins when data is available.

## 4. Simulations

The growth-poverty linkage analysis is carried out in two stages and starts in 1999, the year of the last living standards survey in Ghana. The first stage comprises a group of scenarios assessing the effects of growth and different sources of growth on poverty reduction at the national level as well as in the poor regions of the north. The scenarios included at this stage are:

1. 'Business as usual' in which total GDP and agricultural GDP will grow along their current trends until 2015. Along this trend, agricultural GDP grows at 4.91%, nonagriculture at 4.76%, and total GDP at 4.83% annually with an exogenous growth rate of 2.5% for population.

2. Agriculture-led versus non-agriculture-led growth, which compares the differential effects on poverty reduction from similar overall growth driven by either agriculture or non-agriculture.

3. Broad-based versus export-led agricultural growth, which compares the differential effect on poverty reduction from similar overall and agricultural growth driven by different agricultural subsectors.

The second stage of the analysis attempts to identify the commodities whose productivity growth has the highest impact on poverty reduction in the three northern regions. The crops are pre-selected on the basis of their impact on household income.

### **Ghana will meet with MDG One along the current growth path**

According to MDG One, each country should halve their 1990's poverty incidence by 2015. In the case of Ghana the national poverty rate of 52% for 1991/92 is chosen because the household survey conducted in 1991/92 is the closest to the 1990 base year of MDG One. The 'business as usual' scenario results show that with the current patterns of growth, the national poverty rate will fall below 27% before 2015 (Table 1), indicating that the MDG One is achievable for Ghana. However, the MDG One regional inequality will be worsened. The Northern, Upper East, Upper West and the Eastern regions will experience only modest reductions in the poverty incidence. By 2015, more than half the population in the Northern, 70% of populations in the Upper East and 67% in the Upper West regions will remain poor. The poverty rates are far above the estimated national average of 33.1% for rural areas.

**Table 1. Poverty changes by region, model results from business-as-usual growth**

	GLSS surveys			Model projection			
	Poverty head count rate (P0)		% decline in 98/99 from 91/92	Poverty head count rate (P0)			% decline by 2015 from 1999
	1991/92	1998/99		2003	2012	2015	
ACCRA	25.8	5.2	-79.8	4.0	2.3	2.1	-60.5
ASHANTI	41.2	27.7	-32.7	23.7	15.6	13.4	-51.6
BRONG_AHAFO	65.0	35.8	-44.9	27.8	14.7	12.9	-63.9
CENTRAL	44.3	48.4	9.4	40.2	26.8	20.4	-57.8
EASTERN	48.0	43.7	-9.0	41.1	33.1	30.4	-30.4
NORTHERN	63.4	69.2	9.1	65.7	59.3	56.5	-18.3
UPPER_EAST	66.9	88.2	31.8	86.3	77.8	69.9	-20.7
UPPER_WEST	88.4	83.9	-5.1	76.0	70.8	67.3	-19.9
VOLTA	57.0	37.7	-33.8	31.0	18.6	15.0	-60.2
WESTERN	59.6	27.3	-54.3	23.0	11.0	8.5	-69.0
National, rural	63.6	49.5	-22.2	44.2	33.1	30.1	-39.1
National, urban	27.7	19.4	-30.0	16.1	11.4	8.6	-55.5
National, total	52.0	39.5	-24.1	34.9	25.9	23.0	-41.8

Source: Model simulation results

### Growth and poverty linkages at the sector level

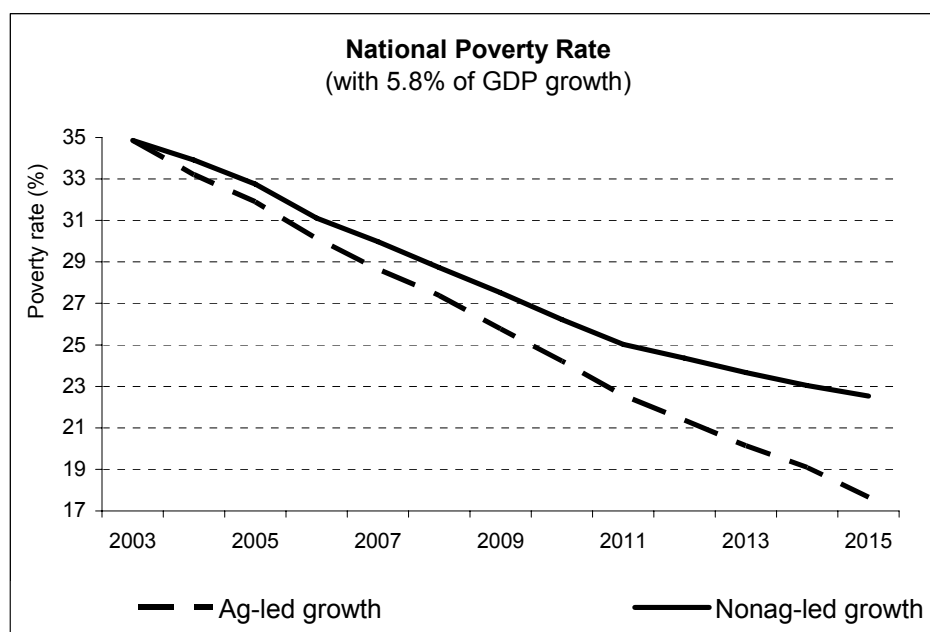
Given that the regional inequality will increase with business-as-usual growth pattern, the following simulations seek to compare the effects of growth driven by different sectors on poverty reduction and regional inequality. We first compare the effect of growth driven by the agricultural sector or by the nonagricultural sector. Given the same overall GDP growth, different sector level growth rate is assumed. For example, in the agriculture-led growth scenario, a more rapid growth is assumed for the agricultural sector, while the nonagriculture would grow along its current growth trend. Similar assumptions are also employed in the nonagriculture-led growth. The simulation results indicate that agriculture-led growth reduces poverty more than the nonagricultural growth (Figure 3) and such pro-poor growth is more effective in the poor region (Table 2).

**Table 2: Poverty rate in northern Ghana from different sector growth (2015)**

	1998/99	2015	
		Agriculture-led growth	Non agriculture-led growth
GDP annual growth rate		5.8	5.8
AgGDP annual growth rate		6.8	4.4
NonagGDP annual growth rate		4.8	6.9
National poverty rate	39.5	17.7	22.5
NORTHERN	69.2	47.3	54.5
UPPER_EAST	88.2	59.0	73.2
UPPER_WEST	83.9	61.2	69.7

*Source: Model simulation results*

**Figure 3: Poverty reductions in agriculture-led and nonagriculture-led growth scenarios**



*Source: Model simulation results*

We now examine the agriculture-led model more closely and compare the effect of growth driven by staple crops and livestock vs. growth driven by exportable agricultural commodities, including both traditional and nontraditional. Similar to the previous scenario, different subsector level growth rate is assumed, which results in a similar overall GDP and total agricultural GDP growth. The results show that growth engendered by staple crops and livestock reduces poverty much more both at the national level (Figure 4) and in the poor regions (Table 3).

The key conclusions from the above model simulations are:

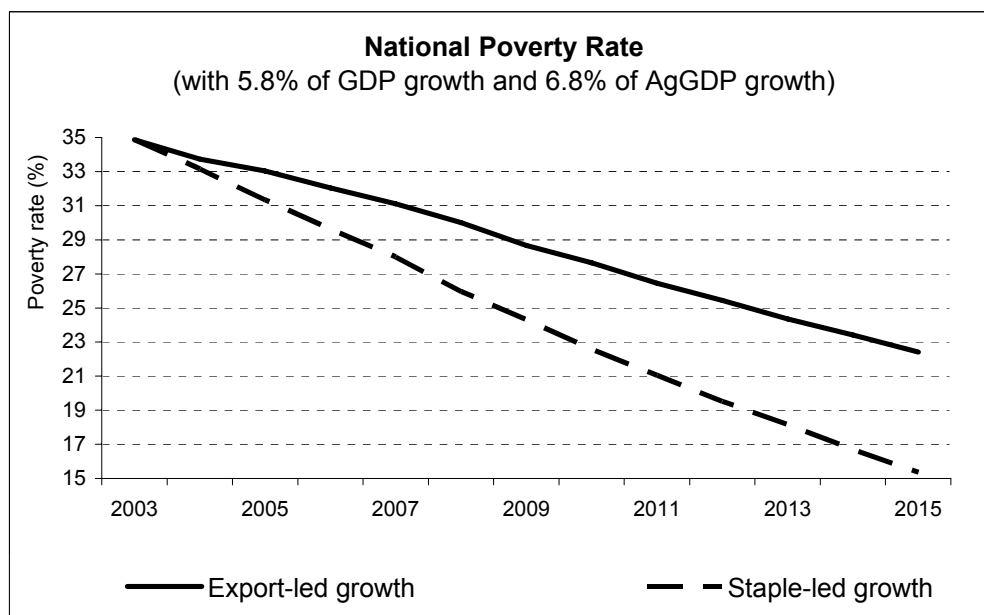
- At the present rate of growth, it is possible for the country to halve poverty by 2015 at the national level, but regional inequality will be worsened with the current patterns of growth.
- With a similar overall economic growth rate, growth led by the agricultural sector will be more effective in reducing poverty both at the national level and in the poor regions because of strong income and consumption linkages from agricultural growth.
- Within agriculture, growth in staple crops and livestock has more impact on poverty reduction especially in poor regions than growth in export crops, due to the broad-based nature of production of staple crops.

**Table 3: Poverty rate for the poorest three regions: Staple-led growth vs. export-led growth scenarios**

	1998/99	2015	
		Staple-led growth	Export-led growth
GDP annual growth rate		5.8	5.8
AgGDP annual growth rate		6.8	6.8
NonagGDP annual growth rate		4.8	4.8
National poverty rate	39.5	15.4	22.4
NORTHERN	69.2	41.7	56.7
UPPER_EAST	88.2	43.8	73.1
UPPER_WEST	83.9	51.4	68.9

*Source: Model simulation results*

**Figure 4: Poverty reductions in staple-led and agricultural export-led growth scenarios**



Source: Model simulation results

We pursue the last result to determine specific staple crops, whose growth will stimulate the highest poverty reduction in each of the three northern regions. The first step of the analysis is the identification of crops that have significant impact on income using consumption income of the GLSS surveys. This is done with a pooling of household data from the GLSS survey and time series data on production from the Ministry of Food and Agriculture.<sup>2</sup>

The econometric analysis shows that growth in maize, yam and groundnuts has large and significant positive effects on household income in the north. Based on such information, the model simulates the potential impact of rapid growth in these crops on the poverty reduction in the north. The regional level growth rate of the last five years for these crops (2000-04) is used in simulations. As a result, growth in groundnut generates the largest reduction in poverty in each of the three northern regions compared to growth in staples at the national level. Growth in groundnut output reduces poverty to 35.3% in the Northern region, 41.1% in the Upper East region and 50.2% in the Upper West region, by 2015 (Table 4 and Figures 5-7). No other crop in the Upper East region reduces poverty more than the generalized growth in national staples. In the Northern region, cassava growth reduces poverty more than a nationwide growth in staples; while in the Upper West region, cowpea is the crop that can influence poverty reduction more than a general increase in staples.

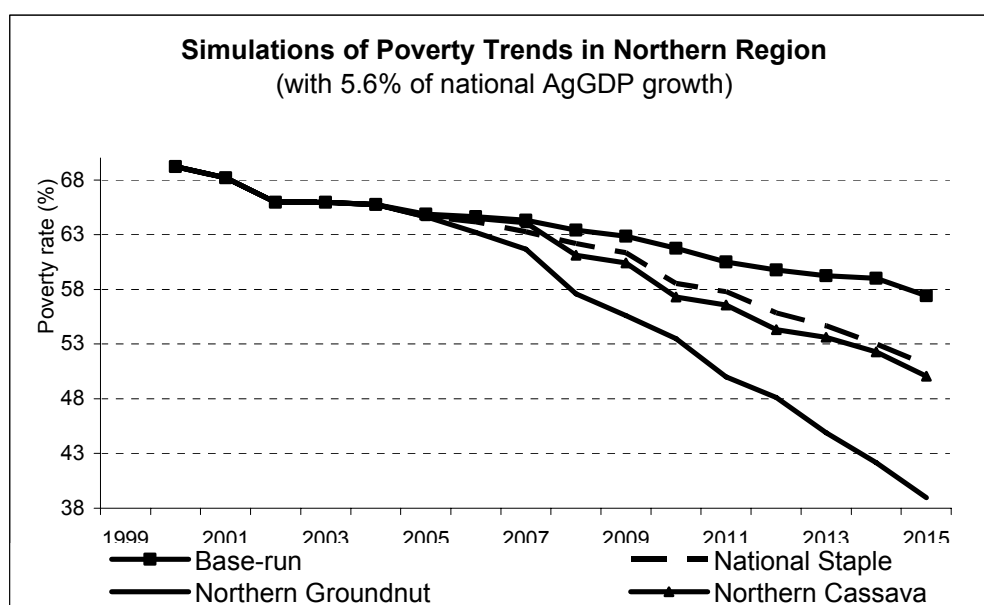
<sup>2</sup> The econometric regressions are done by Marc Rockmore of IFPRI and the authors acknowledge and thank him for his help in this study.

**Table 4: Effects of growth in productivity of staples on absolute poverty incidence by 2015**

	1998/99	2015				National Staples
		Base	Groundnut	Cassava	Cowpea	
AgGDP annual growth rate		4.9	5.5	5.6	5.6	5.6
National poverty rate		23.0	18.2	22.6	19.5	20.0
NORTHERN	69.2	65.7	35.3	49.2	-	49.3
UPPER_EAST	88.2	86.3	41.1	-	66.4	66.4
UPPER_WEST	83.9	76.0	50.2	68.3	55.2	63.4

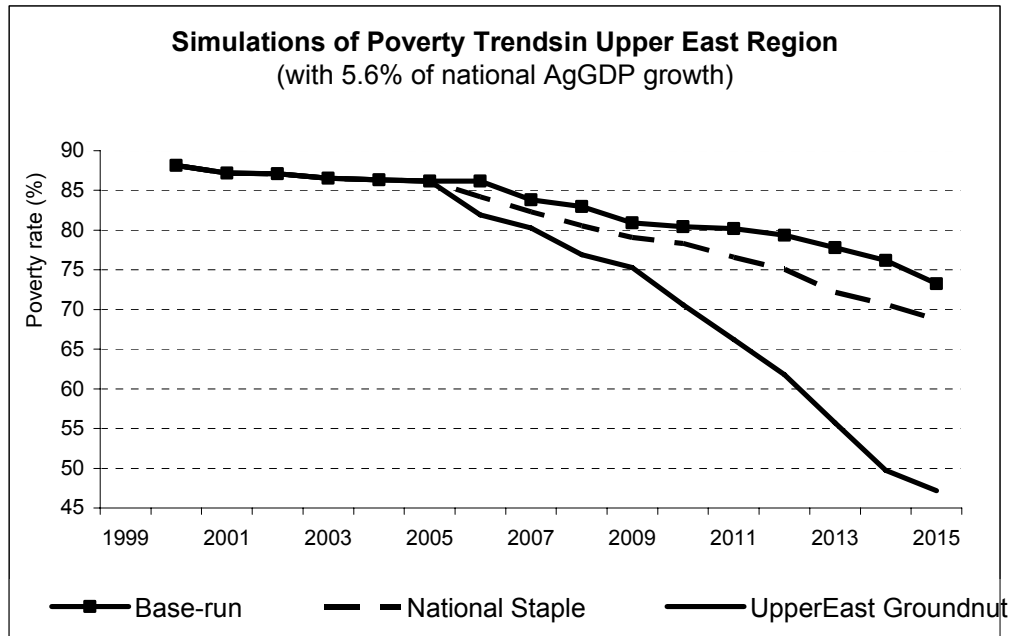
Source: Model simulation results

**Figure 5: Poverty reduction in Northern Region under different scenarios**



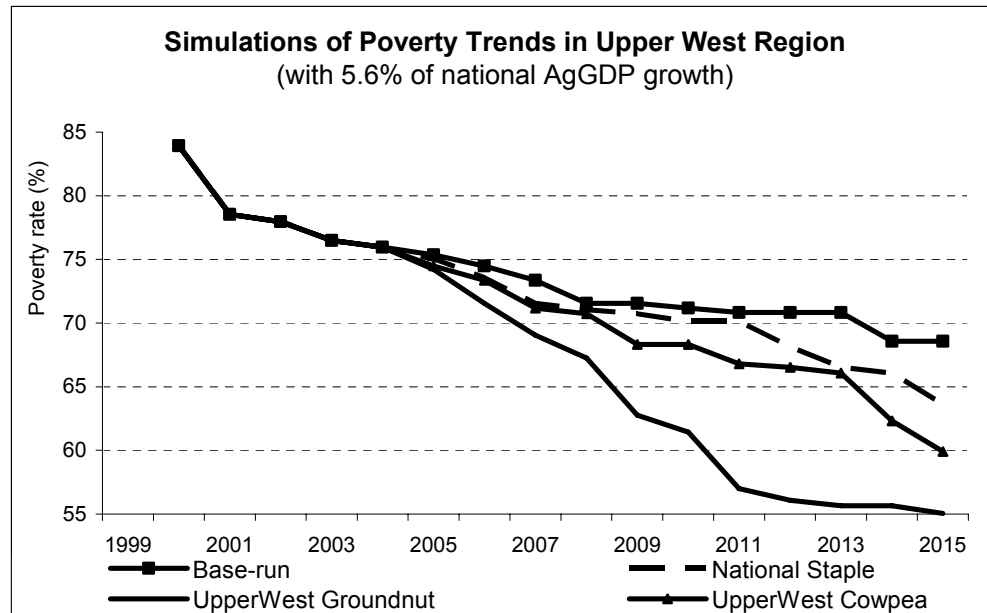
Source: Model simulation results

**Figure 6: Poverty reduction in Upper East Region under different scenarios**



Source: Model simulation results

**Figure 7: Poverty reduction in Upper West Region under different scenarios**



Source: Model simulation results

The model simulations identify groundnut, cassava and cowpea as the crops to target for pro-poor growth in northern Ghana. Both groundnut and cassava have significant forward linkage potentials through processing. For example, there are two oil processing enterprises in the Northern region that use



groundnut but supply of raw material is a major constraint (ODI and CEPA, 2005). Cowpea, on the other hand, is equally a high value crop with enormous demand within the country and across its borders. There is buoyant intra-regional trade in cowpea from which Ghana supplements her domestic production (Table 5). The importance of this trade is that the net inflow is towards Accra rather than the north further intensifying the unsatisfied demand for the crop within Ghana.

**Table 5: Supply and demand for cowpeas in selected countries of West and Central Africa (1990 – 1999)**

	Harvested Area (‘000 ha)	Average yield (t ha <sup>-1</sup> )	Production (‘000 t)	Consumption (kg capita <sup>-1</sup> year <sup>-1</sup> )	Demand <sup>1</sup> (‘000 t)	Surplus/ Deficit <sup>2</sup> (‘000 t)
Nigeria	3,066	0.548	1,680	18	2,160	-480
Niger	3,254	0.116	377	1.5	16	361
Mali	326	0.236	77	1.5	16	61
Benin	100	0.620	62	9	55	7
Ghana	85	0.659	56	9	169	-113
Cameroon	58	0.759	44	1.5	22	22
Togo	132	0.242	32	9	41	-9
Senegal	103	0.301	31	1.5	14	17
Chad	44	0.477	21	1.5	11	10
Côte d’Ivoire <sup>3</sup>	40	0.500	20	1.8	28	-8
Mauritania	52	0.327	17	2.5	25	-8
Burkina Faso	278	0.561	156	1.5	16	140
Total	7,538	-	2,573	-	2,573	0
World	12,763	-	7,562	-	-	-

*Source: Langyintuo et al (n.d.). Department of Agricultural Economics, Purdue University, 1145 Krannert Building, West Lafayette, IN 47907, USA*

*Notes: <sup>1</sup> Demand includes consumption demand and demand for seed. <sup>2</sup> Negative figures imply demand exceeds supply <sup>3</sup> Estimate available for only 1999 cropping season from Nestle, Côte d’Ivoire. Total may differ from the sum of country estimates because of rounding. Over 570,000 ha are cultivated in other parts of Africa.*

While cassava is widely known as a food security crop (Prudencio and Al-Hassan, 1994), the importance of groundnut and cowpea in bridging the hunger gap in northern Ghana is less well known in policy circles. Also, because they are high protein sources, they have an inherent value in enhancing nutrition security. The potential of groundnut and cowpea to improve soil nitrogen and to generate vegetative material for livestock feeding are additional benefits from increasing the production of these crops. The link with livestock is very important because livestock rearing is an important aspect of livelihood strategies in northern Ghana. They play both social and economic roles in livelihood strategies. Livestock income finances the purchase of inputs for crop production, food purchases when crops fail and serves as long-term investment capital. The diversification role of livestock is particularly important in reducing the vulnerability of households to food insecurity. The social capital function is

most prominent in the Upper East region where cattle are used as dowry. Whitehead's study of poverty in North East Ghana has identified large family sizes and large livestock populations as distinguishing the wealthy and secure household from the poor and destitute (Whitehead, n.d.).

## V. Summary and Conclusions

The development pattern in Ghana is characterised by a north-south divide in which the north lags far behind the south. While Ghana has achieved sustained growth and poverty reduction during the 1990s, there was an increase in inequality because poverty rates in some regions, particularly the three northern regions, changed little or even increased. Much of the growth has been generated by export agriculture in which northern Ghana has little or no contribution. This paper has set out to identify avenues for pro-poor growth in Ghana, focussing on agricultural opportunities, particularly in northern Ghana.

Using an economy-wide multimarket model, and based on time series production data and Ghana Living Standards Survey data of 1991/92 and 1998/99, simulations are made of the poverty reduction trends up to 2015 using different assumptions of sources of growth. The results show that agriculture-led growth has a larger poverty reducing effect than nonagriculture-led growth. Within agriculture, growth in staple crop production reduces poverty more than export crops. In northern Ghana, the staple crops whose growth exerts the largest effect on poverty reduction are groundnut, cassava and cowpea. The conclusion from both of these is that pro-poor growth is generated from activities and crops in which the poor in particular engage. The growth in agriculture led by export crops, which is concentrated in certain localities, has not trickled down to non-export crop producing areas in form of higher incomes. As Shepherd and Gyimah-Boadi (2004) have noted, liberalization is usually perceived as an international process, but for land-locked under-developed regions such as northern Ghana, which do not have advantages of 'core' exporting regions, there could be more significant benefits of regional liberalization than of international liberalization. In this regard, the commodities identified from the present analysis offer avenues for this regional liberalisation as a strategy for northern Ghana, which points to investments in infrastructure and institutional development to remove barriers to regional trade, including trade between northern Ghana and southern Ghana.

While the effects of the agriculture-led growth on poverty reduction are large, the projected poverty rates in the regions, particularly the Upper East, are still high. This implies a need for complementary avenues for poverty reduction, such as improved migration outcomes and private investment in economic production within northern Ghana. Ultimately, the regions must attract production investment to boost economic activity and generate local growth. The state must play a leading role in investing in productive and social infrastructure, as a way of facilitating the environment for private sector operators. The call for investments in economic infrastructure, though obvious and not new, is worth repeating because of the tendency for public agencies to assess the provision of that infrastructure in terms of financial benefits and measures of efficiency.

The main production constraints of the legumes are field and storage pests. Further investments in crop improvement and methods of crop management in the field are needed. The uneducated unskilled labour enters the informal job market where wages are low. The implication is for the enhancement of this labour with education and skills.

## References

- Aryeetey, Ernest and Andrew McKay (2004). Operationalizing Pro-Poor Growth: Ghana Case Study. Department for International Development, London, UK.
- Chamberlin, Jordan (2005). Spatial Perspectives on Development Opportunities in Ghana Draft. International Food Policy Research Institute, Washington D.C., USA.
- Diao, Xinshen, Peter Hazell, Danielle Resnick, and James Thurlow (2006). The Role of Agriculture in Development: Implications for Sub-Saharan Africa. Development Strategy and Governance Division Discussion Paper No. 29. International Food Policy Research Institute, Washington D.C, USA.
- Diao, Xinshen (2005). Analysing Growth Options and Poverty Reduction in Ghana: Preliminary Results of an Economy-wide, Multi-market Model of Ghana (1999-2015). Draft. International Food Policy Research Institute, Washington D.C, USA.
- Department for International Development (2004). Migration and pro-poor policy in sub-Saharan Africa. Briefing paper, Development Research Centre on Migration and Poverty.
- FAO (Food and Agriculture Organization of the United Nation). 2005. FAOSTAT. <http://www.Faostat.fao.org/> last time access: December 2005.
- GSS (Ghana Statistical Service). 2005. Quarterly Digest of Statistics, 2001 – 2005. Accra, Ghana.
- GSS (Ghana Statistical Service). 2004. Ghana Living Standard Survey Report, 1989/99. Accra, Ghana.
- Haggblade, S., Hazell P. and Brown, J. 1989. "Farm-Nonfarm Linkages in Rural Sub-Saharan Africa." *World Development*, 17(8): 1173-1202.
- Hazell, P. and Roell, A. 1983. "Rural Growth Linkages: Household Expenditure Patterns in Malaysia and Nigeria." IFPRI Research Report 41. Washington, DC: IFPRI.
- IMF (International Monetary Fund). 2005. Ghana: Statistics Appendix. IMF Country Report No 05/286. Washington, DC: IMF.
- Johnson, D.G. and Mellor, J.W. 1961. "The Role of Agriculture in Economic Development." *American Economic Review*, 51(4): 566-593.
- King, Robert P. and Derek Byerlee (1978). "Factor Intensities and Locational Linkages of Rural Consumption Patterns in Sierra Leone," *American Journal of Agricultural Economics* May 1978: 197-206.
- Langyintuo, A. S. Lowenberg-DeBoer, J., Faye, M., Lambert, D., Ibro, G., Moussa, B, Kergna, A., Kushwaha, S, Musa, S., and Ntougam, G. (n.d.). Cowpea Supply and Demand in West Africa. Purdue University.
- MoFA (Ministry of Food and Agriculture). 2005. Average Yield for Major Crops in Ghana. Accra, Ghana.
- Overseas Development Institute (ODI) and Center for Policy Analysis (CEPA) (2005). Economic Growth in Northern Ghana. Revised Report for DfID. Accra, Ghana.
- Prudencio, C.Y. and Ramatu Al-Hassan (1994). "The Food Security Stabilisation Roles of Cassava in Africa." *Food Policy Journal* Vol. No. 19, 57-64 Butterworth-Heinemann.
- Republic of Ghana (2005). Implementation of the Ghana Poverty Reduction Strategy, 2004 Annual Progress Report. National Development Planning Commission, Accra.
- Republic of Ghana (2005). Growth and Poverty Reduction Strategy (GPRS II). Coordinated programme for the Economic and Social Development of Ghana (2006 – 2009). Final Draft. National Development Planning Commission, Accra.
- Shepherd Andrew and E. Gyimah-Boadi (2004). Bridging the north south divide? Background Paper for the 2005 World Development Report. Draft 23/12/04.
- <http://siteresources.worldbank.org/INTWDR2006/>

- Vogel, S.J. 1994. "Structural Changes in Agriculture: Production Linkages and Agricultural Demand-Led Industrialization."  
*Oxford Economic Papers. New Series*, 46(1): 136-156.
- Whitehead, Ann (n.d.). Persistent Poverty in North East Ghana. Institute of Development Studies, University of Sussex.

## Appendix

### A1. List of agricultural commodities and nonagricultural sub-sectors in the EMM model

#### Agriculture:

Cereals: maize, rice, wheat, sorghum/millet;  
 Roots and tubers: cassava, yam, cocoyam;  
 Oilseeds and pulses: groundnut, beans and other pulses;  
 Cash crops: sugar, tobacco, vegetables for export, vegetables for domestic, pineapple;  
 Tree crops: cocoa, coffee, plantains, coconut, tree nuts, oil palm, fruits for export, fruits for domestic;  
 Livestock: beef, goat and sheep meats, poultry, pork, other meats, milk, eggs, fish;  
 Industrial crops and agricultural processing: cotton, rubber, wood, cocoa processing, fish processing, other processing;

#### Nonagriculture:

Mining, agriculture-related manufacturing, other manufacturing, electric and water, construction, transport, trade, finance, government, community and other services

### A2. Estimation and calculation of elasticities in the demand functions

Elasticities applied in the consumption demand functions are from the combination of econometric estimation and calculation based on a structural utility function, the Stone-Geary utility function, defined as the following:

$$(1) \quad U(c_1, c_2, \dots, c_I) = \prod_{i=1}^I (c_i - \gamma_i)^{\beta_i}$$

Where  $c_i$  is demand for good  $i$ ,  $\gamma_i$  is subsistence level of  $i$ , and  $\beta_i$  is the marginal budget share of good  $i$ .

Demand function for  $c_i$  derived from this utility function is called a linear expenditure system (LES) that has the following function form:

$$(2) \quad c_i = \frac{\beta_i \left( Y - \sum_{j=1}^I p_j \gamma_j \right)}{p_i} + \gamma_i$$

Where  $Y$  is household's total income,  $p_i$  is the price for good  $i$ .

Let  $s_i$  be the average budget (expenditure) share of good  $i$ , i.e.,  $s_i = \frac{p_i c_i}{Y}$ , and assume that  $\sum_{i=1}^I p_i c_i = Y$ , the income elasticity of demand for good  $i$  can be derived from (2) as following:

$$(3) \quad \varepsilon_i^Y = \frac{\partial c_i}{\partial Y} \cdot \frac{Y}{c_i} = \frac{\beta_i}{s_i},$$

i.e., the ratio between marginal and average budget share. The cross price elasticity of the demand is:

$$(4) \quad \varepsilon_{ij}^p = \frac{\partial c_i}{\partial p_j} \cdot \frac{p_j}{c_i} = -\frac{\beta_i p_j \gamma_j}{p_i c_i} = -\frac{\beta_i}{s_i} \cdot \frac{p_j \gamma_j}{Y}, i \neq j,$$

while the own price elasticity of the demand is:

$$(5) \quad \varepsilon_{ii}^p = \frac{\partial c_i}{\partial p_i} \cdot \frac{p_i}{c_i} = -\frac{\beta_i}{s_i} + \frac{\beta_i}{s_i} \sum_{j \neq i}^I \frac{p_j \gamma_j}{Y} = -\left( \varepsilon_i^Y + \sum_{j \neq i}^I \varepsilon_{ij}^p \right).$$

Commodity expenditure share,  $s_i$ , is given by data, data about the home consumption is used to define  $\gamma_i$ , and the income elasticity of the demand is econometrically estimated by the authors using a semi-log inverse function (RSLI) suggested by King

and Byerlee (1978). With this information, marginal budget share,  $\beta_i$ , can be derived from (3), as  $\beta_i = \mathcal{E}_i^Y s_i$ , while  $\mathcal{E}_{ij}^P$  can be derived from (4). In order to derive a non-zero cross price elasticity,  $\mathcal{E}_{ij}^P, \gamma_i$  has to be non-zero for commodities  $i$  and  $j$ . Because of a positive value of  $\gamma_j$ ,  $\mathcal{E}_{ij}^P$  is negative. Finally, the homogeneity condition (Equation (5)) gives  $\mathcal{E}_{ii}^P$ .

With all these elasticities, the demand function can also be written as a function of the income and price elasticities only, i.e.,

$$(6) \quad c_i = Y^{\mathcal{E}_i^Y} \prod_{j=1}^I p_j^{\mathcal{E}_{ij}^P}$$

Equation (6) is the one used in the model. Price elasticities in this equation vary across regions and household groups (rural vs. urban), and are different for different commodities due to the differences in  $s_i$  and  $\gamma_i$ . Table A1 presents income elasticities, Table A2 is the selected  $\gamma_i$  in the function used to derive the elasticities, while the price elasticities presented in tables A3 and A4 are the average over all regions for the rural and urban respectively.



**Table A1: Income elasticities in the EMM model**

	Wheat	Rice	Maize	Sorghum & millet	Cassava	Yam
Rural	0.90	0.91	0.42	0.21	0.36	0.40
Urban	0.80	0.82	0.20	0.12	0.10	0.20
	Cocoyam	Plantains	Groundnut	Beans	Vegetables for export	Vegetables domestic
Rural	0.30	0.30	1.22	0.51	1.04	0.91
Urban	0.10	0.10	1.20	0.30	1.00	0.90
	Fruits for export	Fruits domestic	Pineapple	Nuts	Coconut	Oil Palm
Rural	1.03	0.81	1.03	1.10	0.60	0.60
Urban	1.00	0.80	1.00	1.10	0.50	0.50
	Sugar	Cocoa	Coffee	Tobacco	Poultry	Eggs
Rural	0.71	1.10	1.10	1.10	1.52	1.30
Urban	0.50	1.20	1.20	1.10	1.60	1.20
	Beef	Milk	Sheep & goat meats	Pork	Other meat	Fish
Rural	1.21	1.20	1.11	1.04	0.90	1.20
Urban	1.45	1.30	1.00	1.00	0.80	1.30
	Other ag manufacturing	Other Manufacturing	Electric & water	Construction	Transport	Trade
Rural	1.00	1.30	1.00	1.00	1.00	1.00
Urban	1.00	1.30	1.00	1.00	1.00	1.00
	Transport	Trade	Finance	Government	Community	
Rural	1.00	1.00	1.00	1.10	1.00	
Urban	1.00	1.00	1.00	1.30	1.00	

**Table A2: Subsistence consumption level per capita in the EMM model (kg/year)**

	Wheat	Rice	Maize	Sorghum & millet	Cassava	Yam
Rural	3.87	10.57	15.76	9.28	41.28	16.98
Urban	5.49	10.89	6.21	1.73	17.34	12.19

	Cocoyam	Plantains	Groundnut	Beans	Vegetables	Fruits
Rural	10.78	14.09	0.95	1.43	0.15	0.03
Urban	5.03	8.08	0.83	0.57	0.20	0.13

	Poultry	Eggs	Beef	Milk	Sheep & goat meats	Pork
Rural	0.02	0.01	0.00	0.02	0.00	0.00
Urban	0.04	0.02	0.01	0.08	0.01	0.00

	Other meat	Fish
Rural	0.02	0.07
Urban	0.02	0.09

**Table A3: Average price elasticity in demand, rural**

	Maize	Rice	Wheat	Sorghum/Millet	Cassava	Yam
Maize	-3.99E-01	-5.68E-03	-1.55E-03	-7.91E-03	-2.41E-03	-2.06E-03
Rice	-9.36E-03	-8.65E-01	-3.72E-03	-7.97E-03	-5.60E-03	-4.07E-03
Wheat	-9.28E-03	-1.31E-02	-8.58E-01	-3.24E-03	-5.66E-03	-3.98E-03
Sorghum/Millet	-2.80E-03	-3.44E-03	-1.76E-04	-1.98E-01	-3.30E-04	-4.97E-04
Cassava	-3.77E-03	-5.54E-03	-1.54E-03	-1.20E-03	-3.47E-01	-1.75E-03
Yam	-4.68E-03	-5.53E-03	-1.54E-03	-2.72E-03	-2.70E-03	-3.81E-01
Cocoyam	-2.59E-03	-3.96E-03	-1.19E-03	-1.07E-04	-1.81E-03	-1.72E-03
Plantains	-2.43E-03	-4.32E-03	-1.20E-03	-7.78E-05	-2.02E-03	-1.37E-03
Groundnut	-1.58E-02	-1.75E-02	-4.53E-03	-2.02E-02	-6.63E-03	-6.20E-03
Beans	-8.26E-03	-7.61E-03	-1.69E-03	-1.69E-02	-2.38E-03	-2.17E-03
VegExp	-1.09E-02	-1.50E-02	-4.31E-03	-6.16E-03	-6.54E-03	-4.95E-03
VegDom	-1.19E-02	-1.30E-02	-3.53E-03	-1.27E-02	-5.28E-03	-4.52E-03
Pineapple	-9.30E-03	-1.48E-02	-4.52E-03	-8.77E-04	-6.62E-03	-4.62E-03
Coconut	-5.77E-03	-8.89E-03	-2.80E-03	-3.32E-04	-4.05E-03	-1.76E-03
FruitsExp	-9.97E-03	-1.48E-02	-4.43E-03	-4.93E-03	-6.22E-03	-4.47E-03
FruitsDom	-9.21E-03	-1.15E-02	-3.26E-03	-1.26E-02	-4.93E-03	-2.98E-03
Coffee	-1.30E-02	-1.57E-02	-4.63E-03	-1.37E-02	-6.29E-03	-4.39E-03
Cocoa	-1.03E-02	-1.61E-02	-4.79E-03	-2.85E-03	-6.86E-03	-4.92E-03
Sugar	-9.22E-03	-1.01E-02	-2.81E-03	-7.88E-03	-4.26E-03	-3.49E-03
Tobacco	-1.57E-02	-1.67E-02	-3.89E-03	-2.43E-02	-6.03E-03	-5.81E-03
Nuts	-1.38E-02	-1.65E-02	-4.19E-03	-1.90E-02	-7.21E-03	-5.41E-03
Beef	-1.32E-02	-1.69E-02	-5.03E-03	-6.80E-03	-6.72E-03	-6.07E-03
Poultry	-1.98E-02	-2.26E-02	-5.70E-03	-2.43E-02	-8.70E-03	-7.05E-03
Sheep Meat	-1.42E-02	-1.68E-02	-4.14E-03	-2.05E-02	-6.02E-03	-5.01E-03
Pork	-2.46E-02	-1.37E-02	-3.26E-03	-3.80E-02	-4.72E-03	-5.31E-03
Other Meat	-8.52E-03	-1.27E-02	-3.53E-03	-2.85E-03	-5.83E-03	-4.33E-03
Milk	-1.20E-02	-1.76E-02	-5.37E-03	-3.64E-03	-7.18E-03	-4.86E-03
Eggs	-1.34E-02	-1.88E-02	-5.64E-03	-4.60E-03	-8.11E-03	-5.68E-03
Fish	-1.22E-02	-1.75E-02	-5.09E-03	-4.29E-03	-7.99E-03	-5.98E-03
CocoaPr	-1.12E-02	-1.76E-02	-5.23E-03	-3.11E-03	-7.48E-03	-5.37E-03
FishPr	-1.08E-02	-1.61E-02	-4.66E-03	-3.89E-03	-7.29E-03	-5.35E-03
OtherPr	-1.52E-02	-1.91E-02	-5.29E-03	-1.54E-02	-7.73E-03	-6.00E-03
AgMfc	-1.19E-02	-1.44E-02	-4.22E-03	-5.22E-03	-6.37E-03	-4.96E-03
Manufacturing	-1.39E-02	-1.88E-02	-5.36E-03	-8.95E-03	-8.13E-03	-6.17E-03
Electric/Water	-1.42E-02	-1.41E-02	-3.81E-03	-1.56E-02	-5.64E-03	-4.99E-03
Construction	-9.12E-03	-1.41E-02	-4.34E-03	-5.19E-04	-6.30E-03	-4.56E-03
Trade	-1.13E-02	-1.48E-02	-4.02E-03	-1.33E-02	-5.67E-03	-4.23E-03
Finance	-7.24E-03	-1.47E-02	-4.62E-03	-7.10E-05	-5.91E-03	-4.20E-03
Government	-9.53E-03	-1.27E-02	-3.92E-03	-4.19E-04	-6.47E-03	-4.79E-03
Community	-1.28E-02	-1.43E-02	-4.08E-03	-1.08E-02	-5.57E-03	-4.50E-03

**Table A3: Continued.**

	Cocoyam	Plantains	Groundnut	Beans	VegExp	VegDom
Maize	-1.02E-03	-8.58E-04	-6.48E-04	-7.05E-04	-1.80E-06	-3.50E-05
Rice	-2.65E-03	-2.60E-03	-1.17E-03	-1.01E-03	-4.13E-06	-6.27E-05
Wheat	-2.79E-03	-2.54E-03	-1.06E-03	-7.90E-04	-4.17E-06	-5.97E-05
Sorghum/Millet	-1.63E-05	-4.40E-06	-5.04E-04	-9.34E-04	-5.43E-07	-2.16E-05
Cassava	-1.05E-03	-1.14E-03	-3.84E-04	-2.88E-04	-1.79E-06	-2.36E-05
Yam	-1.56E-03	-1.12E-03	-5.61E-04	-3.93E-04	-1.85E-06	-2.95E-05
Cocoyam	-2.86E-01	-1.12E-03	-3.47E-04	-1.40E-04	-1.37E-06	-1.71E-05
Plantains	-1.25E-03	-2.86E-01	-3.02E-04	-1.39E-04	-1.36E-06	-1.55E-05
Groundnut	-3.48E-03	-2.73E-03	-1.13E+00	-2.08E-03	-5.30E-06	-1.01E-04
Beans	-7.05E-04	-6.28E-04	-1.04E-03	-4.71E-01	-2.11E-06	-5.20E-05
VegExp	-3.33E-03	-2.99E-03	-1.28E-03	-1.02E-03	-9.80E-01	-7.02E-05
VegDom	-2.37E-03	-1.93E-03	-1.39E-03	-1.44E-03	-4.01E-06	-8.51E-01
Pineapple	-3.71E-03	-3.57E-03	-1.05E-03	-6.50E-04	-4.89E-06	-5.89E-05
Coconut	-1.30E-03	-1.60E-03	-4.95E-04	-4.55E-04	-2.83E-06	-3.73E-05
FruitsExp	-3.51E-03	-2.88E-03	-1.19E-03	-8.79E-04	-4.73E-06	-6.75E-05
FruitsDom	-2.06E-03	-2.03E-03	-8.78E-04	-8.29E-04	-3.55E-06	-5.49E-05
Coffee	-2.70E-03	-2.47E-03	-1.40E-03	-1.43E-03	-4.75E-06	-7.96E-05
Cocoa	-3.81E-03	-3.55E-03	-1.27E-03	-8.15E-04	-5.14E-06	-6.79E-05
Sugar	-1.83E-03	-1.63E-03	-1.04E-03	-1.03E-03	-3.17E-06	-5.62E-05
Tobacco	-2.70E-03	-2.13E-03	-2.08E-03	-2.48E-03	-4.81E-06	-1.03E-04
Nuts	-2.58E-03	-2.46E-03	-1.65E-03	-1.84E-03	-4.88E-06	-8.95E-05
Beef	-4.47E-03	-3.48E-03	-1.69E-03	-1.23E-03	-5.53E-06	-8.39E-05
Poultry	-4.00E-03	-3.92E-03	-2.49E-03	-2.67E-03	-6.67E-06	-1.24E-04
Sheep Meat	-2.75E-03	-2.41E-03	-1.86E-03	-2.07E-03	-4.83E-06	-9.13E-05
Pork	-6.48E-04	-5.71E-04	-2.75E-03	-3.96E-03	-4.36E-06	-1.32E-04
Other Meat	-3.69E-03	-3.64E-03	-1.00E-03	-5.68E-04	-4.11E-06	-5.21E-05
Milk	-3.65E-03	-3.42E-03	-1.39E-03	-1.01E-03	-5.54E-06	-7.81E-05
Eggs	-4.43E-03	-3.99E-03	-1.55E-03	-1.07E-03	-6.02E-06	-8.53E-05
Fish	-3.85E-03	-3.59E-03	-1.38E-03	-9.51E-04	-5.57E-06	-7.84E-05
CocoaPr	-4.15E-03	-3.88E-03	-1.39E-03	-8.90E-04	-5.60E-06	-7.41E-05
FishPr	-3.69E-03	-3.43E-03	-1.26E-03	-8.55E-04	-5.12E-06	-7.04E-05
OtherPr	-3.74E-03	-3.32E-03	-1.83E-03	-1.74E-03	-5.92E-06	-9.72E-05
AgMfc	-2.44E-03	-2.77E-03	-1.25E-03	-1.05E-03	-4.43E-06	-7.11E-05
Manufacturing	-4.11E-03	-3.89E-03	-1.64E-03	-1.33E-03	-5.88E-06	-8.86E-05
Electric/Water	-2.40E-03	-1.80E-03	-1.54E-03	-1.75E-03	-4.53E-06	-8.64E-05
Construction	-3.51E-03	-2.96E-03	-1.02E-03	-6.01E-04	-4.65E-06	-6.02E-05
Trade	-3.01E-03	-2.68E-03	-1.43E-03	-1.36E-03	-4.53E-06	-7.26E-05
Finance	-4.29E-03	-3.65E-03	-1.17E-03	-4.25E-04	-4.71E-06	-4.98E-05
Government	-3.76E-03	-3.09E-03	-9.99E-04	-5.62E-04	-4.30E-06	-5.95E-05
Community	-2.96E-03	-2.58E-03	-1.56E-03	-1.50E-03	-4.55E-06	-7.79E-05

**Table A3: Continued.**

	Pineapple	Coconut	FruitsExp	FruitsDom	Coffee	Cocoa
Maize	-1.40E-06	-2.69E-05	-3.43E-06	-5.25E-06	-9.82E-08	-7.76E-06
Rice	-3.81E-06	-7.05E-05	-8.45E-06	-9.12E-06	-1.86E-07	-2.06E-05
Wheat	-4.08E-06	-7.82E-05	-8.86E-06	-9.07E-06	-1.93E-07	-2.15E-05
Sorghum/Millet	-1.41E-08	-5.19E-07	-1.44E-06	-6.56E-06	-8.75E-08	-8.47E-07
Cassava	-1.64E-06	-3.60E-05	-3.40E-06	-4.12E-06	-6.19E-08	-8.12E-06
Yam	-1.61E-06	-1.90E-05	-3.45E-06	-3.20E-06	-7.08E-08	-8.52E-06
Cocoyam	-1.42E-06	-1.54E-05	-2.99E-06	-2.44E-06	-4.79E-08	-7.27E-06
Plantains	-1.52E-06	-2.11E-05	-2.73E-06	-2.67E-06	-4.89E-08	-7.54E-06
Groundnut	-4.06E-06	-5.89E-05	-1.01E-05	-1.04E-05	-2.49E-07	-2.43E-05
Beans	-1.25E-06	-2.71E-05	-3.76E-06	-4.93E-06	-1.28E-07	-7.81E-06
VegExp	-4.56E-06	-8.17E-05	-9.79E-06	-1.02E-05	-2.05E-07	-2.38E-05
VegDom	-3.14E-06	-6.14E-05	-7.99E-06	-9.04E-06	-1.97E-07	-1.80E-05
Pineapple	-9.82E-01	-8.91E-05	-1.04E-05	-1.11E-05	-2.16E-07	-2.68E-05
Coconut	-2.88E-06	-5.71E-01	-6.82E-06	-8.17E-06	-1.58E-07	-1.46E-05
FruitsExp	-4.67E-06	-9.51E-05	-9.81E-01	-1.19E-05	-2.28E-07	-2.45E-05
FruitsDom	-3.59E-06	-8.18E-05	-8.57E-06	-7.62E-01	-2.01E-07	-1.73E-05
Coffee	-4.67E-06	-1.05E-04	-1.09E-05	-1.34E-05	-1.04E+00	-2.44E-05
Cocoa	-5.39E-06	-9.06E-05	-1.09E-05	-1.07E-05	-2.28E-07	-1.04E+00
Sugar	-2.60E-06	-5.07E-05	-6.08E-06	-6.91E-06	-1.46E-07	-1.45E-05
Tobacco	-3.15E-06	-4.72E-05	-8.60E-06	-8.12E-06	-2.31E-07	-1.92E-05
Nuts	-3.86E-06	-7.93E-05	-9.49E-06	-1.19E-05	-2.45E-07	-2.09E-05
Beef	-5.25E-06	-7.12E-05	-1.19E-05	-1.05E-05	-2.39E-07	-2.95E-05
Poultry	-5.57E-06	-8.18E-05	-1.25E-05	-1.36E-05	-3.19E-07	-3.11E-05
Sheep Meat	-4.09E-06	-5.59E-05	-9.14E-06	-9.99E-06	-2.60E-07	-2.24E-05
Pork	-1.65E-06	-1.57E-05	-4.25E-06	-5.88E-06	-1.88E-07	-1.35E-05
Other Meat	-4.30E-06	-5.62E-05	-7.91E-06	-8.64E-06	-1.48E-07	-2.11E-05
Milk	-5.77E-06	-1.10E-04	-1.21E-05	-1.26E-05	-2.75E-07	-3.04E-05
Eggs	-6.03E-06	-1.08E-04	-1.34E-05	-1.40E-05	-2.78E-07	-3.21E-05
Fish	-5.28E-06	-9.92E-05	-1.14E-05	-1.21E-05	-2.38E-07	-2.77E-05
CocoaPr	-5.88E-06	-9.88E-05	-1.19E-05	-1.17E-05	-2.48E-07	-3.09E-05
FishPr	-4.96E-06	-8.95E-05	-1.06E-05	-1.10E-05	-2.13E-07	-2.58E-05
OtherPr	-5.21E-06	-9.44E-05	-1.21E-05	-1.35E-05	-2.81E-07	-2.85E-05
AgMfc	-4.09E-06	-8.32E-05	-8.30E-06	-9.18E-06	-2.36E-07	-2.27E-05
Manufacturing	-5.55E-06	-9.77E-05	-1.20E-05	-1.27E-05	-2.71E-07	-2.95E-05
Electric/Water	-3.16E-06	-7.91E-05	-8.75E-06	-1.08E-05	-2.02E-07	-1.80E-05
Construction	-4.77E-06	-9.09E-05	-1.02E-05	-1.04E-05	-1.97E-07	-2.39E-05
Trade	-4.05E-06	-6.92E-05	-9.32E-06	-1.02E-05	-2.24E-07	-2.26E-05
Finance	-5.75E-06	-5.12E-05	-1.03E-05	-7.38E-06	-2.16E-07	-3.02E-05
Government	-4.25E-06	-8.20E-05	-9.68E-06	-1.02E-05	-1.90E-07	-2.12E-05
Community	-3.95E-06	-6.13E-05	-8.79E-06	-8.09E-06	-2.11E-07	-2.28E-05

**Table A3: Continued.**

	Sugar	Tobacco	Nuts	Beef	Poultry	Sheep Meat
Maize	-2.61E-07	-6.55E-06	-2.65E-07	-5.56E-06	-2.85E-05	-7.57E-06
Rice	-4.74E-07	-1.16E-05	-5.06E-07	-1.20E-05	-5.39E-05	-1.47E-05
Wheat	-4.64E-07	-9.52E-06	-4.51E-07	-1.25E-05	-4.78E-05	-1.28E-05
Sorghum/Millet	-1.01E-07	-6.33E-06	-2.58E-07	-8.23E-07	-2.07E-05	-7.75E-06
Cassava	-1.91E-07	-3.91E-06	-2.12E-07	-4.11E-06	-1.92E-05	-4.82E-06
Yam	-2.22E-07	-5.49E-06	-2.25E-07	-5.83E-06	-2.28E-05	-5.95E-06
Cocoyam	-1.28E-07	-2.81E-06	-1.18E-07	-4.74E-06	-1.43E-05	-3.60E-06
Plantains	-1.27E-07	-2.47E-06	-1.25E-07	-4.10E-06	-1.55E-05	-3.50E-06
Groundnut	-7.29E-07	-2.17E-05	-7.60E-07	-1.79E-05	-8.91E-05	-2.44E-05
Beans	-3.62E-07	-1.30E-05	-4.24E-07	-6.55E-06	-4.79E-05	-1.36E-05
VegExp	-5.41E-07	-1.22E-05	-5.44E-07	-1.42E-05	-5.78E-05	-1.54E-05
VegDom	-5.48E-07	-1.49E-05	-5.69E-07	-1.24E-05	-6.16E-05	-1.66E-05
Pineapple	-4.76E-07	-8.56E-06	-4.61E-07	-1.45E-05	-5.17E-05	-1.40E-05
Coconut	-3.00E-07	-4.15E-06	-3.06E-07	-6.36E-06	-2.46E-05	-6.18E-06
FruitsExp	-5.01E-07	-1.05E-05	-5.11E-07	-1.48E-05	-5.26E-05	-1.41E-05
FruitsDom	-4.09E-07	-7.15E-06	-4.59E-07	-9.37E-06	-4.10E-05	-1.11E-05
Coffee	-5.76E-07	-1.35E-05	-6.30E-07	-1.42E-05	-6.40E-05	-1.91E-05
Cocoa	-5.35E-07	-1.05E-05	-5.02E-07	-1.64E-05	-5.81E-05	-1.54E-05
Sugar	-6.63E-01	-1.07E-05	-4.23E-07	-9.61E-06	-4.64E-05	-1.23E-05
Tobacco	-7.20E-07	-1.03E+00	-8.37E-07	-1.48E-05	-9.52E-05	-2.68E-05
Nuts	-6.48E-07	-1.91E-05	-1.04E+00	-1.25E-05	-7.70E-05	-2.16E-05
Beef	-6.36E-07	-1.46E-05	-5.40E-07	-1.14E+00	-7.29E-05	-1.87E-05
Poultry	-9.13E-07	-2.78E-05	-9.88E-07	-2.17E-05	-1.41E+00	-3.24E-05
Sheep Meat	-6.56E-07	-2.13E-05	-7.56E-07	-1.51E-05	-8.81E-05	-1.03E+00
Pork	-1.00E-06	-3.26E-05	-9.06E-07	-1.81E-05	-1.25E-04	-2.98E-05
Other Meat	-4.14E-07	-9.03E-06	-4.13E-07	-1.16E-05	-4.82E-05	-1.19E-05
Milk	-6.11E-07	-1.15E-05	-5.54E-07	-1.73E-05	-6.26E-05	-1.69E-05
Eggs	-6.55E-07	-1.32E-05	-6.18E-07	-1.97E-05	-7.16E-05	-1.78E-05
Fish	-6.12E-07	-1.27E-05	-6.24E-07	-1.56E-05	-6.18E-05	-1.65E-05
CocoaPr	-5.83E-07	-1.14E-05	-5.48E-07	-1.78E-05	-6.34E-05	-1.68E-05
FishPr	-5.49E-07	-1.15E-05	-5.64E-07	-1.46E-05	-5.70E-05	-1.49E-05
OtherPr	-7.26E-07	-1.83E-05	-7.49E-07	-1.85E-05	-8.21E-05	-2.20E-05
AgMfc	-5.70E-07	-1.13E-05	-5.23E-07	-1.28E-05	-5.57E-05	-1.54E-05
Manufacturing	-6.79E-07	-1.56E-05	-6.90E-07	-1.76E-05	-7.43E-05	-1.98E-05
Electric/Water	-6.40E-07	-1.68E-05	-6.31E-07	-1.30E-05	-6.45E-05	-1.73E-05
Construction	-4.72E-07	-8.43E-06	-4.54E-07	-1.31E-05	-4.32E-05	-1.21E-05
Trade	-5.38E-07	-1.41E-05	-5.59E-07	-1.48E-05	-6.44E-05	-1.78E-05
Finance	-4.03E-07	-7.54E-06	-3.63E-07	-1.92E-05	-5.38E-05	-1.58E-05
Government	-4.52E-07	-8.72E-06	-4.78E-07	-1.16E-05	-4.25E-05	-1.11E-05
Community	-5.94E-07	-1.53E-05	-5.40E-07	-1.65E-05	-6.99E-05	-1.81E-05

**Table A3: Continued.**

	Pork	Other meat	Milk	Eggs	Fish	CocoaPr
Maize	-5.79E-06	-1.83E-05	-5.90E-06	-8.46E-06	-2.79E-06	-8.03E-07
Rice	-5.24E-06	-4.52E-05	-1.47E-05	-1.99E-05	-6.76E-06	-2.13E-06
Wheat	-4.38E-06	-4.42E-05	-1.58E-05	-2.10E-05	-6.90E-06	-2.23E-06
Sorghum/Millet	-2.75E-06	-4.25E-06	-5.85E-07	-1.14E-06	-4.76E-07	-8.77E-08
Cassava	-1.45E-06	-2.04E-05	-5.43E-06	-8.04E-06	-3.04E-06	-8.41E-07
Yam	-2.76E-06	-2.10E-05	-5.51E-06	-8.18E-06	-3.13E-06	-8.82E-07
Cocoyam	-3.71E-07	-1.97E-05	-4.57E-06	-7.03E-06	-2.22E-06	-7.52E-07
Plantains	-3.63E-07	-2.16E-05	-4.75E-06	-7.04E-06	-2.30E-06	-7.80E-07
Groundnut	-1.58E-05	-5.38E-05	-1.74E-05	-2.47E-05	-7.98E-06	-2.52E-06
Beans	-1.14E-05	-1.52E-05	-6.36E-06	-8.51E-06	-2.76E-06	-8.09E-07
VegExp	-6.06E-06	-5.33E-05	-1.69E-05	-2.32E-05	-7.81E-06	-2.47E-06
VegDom	-1.05E-05	-3.86E-05	-1.36E-05	-1.88E-05	-6.28E-06	-1.86E-06
Pineapple	-2.46E-06	-5.98E-05	-1.88E-05	-2.49E-05	-7.94E-06	-2.78E-06
Coconut	-7.56E-07	-2.53E-05	-1.16E-05	-1.45E-05	-4.82E-06	-1.51E-06
FruitsExp	-2.85E-06	-4.95E-05	-1.78E-05	-2.49E-05	-7.70E-06	-2.54E-06
FruitsDom	-2.84E-06	-3.89E-05	-1.33E-05	-1.88E-05	-5.90E-06	-1.79E-06
Coffee	-6.05E-06	-4.44E-05	-1.94E-05	-2.49E-05	-7.73E-06	-2.53E-06
Cocoa	-4.06E-06	-5.90E-05	-2.00E-05	-2.67E-05	-8.37E-06	-2.93E-06
Sugar	-8.16E-06	-3.15E-05	-1.09E-05	-1.48E-05	-5.03E-06	-1.51E-06
Tobacco	-1.79E-05	-4.62E-05	-1.38E-05	-2.02E-05	-7.01E-06	-1.99E-06
Nuts	-1.13E-05	-4.81E-05	-1.51E-05	-2.14E-05	-7.85E-06	-2.17E-06
Beef	-9.76E-06	-5.86E-05	-2.04E-05	-2.96E-05	-8.48E-06	-3.05E-06
Poultry	-2.00E-05	-7.20E-05	-2.19E-05	-3.19E-05	-9.99E-06	-3.22E-06
Sheep Meat	-1.30E-05	-4.86E-05	-1.61E-05	-2.16E-05	-7.25E-06	-2.32E-06
Pork	-9.45E-01	-2.47E-05	-1.16E-05	-1.75E-05	-4.51E-06	-1.40E-06
Other Meat	-2.64E-06	-8.54E-01	-1.36E-05	-2.01E-05	-6.83E-06	-2.18E-06
Milk	-5.31E-06	-5.82E-05	-1.14E+00	-2.92E-05	-9.06E-06	-3.15E-06
Eggs	-6.29E-06	-6.74E-05	-2.30E-05	-1.23E+00	-9.71E-06	-3.32E-06
Fish	-4.47E-06	-6.32E-05	-1.96E-05	-2.67E-05	-1.14E+00	-2.87E-06
CocoaPr	-4.42E-06	-6.43E-05	-2.18E-05	-2.91E-05	-9.13E-06	-1.14E+00
FishPr	-4.03E-06	-5.98E-05	-1.80E-05	-2.50E-05	-8.64E-06	-2.67E-06
OtherPr	-1.17E-05	-6.03E-05	-2.07E-05	-2.88E-05	-9.30E-06	-2.95E-06
AgMfc	-7.17E-06	-4.54E-05	-1.77E-05	-2.08E-05	-7.72E-06	-2.35E-06
Manufacturing	-7.70E-06	-6.72E-05	-2.11E-05	-2.87E-05	-9.72E-06	-3.05E-06
Electric/Water	-1.34E-05	-3.96E-05	-1.42E-05	-1.93E-05	-6.92E-06	-1.86E-06
Construction	-1.36E-06	-5.26E-05	-1.74E-05	-2.26E-05	-7.87E-06	-2.47E-06
Trade	-8.69E-06	-4.79E-05	-1.59E-05	-2.23E-05	-6.93E-06	-2.34E-06
Finance	-1.85E-06	-5.59E-05	-1.91E-05	-2.67E-05	-7.49E-06	-3.13E-06
Government	-1.08E-06	-5.60E-05	-1.50E-05	-2.13E-05	-7.43E-06	-2.20E-06
Community	-1.35E-05	-4.56E-05	-1.64E-05	-2.29E-05	-6.73E-06	-2.36E-06

**Table A3: Continued.**

	FishPr	OtherPr	AgMfc	Manufacturing	Electric/Water	Construction
Maize	-1.19E-06	-5.36E-06	-9.94E-06	-2.86E-04	-5.82E-05	-8.58E-05
Rice	-2.99E-06	-1.08E-05	-2.05E-05	-6.41E-04	-9.35E-05	-2.26E-04
Wheat	-3.05E-06	-1.05E-05	-2.11E-05	-6.42E-04	-8.86E-05	-2.44E-04
Sorghum/Millet	-2.22E-07	-3.50E-06	-9.89E-07	-1.10E-04	-3.60E-05	-5.21E-07
Cassava	-1.34E-06	-4.20E-06	-7.58E-06	-2.57E-04	-3.99E-05	-9.87E-05
Yam	-1.35E-06	-4.61E-06	-9.56E-06	-2.85E-04	-4.48E-05	-9.90E-05
Cocoyam	-1.03E-06	-3.16E-06	-5.19E-06	-2.09E-04	-2.37E-05	-8.40E-05
Plantains	-1.06E-06	-3.12E-06	-6.54E-06	-2.20E-04	-1.98E-05	-7.89E-05
Groundnut	-3.52E-06	-1.56E-05	-2.67E-05	-8.38E-04	-1.53E-04	-2.46E-04
Beans	-1.19E-06	-7.40E-06	-1.12E-05	-3.40E-04	-8.68E-05	-7.22E-05
VegExp	-3.47E-06	-1.22E-05	-2.28E-05	-7.29E-04	-1.09E-04	-2.71E-04
VegDom	-2.72E-06	-1.14E-05	-2.10E-05	-6.28E-04	-1.19E-04	-2.00E-04
Pineapple	-3.60E-06	-1.15E-05	-2.26E-05	-7.37E-04	-8.15E-05	-2.98E-04
Coconut	-2.10E-06	-6.74E-06	-1.49E-05	-4.20E-04	-6.59E-05	-1.83E-04
FruitsExp	-3.45E-06	-1.20E-05	-2.07E-05	-7.18E-04	-1.02E-04	-2.87E-04
FruitsDom	-2.58E-06	-9.67E-06	-1.65E-05	-5.46E-04	-8.98E-05	-2.11E-04
Coffee	-3.34E-06	-1.34E-05	-2.82E-05	-7.76E-04	-1.13E-04	-2.66E-04
Cocoa	-3.76E-06	-1.26E-05	-2.53E-05	-7.87E-04	-9.32E-05	-3.00E-04
Sugar	-2.18E-06	-8.76E-06	-1.72E-05	-4.93E-04	-9.03E-05	-1.61E-04
Tobacco	-3.08E-06	-1.49E-05	-2.30E-05	-7.63E-04	-1.59E-04	-1.94E-04
Nuts	-3.43E-06	-1.38E-05	-2.42E-05	-7.68E-04	-1.36E-04	-2.38E-04
Beef	-3.83E-06	-1.48E-05	-2.57E-05	-8.47E-04	-1.21E-04	-2.96E-04
Poultry	-4.45E-06	-1.95E-05	-3.32E-05	-1.06E-03	-1.79E-04	-2.90E-04
Sheep Meat	-3.17E-06	-1.42E-05	-2.50E-05	-7.69E-04	-1.31E-04	-2.20E-04
Pork	-1.96E-06	-1.74E-05	-2.66E-05	-6.86E-04	-2.31E-04	-5.68E-05
Other Meat	-3.12E-06	-9.57E-06	-1.81E-05	-6.42E-04	-7.34E-05	-2.36E-04
Milk	-4.00E-06	-1.40E-05	-3.01E-05	-8.58E-04	-1.13E-04	-3.33E-04
Eggs	-4.38E-06	-1.53E-05	-2.78E-05	-9.21E-04	-1.20E-04	-3.41E-04
Fish	-4.17E-06	-1.36E-05	-2.84E-05	-8.59E-04	-1.19E-04	-3.27E-04
CocoaPr	-4.10E-06	-1.38E-05	-2.75E-05	-8.58E-04	-1.02E-04	-3.27E-04
FishPr	-1.04E+00	-1.25E-05	-2.44E-05	-7.84E-04	-1.05E-04	-2.99E-04
OtherPr	-4.12E-06	-1.23E+00	-2.87E-05	-9.14E-04	-1.51E-04	-3.09E-04
AgMfc	-3.19E-06	-1.14E-05	-9.48E-01	-7.37E-04	-1.10E-04	-2.54E-04
Manufacturing	-4.28E-06	-1.52E-05	-3.07E-05	-1.23E+00	-1.32E-04	-3.30E-04
Electric/Water	-2.94E-06	-1.29E-05	-2.36E-05	-6.78E-04	-9.47E-01	-2.34E-04
Construction	-3.47E-06	-1.09E-05	-2.25E-05	-7.03E-04	-9.65E-05	-9.51E-01
Trade	-3.12E-06	-1.26E-05	-2.08E-05	-6.99E-04	-1.09E-04	-2.32E-04
Finance	-3.53E-06	-1.17E-05	-1.94E-05	-7.34E-04	-3.23E-05	-2.72E-04
Government	-3.29E-06	-9.89E-06	-2.09E-05	-6.72E-04	-9.19E-05	-2.81E-04
Community	-3.02E-06	-1.30E-05	-2.30E-05	-7.06E-04	-1.19E-04	-2.19E-04



**Table A3: Continued.**

	Transport	Trade	Finance	Government	Community
Maize	-7.30E-06	-1.05E-04	-9.91E-06	-1.14E-04	-1.53E-05
Rice	-2.14E-05	-2.17E-04	-3.42E-05	-2.65E-04	-2.88E-05
Wheat	-2.23E-05	-2.08E-04	-3.78E-05	-2.90E-04	-2.88E-05
Sorghum/Millet	-3.06E-08	-8.89E-05	-1.03E-08	-5.01E-07	-4.61E-06
Cassava	-1.09E-05	-7.96E-05	-1.07E-05	-1.15E-04	-9.88E-06
Yam	-7.18E-06	-8.45E-05	-1.33E-05	-1.22E-04	-1.23E-05
Cocoyam	-6.56E-06	-6.63E-05	-1.49E-05	-1.12E-04	-8.91E-06
Plantains	-7.37E-06	-6.55E-05	-1.41E-05	-1.06E-04	-8.61E-06
Groundnut	-2.10E-05	-3.16E-04	-4.10E-05	-3.08E-04	-4.71E-05
Beans	-5.95E-06	-1.50E-04	-7.43E-06	-8.80E-05	-2.26E-05
VegExp	-2.50E-05	-2.42E-04	-3.99E-05	-3.22E-04	-3.33E-05
VegDom	-1.69E-05	-2.22E-04	-2.41E-05	-2.53E-04	-3.25E-05
Pineapple	-2.63E-05	-2.32E-04	-5.22E-05	-3.47E-04	-3.10E-05
Coconut	-1.87E-05	-1.28E-04	-1.50E-05	-2.16E-04	-1.55E-05
FruitsExp	-2.55E-05	-2.41E-04	-4.20E-05	-3.53E-04	-3.11E-05
FruitsDom	-1.88E-05	-1.90E-04	-2.17E-05	-2.69E-04	-2.06E-05
Coffee	-2.50E-05	-2.77E-04	-4.24E-05	-3.36E-04	-3.57E-05
Cocoa	-2.84E-05	-2.60E-04	-5.51E-05	-3.50E-04	-3.58E-05
Sugar	-1.41E-05	-1.69E-04	-2.00E-05	-1.98E-04	-2.54E-05
Tobacco	-1.64E-05	-2.97E-04	-2.52E-05	-2.50E-04	-4.41E-05
Nuts	-2.02E-05	-2.69E-04	-2.76E-05	-3.13E-04	-3.54E-05
Beef	-2.79E-05	-3.08E-04	-6.31E-05	-3.45E-04	-4.70E-05
Poultry	-2.81E-05	-3.97E-04	-5.26E-05	-3.71E-04	-5.89E-05
Sheep Meat	-2.03E-05	-2.99E-04	-4.20E-05	-2.68E-04	-4.16E-05
Pork	-5.13E-06	-3.35E-04	-1.13E-05	-6.23E-05	-7.08E-05
Other Meat	-2.10E-05	-1.98E-04	-3.65E-05	-3.19E-04	-2.57E-05
Milk	-2.97E-05	-2.79E-04	-5.33E-05	-3.87E-04	-3.94E-05
Eggs	-3.28E-05	-3.09E-04	-5.87E-05	-4.21E-04	-4.34E-05
Fish	-2.95E-05	-2.64E-04	-4.52E-05	-3.95E-04	-3.51E-05
CocoaPr	-3.10E-05	-2.84E-04	-6.01E-05	-3.82E-04	-3.91E-05
FishPr	-2.75E-05	-2.47E-04	-4.42E-05	-3.63E-04	-3.27E-05
OtherPr	-2.89E-05	-3.29E-04	-4.83E-05	-3.65E-04	-4.61E-05
AgMfc	-2.03E-05	-2.16E-04	-3.19E-05	-3.10E-04	-3.26E-05
Manufacturing	-2.90E-05	-3.02E-04	-5.02E-05	-4.09E-04	-4.16E-05
Electric/Water	-1.91E-05	-2.44E-04	-1.14E-05	-2.80E-04	-3.61E-05
Construction	-2.48E-05	-2.13E-04	-3.96E-05	-3.64E-04	-2.76E-05
Trade	-2.36E-05	-9.48E-01	-4.41E-05	-2.71E-04	-3.68E-05
Finance	-2.99E-05	-2.79E-04	-9.52E-01	-2.82E-04	-3.86E-05
Government	-1.96E-05	-1.89E-04	-2.91E-05	-9.24E-01	-2.42E-05
Community	-2.18E-05	-2.70E-04	-4.47E-05	-2.56E-04	-9.48E-01

**Table A4: Average price elasticity in demand, urban**

	Maize	Rice	Wheat	Sorghum/Millet	Cassava	Yam
Maize	-1.96E-01	-1.52E-03	-5.31E-04	-1.73E-04	-3.05E-04	-3.83E-04
Rice	-1.83E-03	-8.09E-01	-2.24E-03	-6.70E-04	-1.13E-03	-1.45E-03
Wheat	-1.57E-03	-5.61E-03	-7.87E-01	-2.67E-04	-9.54E-04	-1.22E-03
Sorghum/Millet	-2.47E-04	-1.05E-03	-7.42E-05	-1.22E-01	-6.66E-05	-3.70E-04
Cassava	-2.51E-04	-7.74E-04	-2.67E-04	-5.10E-05	-9.80E-02	-1.93E-04
Yam	-4.85E-04	-1.51E-03	-5.24E-04	-2.35E-04	-2.96E-04	-1.96E-01
Cocoyam	-2.09E-04	-7.50E-04	-2.65E-04	-2.81E-05	-1.54E-04	-1.83E-04
Plantains	-1.75E-04	-7.25E-04	-2.77E-04	-2.09E-05	-1.34E-04	-1.70E-04
Groundnut	-2.81E-03	-8.59E-03	-3.30E-03	-1.09E-03	-1.52E-03	-2.10E-03
Beans	-1.02E-03	-2.25E-03	-7.57E-04	-1.44E-03	-3.77E-04	-6.05E-04
VegExp	-2.10E-03	-7.25E-03	-2.72E-03	-9.73E-04	-1.31E-03	-1.73E-03
VegDom	-2.51E-03	-6.66E-03	-2.37E-03	-1.85E-03	-1.19E-03	-1.67E-03
Pineapple	-1.88E-03	-6.83E-03	-2.82E-03	-1.59E-04	-1.19E-03	-1.59E-03
Coconut	-1.40E-03	-3.80E-03	-1.37E-03	-1.47E-04	-7.26E-04	-8.11E-04
FruitsExp	-1.63E-03	-6.83E-03	-2.85E-03	-6.18E-04	-1.12E-03	-1.46E-03
FruitsDom	-1.38E-03	-5.43E-03	-2.28E-03	-1.27E-04	-9.02E-04	-1.06E-03
Coffee	-2.35E-03	-8.95E-03	-3.68E-03	-2.68E-04	-1.44E-03	-1.80E-03
Cocoa	-2.52E-03	-8.45E-03	-3.41E-03	-6.25E-04	-1.43E-03	-1.82E-03
Sugar	-1.49E-03	-3.67E-03	-1.38E-03	-3.46E-04	-6.70E-04	-8.68E-04
Tobacco	-3.86E-03	-8.46E-03	-3.15E-03	-1.22E-03	-1.60E-03	-2.00E-03
Nuts	-2.90E-03	-8.12E-03	-3.00E-03	-1.71E-03	-1.45E-03	-1.98E-03
Beef	-3.36E-03	-1.06E-02	-4.00E-03	-1.38E-03	-1.87E-03	-2.62E-03
Poultry	-2.57E-03	-1.12E-02	-4.55E-03	-7.28E-04	-1.83E-03	-2.30E-03
Sheep Meat	-2.18E-03	-7.16E-03	-2.67E-03	-1.90E-03	-1.15E-03	-1.53E-03
Pork	-1.59E-03	-7.22E-03	-2.45E-03	-6.66E-03	-1.05E-03	-1.79E-03
Other Meat	-1.51E-03	-5.55E-03	-2.19E-03	-1.51E-04	-1.06E-03	-1.45E-03
Milk	-2.66E-03	-9.04E-03	-3.70E-03	-3.27E-04	-1.54E-03	-1.98E-03
Eggs	-2.29E-03	-8.33E-03	-3.41E-03	-5.41E-04	-1.40E-03	-1.75E-03
Fish	-2.93E-03	-9.34E-03	-3.55E-03	-7.82E-04	-1.74E-03	-2.24E-03
CocoaPr	-2.52E-03	-8.45E-03	-3.41E-03	-6.25E-04	-1.43E-03	-1.82E-03
FishPr	-2.42E-03	-7.89E-03	-3.01E-03	-6.73E-04	-1.46E-03	-1.89E-03
OtherPr	-2.58E-03	-9.14E-03	-3.59E-03	-9.75E-04	-1.58E-03	-2.12E-03
AgMfc	-2.12E-03	-7.00E-03	-2.84E-03	-8.43E-04	-1.18E-03	-1.60E-03
Manufacturing	-2.75E-03	-9.25E-03	-3.62E-03	-9.35E-04	-1.62E-03	-2.13E-03
Electric/Water	-2.58E-03	-7.48E-03	-2.68E-03	-1.43E-03	-1.36E-03	-1.82E-03
Construction	-1.81E-03	-7.08E-03	-2.79E-03	-1.60E-04	-1.25E-03	-1.63E-03
Trade	-2.17E-03	-7.00E-03	-2.74E-03	-7.50E-04	-1.23E-03	-1.64E-03
Finance	-1.27E-03	-6.41E-03	-2.82E-03	-4.78E-05	-9.96E-04	-1.28E-03
Government	-1.94E-03	-6.40E-03	-2.45E-03	-2.03E-04	-1.20E-03	-1.46E-03
Community	-2.35E-03	-7.17E-03	-2.68E-03	-1.61E-03	-1.28E-03	-1.77E-03

**Table A4: Continued.**

	Cocoyam	Plantains	Groundnut	Beans	VegExp	VegDom
Maize	-1.46E-04	-1.35E-04	-1.22E-04	-1.15E-04	-8.34E-07	-1.23E-05
Rice	-6.64E-04	-6.70E-04	-4.51E-04	-3.01E-04	-3.46E-06	-3.91E-05
Wheat	-5.46E-04	-6.31E-04	-4.23E-04	-2.51E-04	-3.19E-06	-3.44E-05
Sorghum/Millet	-1.98E-05	-2.97E-06	-7.90E-05	-4.29E-04	-8.57E-07	-2.23E-05
Cassava	-8.89E-05	-8.56E-05	-5.44E-05	-3.50E-05	-4.29E-07	-4.80E-06
Yam	-1.62E-04	-1.66E-04	-1.16E-04	-8.63E-05	-8.70E-07	-1.04E-05
Cocoyam	-9.80E-02	-9.81E-05	-5.88E-05	-2.91E-05	-4.53E-07	-4.58E-06
Plantains	-8.87E-05	-9.81E-02	-5.26E-05	-2.58E-05	-4.19E-07	-4.17E-06
Groundnut	-9.46E-04	-9.34E-04	-1.18E+00	-4.86E-04	-4.96E-06	-5.86E-05
Beans	-1.81E-04	-1.77E-04	-1.87E-04	-2.92E-01	-1.31E-06	-2.14E-05
VegExp	-7.95E-04	-8.14E-04	-5.42E-04	-3.72E-04	-9.79E-01	-4.73E-05
VegDom	-6.51E-04	-6.56E-04	-5.19E-04	-4.91E-04	-3.83E-06	-8.79E-01
Pineapple	-6.83E-04	-8.30E-04	-5.18E-04	-2.80E-04	-4.01E-06	-4.23E-05
Coconut	-3.07E-04	-3.98E-04	-2.40E-04	-1.72E-04	-2.11E-06	-2.43E-05
FruitsExp	-6.74E-04	-7.83E-04	-5.13E-04	-3.11E-04	-4.01E-06	-4.21E-05
FruitsDom	-5.37E-04	-5.74E-04	-4.04E-04	-2.21E-04	-3.21E-06	-3.25E-05
Coffee	-7.86E-04	-9.48E-04	-6.27E-04	-3.86E-04	-4.94E-06	-5.18E-05
Cocoa	-7.10E-04	-8.81E-04	-6.17E-04	-4.19E-04	-4.83E-06	-5.36E-05
Sugar	-3.49E-04	-3.63E-04	-2.85E-04	-2.20E-04	-2.04E-06	-2.57E-05
Tobacco	-7.23E-04	-7.47E-04	-6.48E-04	-6.46E-04	-4.55E-06	-5.98E-05
Nuts	-7.12E-04	-7.76E-04	-6.13E-04	-5.48E-04	-4.56E-06	-5.73E-05
Beef	-1.32E-03	-1.21E-03	-8.53E-04	-6.03E-04	-6.10E-06	-7.21E-05
Poultry	-1.16E-03	-1.35E-03	-8.41E-04	-4.26E-04	-6.38E-06	-6.61E-05
Sheep Meat	-6.05E-04	-6.57E-04	-5.85E-04	-4.79E-04	-3.99E-06	-5.02E-05
Pork	-6.58E-04	-7.42E-04	-5.39E-04	-8.92E-04	-4.57E-06	-6.72E-05
Other Meat	-7.12E-04	-7.15E-04	-4.37E-04	-2.21E-04	-3.41E-06	-3.48E-05
Milk	-8.52E-04	-9.82E-04	-6.88E-04	-4.10E-04	-5.18E-06	-5.62E-05
Eggs	-8.57E-04	-9.55E-04	-6.31E-04	-3.78E-04	-4.81E-06	-5.19E-05
Fish	-1.01E-03	-1.07E-03	-6.91E-04	-4.47E-04	-5.44E-06	-6.06E-05
CocoaPr	-7.10E-04	-8.81E-04	-6.17E-04	-4.19E-04	-4.83E-06	-5.36E-05
FishPr	-8.63E-04	-9.16E-04	-5.86E-04	-3.75E-04	-4.61E-06	-5.08E-05
OtherPr	-9.27E-04	-1.01E-03	-7.02E-04	-4.65E-04	-5.25E-06	-5.85E-05
AgMfc	-6.80E-04	-8.00E-04	-5.41E-04	-3.91E-04	-3.98E-06	-4.59E-05
Manufacturing	-9.58E-04	-1.03E-03	-7.06E-04	-4.68E-04	-5.32E-06	-5.97E-05
Electric/Water	-6.15E-04	-7.28E-04	-5.51E-04	-4.68E-04	-4.02E-06	-5.07E-05
Construction	-8.52E-04	-8.24E-04	-5.42E-04	-2.73E-04	-4.15E-06	-4.28E-05
Trade	-6.67E-04	-7.58E-04	-5.48E-04	-3.75E-04	-3.94E-06	-4.51E-05
Finance	-5.11E-04	-7.30E-04	-4.72E-04	-2.25E-04	-3.70E-06	-3.63E-05
Government	-6.43E-04	-7.23E-04	-4.48E-04	-2.48E-04	-3.71E-06	-3.92E-05
Community	-7.74E-04	-7.90E-04	-5.61E-04	-4.69E-04	-4.15E-06	-5.11E-05

**Table A4: Continued.**

	Pineapple	Coconut	FruitsExp	FruitsDom	Coffee	Cocoa
Maize	-7.896E-07	-1.122E-05	-2.506E-06	-2.675E-06	-5.95E-08	-5.935E-06
Rice	-3.397E-06	-3.546E-05	-1.234E-05	-1.25E-05	-2.646E-07	-2.335E-05
Wheat	-3.505E-06	-3.236E-05	-1.29E-05	-1.306E-05	-2.758E-07	-2.372E-05
Sorghum/Millet	-1.006E-08	-9.164E-07	-2.127E-06	-2.043E-07	-1.021E-09	-2.772E-06
Cassava	-4.134E-07	-4.804E-06	-1.419E-06	-1.442E-06	-3.013E-08	-2.783E-06
Yam	-8.488E-07	-8.231E-06	-2.832E-06	-2.592E-06	-5.766E-08	-5.437E-06
Cocoyam	-4.121E-07	-3.525E-06	-1.483E-06	-1.489E-06	-2.858E-08	-2.396E-06
Plantains	-4.532E-07	-4.133E-06	-1.558E-06	-1.442E-06	-3.117E-08	-2.689E-06
Groundnut	-5.027E-06	-4.436E-05	-1.813E-05	-1.801E-05	-3.662E-07	-3.344E-05
Beans	-1.049E-06	-1.228E-05	-4.236E-06	-3.811E-06	-8.697E-08	-8.782E-06
VegExp	-4.247E-06	-4.262E-05	-1.546E-05	-1.563E-05	-3.152E-07	-2.862E-05
VegDom	-3.632E-06	-3.968E-05	-1.318E-05	-1.283E-05	-2.68E-07	-2.575E-05
Pineapple	-0.9809161	-4.231E-05	-1.618E-05	-1.566E-05	-3.167E-07	-2.877E-05
Coconut	-2.223E-06	-0.4895132	-7.479E-06	-8.562E-06	-1.765E-07	-1.757E-05
FruitsExp	-4.439E-06	-3.906E-05	-0.9809241	-1.712E-05	-3.516E-07	-2.96E-05
FruitsDom	-3.404E-06	-3.542E-05	-1.356E-05	-0.7852423	-2.825E-07	-2.587E-05
Coffee	-5.259E-06	-5.58E-05	-2.128E-05	-2.158E-05	-1.176002	-3.988E-05
Cocoa	-5.143E-06	-5.979E-05	-1.929E-05	-2.128E-05	-4.293E-07	-1.176381
Sugar	-2.055E-06	-2.33E-05	-7.291E-06	-7.657E-06	-1.676E-07	-1.489E-05
Tobacco	-4.059E-06	-5.525E-05	-1.565E-05	-1.723E-05	-4.354E-07	-3.6E-05
Nuts	-4.306E-06	-4.498E-05	-1.641E-05	-1.692E-05	-3.69E-07	-3.252E-05
Beef	-6.254E-06	-4.679E-05	-2.202E-05	-2.031E-05	-4.461E-07	-3.824E-05
Poultry	-7.175E-06	-5.569E-05	-2.613E-05	-2.371E-05	-4.999E-07	-4.391E-05
Sheep Meat	-3.637E-06	-3.418E-05	-1.465E-05	-1.593E-05	-2.603E-07	-2.892E-05
Pork	-3.811E-06	-3.064E-05	-1.677E-05	-1.166E-05	-2.867E-07	-2.654E-05
Other Meat	-3.734E-06	-3.2E-05	-1.235E-05	-1.253E-05	-2.23E-07	-2.183E-05
Milk	-5.635E-06	-5.422E-05	-2.084E-05	-2.225E-05	-4.429E-07	-3.957E-05
Eggs	-5.331E-06	-5.001E-05	-1.958E-05	-1.987E-05	-3.959E-07	-3.547E-05
Fish	-5.679E-06	-6.113E-05	-1.983E-05	-2.001E-05	-4.14E-07	-3.778E-05
CocoaPr	-5.143E-06	-5.979E-05	-1.929E-05	-2.128E-05	-4.293E-07	-3.966E-05
FishPr	-4.813E-06	-5.034E-05	-1.686E-05	-1.689E-05	-3.516E-07	-3.169E-05
OtherPr	-5.539E-06	-4.906E-05	-2.04E-05	-2.061E-05	-3.903E-07	-3.696E-05
AgMfc	-4.441E-06	-3.391E-05	-1.601E-05	-1.438E-05	-3.358E-07	-2.759E-05
Manufacturing	-5.588E-06	-5.235E-05	-2.028E-05	-2.028E-05	-4.22E-07	-3.756E-05
Electric/Water	-3.942E-06	-4.133E-05	-1.432E-05	-1.386E-05	-2.855E-07	-2.789E-05
Construction	-4.366E-06	-3.873E-05	-1.605E-05	-1.7E-05	-3.222E-07	-2.893E-05
Trade	-4.149E-06	-3.681E-05	-1.515E-05	-1.504E-05	-2.785E-07	-2.753E-05
Finance	-4.516E-06	-3.606E-05	-1.713E-05	-1.812E-05	-2.751E-07	-2.951E-05
Government	-3.892E-06	-4.691E-05	-1.379E-05	-1.49E-05	-2.882E-07	-2.728E-05
Community	-4.156E-06	-3.719E-05	-1.505E-05	-1.366E-05	-2.871E-07	-2.676E-05

Table A4: Continued.

	Sugar	Tobacco	Nuts	Beef	Poultry	Sheep Meat
Maize	-9.998E-08	-1.341E-06	-7.45E-08	-5.601E-06	-1.017E-05	-4.164E-06
Rice	-2.935E-07	-3.475E-06	-2.463E-07	-2.156E-05	-5.213E-05	-1.622E-05
Wheat	-2.747E-07	-3.23E-06	-2.269E-07	-1.972E-05	-5.319E-05	-1.502E-05
Sorghum/Millet	-2.792E-08	-7.238E-07	-1.005E-07	-5.085E-06	-4.285E-06	-7.165E-06
Cassava	-3.722E-08	-4.58E-07	-3.071E-08	-2.577E-06	-6E-06	-1.806E-06
Yam	-7.399E-08	-8.781E-07	-6.439E-08	-5.547E-06	-1.156E-05	-3.683E-06
Cocoyam	-3.362E-08	-3.601E-07	-2.618E-08	-3.164E-06	-6.602E-06	-1.652E-06
Plantains	-3.163E-08	-3.363E-07	-2.582E-08	-2.618E-06	-6.953E-06	-1.624E-06
Groundnut	-4.417E-07	-5.186E-06	-3.626E-07	-3.277E-05	-7.677E-05	-2.568E-05
Beans	-1.315E-07	-1.996E-06	-1.251E-07	-8.94E-06	-1.5E-05	-8.124E-06
VegExp	-3.454E-07	-3.977E-06	-2.944E-07	-2.561E-05	-6.36E-05	-1.915E-05
VegDom	-3.522E-07	-4.234E-06	-3E-07	-2.453E-05	-5.339E-05	-1.95E-05
Pineapple	-3.283E-07	-3.349E-06	-2.625E-07	-2.479E-05	-6.755E-05	-1.646E-05
Coconut	-1.956E-07	-2.396E-06	-1.441E-07	-9.744E-06	-2.755E-05	-8.131E-06
FruitsExp	-3.197E-07	-3.544E-06	-2.744E-07	-2.395E-05	-6.75E-05	-1.82E-05
FruitsDom	-2.66E-07	-3.09E-06	-2.242E-07	-1.75E-05	-4.851E-05	-1.567E-05
Coffee	-4.446E-07	-5.966E-06	-3.735E-07	-2.936E-05	-7.815E-05	-1.957E-05
Cocoa	-4.252E-07	-5.31E-06	-3.544E-07	-2.71E-05	-7.389E-05	-2.341E-05
Sugar	-0.4892243	-2.643E-06	-1.649E-07	-1.295E-05	-2.895E-05	-1.03E-05
Tobacco	-5.118E-07	-1.0744844	-4.504E-07	-2.823E-05	-5.447E-05	-2.458E-05
Nuts	-4.321E-07	-6.097E-06	-1.0757068	-2.758E-05	-6.356E-05	-2.418E-05
Beef	-5.221E-07	-5.878E-06	-4.243E-07	-1.4189658	-9.514E-05	-2.66E-05
Poultry	-4.914E-07	-4.774E-06	-4.116E-07	-4.006E-05	-1.5695323	-3.095E-05
Sheep Meat	-3.634E-07	-4.48E-06	-3.256E-07	-2.329E-05	-6.436E-05	-0.9788359
Pork	-2.875E-07	-3.815E-06	-3.584E-07	-2.958E-05	-6.756E-05	-2.365E-05
Other Meat	-2.579E-07	-2.6E-06	-2.078E-07	-2.161E-05	-5.207E-05	-1.269E-05
Milk	-4.567E-07	-5.32E-06	-3.752E-07	-3.121E-05	-8.307E-05	-2.53E-05
Eggs	-4.011E-07	-4.414E-06	-3.223E-07	-3.001E-05	-8.045E-05	-2.206E-05
Fish	-4.605E-07	-5.097E-06	-3.73E-07	-3.245E-05	-8.13E-05	-2.297E-05
CocoaPr	-4.252E-07	-5.31E-06	-3.544E-07	-2.71E-05	-7.389E-05	-2.341E-05
FishPr	-3.852E-07	-4.319E-06	-3.149E-07	-2.76E-05	-6.926E-05	-1.944E-05
OtherPr	-4.443E-07	-5.249E-06	-3.797E-07	-3.275E-05	-8.285E-05	-2.635E-05
AgMfc	-3.478E-07	-4.367E-06	-2.988E-07	-2.721E-05	-6.651E-05	-1.803E-05
Manufacturing	-4.558E-07	-5.321E-06	-3.803E-07	-3.341E-05	-8.471E-05	-2.52E-05
Electric/Water	-3.885E-07	-5.137E-06	-3.406E-07	-2.432E-05	-5.925E-05	-2.265E-05
Construction	-3.274E-07	-3.328E-06	-2.664E-07	-2.613E-05	-6.695E-05	-1.832E-05
Trade	-3.569E-07	-4.506E-06	-3.044E-07	-2.421E-05	-6.11E-05	-2.224E-05
Finance	-2.906E-07	-2.687E-06	-2.517E-07	-2.09E-05	-6.555E-05	-1.928E-05
Government	-3.088E-07	-3.28E-06	-2.495E-07	-1.951E-05	-5.653E-05	-1.525E-05
Community	-3.61E-07	-4.329E-06	-3.113E-07	-2.744E-05	-6.25E-05	-2.041E-05

Table A4: Continued.

	Pork	Other Meat	Milk	Eggs	Fish	CocoaPr
Maize	-2.33E-07	-5.32E-06	-5.56E-06	-5.98E-06	-9.89E-07	-6.14E-07
Rice	-1.24E-06	-2.39E-05	-2.23E-05	-2.58E-05	-3.75E-06	-2.42E-06
Wheat	-1.07E-06	-2.28E-05	-2.28E-05	-2.63E-05	-3.54E-06	-2.46E-06
Sorghum/Millet	-2.88E-06	-2.28E-07	-1.03E-07	-2.23E-06	-4.72E-07	-2.87E-07
Cassava	-1.28E-07	-3.09E-06	-2.65E-06	-3.03E-06	-4.83E-07	-2.88E-07
Yam	-3.34E-07	-6.50E-06	-5.24E-06	-5.80E-06	-9.57E-07	-5.63E-07
Cocoyam	-1.39E-07	-3.60E-06	-2.55E-06	-3.21E-06	-4.87E-07	-2.48E-07
Plantains	-1.41E-07	-3.27E-06	-2.66E-06	-3.24E-06	-4.69E-07	-2.78E-07
Groundnut	-1.82E-06	-3.55E-05	-3.31E-05	-3.80E-05	-5.37E-06	-3.46E-06
Beans	-1.17E-06	-6.92E-06	-7.62E-06	-8.80E-06	-1.34E-06	-9.09E-07
VegExp	-1.69E-06	-3.03E-05	-2.72E-05	-3.16E-05	-4.62E-06	-2.96E-06
VegDom	-2.01E-06	-2.50E-05	-2.40E-05	-2.77E-05	-4.17E-06	-2.67E-06
Pineapple	-1.33E-06	-3.13E-05	-2.80E-05	-3.31E-05	-4.55E-06	-2.98E-06
Coconut	-5.62E-07	-1.41E-05	-1.41E-05	-1.63E-05	-2.57E-06	-1.82E-06
FruitsExp	-1.61E-06	-2.84E-05	-2.84E-05	-3.34E-05	-4.36E-06	-3.06E-06
FruitsDom	-8.85E-07	-2.28E-05	-2.40E-05	-2.68E-05	-3.49E-06	-2.68E-06
Coffee	-1.66E-06	-3.10E-05	-3.65E-05	-4.08E-05	-5.51E-06	-4.13E-06
Cocoa	-1.66E-06	-3.27E-05	-3.51E-05	-3.94E-05	-5.41E-06	-4.11E-06
Sugar	-6.28E-07	-1.35E-05	-1.42E-05	-1.56E-05	-2.31E-06	-1.54E-06
Tobacco	-1.61E-06	-2.64E-05	-3.20E-05	-3.32E-05	-4.95E-06	-3.73E-06
Nuts	-2.05E-06	-2.86E-05	-3.06E-05	-3.28E-05	-4.90E-06	-3.37E-06
Beef	-2.60E-06	-4.57E-05	-3.91E-05	-4.70E-05	-6.56E-06	-3.96E-06
Poultry	-2.51E-06	-4.64E-05	-4.38E-05	-5.31E-05	-6.92E-06	-4.55E-06
Sheep Meat	-1.82E-06	-2.35E-05	-2.78E-05	-3.03E-05	-4.07E-06	-2.99E-06
Pork	-9.74E-01	-2.53E-05	-2.20E-05	-3.11E-05	-4.36E-06	-2.75E-06
Other Meat	-1.05E-06	-7.84E-01	-2.17E-05	-2.61E-05	-3.83E-06	-2.26E-06
Milk	-1.55E-06	-3.66E-05	-1.27E+00	-4.24E-05	-5.74E-06	-4.10E-06
Eggs	-1.75E-06	-3.53E-05	-3.39E-05	-1.18E+00	-5.35E-06	-3.67E-06
Fish	-1.90E-06	-4.01E-05	-3.56E-05	-4.15E-05	-1.27E+00	-3.91E-06
CocoaPr	-1.66E-06	-3.27E-05	-3.51E-05	-3.94E-05	-5.41E-06	-1.18E+00
FishPr	-1.63E-06	-3.43E-05	-3.00E-05	-3.52E-05	-5.22E-06	-3.28E-06
OtherPr	-1.99E-06	-3.72E-05	-3.61E-05	-4.14E-05	-5.68E-06	-3.83E-06
AgMfc	-1.82E-06	-2.84E-05	-2.75E-05	-3.26E-05	-4.37E-06	-2.86E-06
Manufacturing	-2.01E-06	-3.80E-05	-3.62E-05	-4.18E-05	-5.86E-06	-3.89E-06
Electric/Water	-1.69E-06	-2.52E-05	-2.69E-05	-2.96E-05	-4.41E-06	-2.89E-06
Construction	-1.23E-06	-3.16E-05	-2.82E-05	-3.28E-05	-4.52E-06	-2.99E-06
Trade	-1.37E-06	-2.68E-05	-2.76E-05	-3.09E-05	-4.30E-06	-2.85E-06
Finance	-1.19E-06	-2.60E-05	-2.90E-05	-3.29E-05	-4.03E-06	-3.05E-06
Government	-1.03E-06	-2.72E-05	-2.49E-05	-2.86E-05	-4.31E-06	-2.82E-06
Community	-2.12E-06	-2.81E-05	-2.63E-05	-3.10E-05	-4.50E-06	-2.77E-06

**Table A4: Continued.**

	FishPr	OtherPr	AgMfc	Manufacturing	Electric/Water	Construction
Maize	-4.44E-07	-2.71E-06	-7.82E-06	-1.31E-04	-8.68E-06	-2.44E-05
Rice	-1.72E-06	-1.14E-05	-3.04E-05	-5.24E-04	-2.94E-05	-1.16E-04
Wheat	-1.63E-06	-1.11E-05	-3.09E-05	-5.10E-04	-2.67E-05	-1.11E-04
Sorghum/Millet	-2.23E-07	-1.96E-06	-7.31E-06	-8.25E-05	-8.94E-06	-3.23E-07
Cassava	-2.21E-07	-1.37E-06	-3.60E-06	-6.37E-05	-3.78E-06	-1.39E-05
Yam	-4.40E-07	-2.81E-06	-7.50E-06	-1.28E-04	-7.78E-06	-2.77E-05
Cocoyam	-2.27E-07	-1.39E-06	-3.60E-06	-6.54E-05	-2.97E-06	-1.64E-05
Plantains	-2.18E-07	-1.37E-06	-3.83E-06	-6.39E-05	-3.18E-06	-1.44E-05
Groundnut	-2.48E-06	-1.69E-05	-4.60E-05	-7.75E-04	-4.27E-05	-1.68E-04
Beans	-6.10E-07	-4.33E-06	-1.28E-05	-1.99E-04	-1.40E-05	-3.27E-05
VegExp	-2.12E-06	-1.38E-05	-3.70E-05	-6.38E-04	-3.41E-05	-1.41E-04
VegDom	-1.90E-06	-1.25E-05	-3.46E-05	-5.80E-04	-3.49E-05	-1.17E-04
Pineapple	-2.10E-06	-1.38E-05	-3.90E-05	-6.33E-04	-3.16E-05	-1.39E-04
Coconut	-1.15E-06	-6.41E-06	-1.56E-05	-3.11E-04	-1.74E-05	-6.50E-05
FruitsExp	-2.01E-06	-1.39E-05	-3.85E-05	-6.30E-04	-3.14E-05	-1.41E-04
FruitsDom	-1.60E-06	-1.12E-05	-2.74E-05	-4.99E-04	-2.41E-05	-1.18E-04
Coffee	-2.54E-06	-1.61E-05	-4.89E-05	-7.93E-04	-3.79E-05	-1.71E-04
Cocoa	-2.47E-06	-1.64E-05	-4.33E-05	-7.60E-04	-3.99E-05	-1.65E-04
Sugar	-1.05E-06	-6.92E-06	-1.91E-05	-3.23E-04	-1.95E-05	-6.54E-05
Tobacco	-2.28E-06	-1.58E-05	-4.64E-05	-7.30E-04	-4.98E-05	-1.29E-04
Nuts	-2.25E-06	-1.55E-05	-4.30E-05	-7.06E-04	-4.47E-05	-1.40E-04
Beef	-3.03E-06	-2.06E-05	-6.02E-05	-9.54E-04	-4.91E-05	-2.11E-04
Poultry	-3.20E-06	-2.19E-05	-6.20E-05	-1.02E-03	-5.04E-05	-2.27E-04
Sheep Meat	-1.87E-06	-1.45E-05	-3.49E-05	-6.30E-04	-4.00E-05	-1.29E-04
Pork	-2.04E-06	-1.42E-05	-4.58E-05	-6.52E-04	-3.87E-05	-1.12E-04
Other Meat	-1.78E-06	-1.10E-05	-2.98E-05	-5.14E-04	-2.40E-05	-1.20E-04
Milk	-2.63E-06	-1.81E-05	-4.87E-05	-8.25E-04	-4.34E-05	-1.81E-04
Eggs	-2.46E-06	-1.66E-05	-4.60E-05	-7.63E-04	-3.81E-05	-1.69E-04
Fish	-2.84E-06	-1.76E-05	-4.78E-05	-8.28E-04	-4.41E-05	-1.80E-04
CocoaPr	-2.47E-06	-1.64E-05	-4.33E-05	-7.60E-04	-3.99E-05	-1.65E-04
FishPr	-1.08E+00	-1.50E-05	-4.08E-05	-7.01E-04	-3.70E-05	-1.53E-04
OtherPr	-2.62E-06	-1.27E+00	-4.99E-05	-8.22E-04	-4.56E-05	-1.78E-04
AgMfc	-2.03E-06	-1.42E-05	-9.80E-01	-6.44E-04	-3.52E-05	-1.31E-04
Manufacturing	-2.70E-06	-1.81E-05	-4.99E-05	-1.27E+00	-4.48E-05	-1.79E-04
Electric/Water	-2.01E-06	-1.42E-05	-3.85E-05	-6.33E-04	-9.78E-01	-1.20E-04
Construction	-2.08E-06	-1.39E-05	-3.60E-05	-6.36E-04	-2.99E-05	-9.81E-01
Trade	-1.98E-06	-1.44E-05	-3.88E-05	-6.27E-04	-3.85E-05	-1.28E-04
Finance	-1.85E-06	-1.44E-05	-3.75E-05	-6.00E-04	-3.18E-05	-1.36E-04
Government	-1.97E-06	-1.18E-05	-3.00E-05	-5.57E-04	-2.93E-05	-1.25E-04
Community	-2.07E-06	-1.41E-05	-4.05E-05	-6.41E-04	-3.77E-05	-1.30E-04

**Table A4: Continued.**

	Transport	Trade	Finance	Government	Community
Maize	-7.95E-06	-4.91E-05	-2.95E-05	-7.84E-05	-3.37E-05
Rice	-4.42E-05	-1.87E-04	-1.73E-04	-3.20E-04	-1.23E-04
Wheat	-4.86E-05	-1.83E-04	-1.94E-04	-3.17E-04	-1.14E-04
Sorghum/Millet	-5.82E-08	-2.25E-05	-1.67E-07	-1.23E-06	-5.55E-05
Cassava	-4.81E-06	-2.31E-05	-1.92E-05	-4.08E-05	-1.52E-05
Yam	-9.31E-06	-4.71E-05	-3.79E-05	-7.60E-05	-3.21E-05
Cocoyam	-4.69E-06	-2.17E-05	-1.71E-05	-3.94E-05	-1.59E-05
Plantains	-5.64E-06	-2.23E-05	-2.21E-05	-4.04E-05	-1.47E-05
Groundnut	-6.44E-05	-2.86E-04	-2.53E-04	-4.49E-04	-1.85E-04
Beans	-1.23E-05	-7.56E-05	-4.66E-05	-9.28E-05	-6.00E-05
VegExp	-5.47E-05	-2.25E-04	-2.17E-04	-3.98E-04	-1.50E-04
VegDom	-4.37E-05	-2.09E-04	-1.73E-04	-3.37E-04	-1.50E-04
Pineapple	-6.08E-05	-2.23E-04	-2.50E-04	-4.03E-04	-1.42E-04
Coconut	-2.69E-05	-1.04E-04	-1.05E-04	-2.33E-04	-6.67E-05
FruitsExp	-6.36E-05	-2.24E-04	-2.60E-04	-3.97E-04	-1.41E-04
FruitsDom	-5.25E-05	-1.76E-04	-2.18E-04	-3.34E-04	-1.01E-04
Coffee	-7.82E-05	-2.49E-04	-2.53E-04	-4.96E-04	-1.63E-04
Cocoa	-7.41E-05	-2.65E-04	-2.92E-04	-4.96E-04	-1.63E-04
Sugar	-2.55E-05	-1.20E-04	-1.01E-04	-1.94E-04	-7.71E-05
Tobacco	-5.27E-05	-2.94E-04	-1.80E-04	-3.92E-04	-1.79E-04
Nuts	-5.67E-05	-2.69E-04	-2.28E-04	-4.12E-04	-1.74E-04
Beef	-7.72E-05	-3.29E-04	-2.92E-04	-5.18E-04	-2.36E-04
Poultry	-9.78E-05	-3.49E-04	-3.85E-04	-6.48E-04	-2.27E-04
Sheep Meat	-5.57E-05	-2.65E-04	-2.36E-04	-3.53E-04	-1.54E-04
Pork	-5.03E-05	-2.12E-04	-1.89E-04	-3.16E-04	-2.07E-04
Other Meat	-4.41E-05	-1.72E-04	-1.72E-04	-3.31E-04	-1.14E-04
Milk	-7.94E-05	-2.99E-04	-3.23E-04	-5.18E-04	-1.81E-04
Eggs	-7.37E-05	-2.68E-04	-2.93E-04	-4.79E-04	-1.71E-04
Fish	-7.06E-05	-2.89E-04	-2.78E-04	-5.39E-04	-1.92E-04
CocoaPr	-7.41E-05	-2.65E-04	-2.92E-04	-4.96E-04	-1.63E-04
FishPr	-6.00E-05	-2.45E-04	-2.35E-04	-4.54E-04	-1.62E-04
OtherPr	-7.57E-05	-3.12E-04	-3.20E-04	-4.90E-04	-1.94E-04
AgMfc	-5.94E-05	-2.38E-04	-2.36E-04	-3.63E-04	-1.57E-04
Manufacturing	-7.40E-05	-2.98E-04	-2.93E-04	-5.08E-04	-1.93E-04
Electric/Water	-4.94E-05	-2.59E-04	-2.20E-04	-3.66E-04	-1.61E-04
Construction	-5.97E-05	-2.16E-04	-2.36E-04	-4.05E-04	-1.39E-04
Trade	-5.63E-05	-9.80E-01	-2.50E-04	-3.62E-04	-1.54E-04
Finance	-7.06E-05	-2.43E-04	-9.83E-01	-3.81E-04	-1.33E-04
Government	-4.99E-05	-1.90E-04	-1.99E-04	-8.75E-01	-1.20E-04
Community	-5.18E-05	-2.43E-04	-2.15E-04	-3.60E-04	-9.78E-01



### A3: Estimated and calculated elasticities in the supply functions

Given the size and number of agricultural subsector in the model, it is impossible to estimate supply elasticities using any data set available. Thus, the price elasticities in the yield function and direct price elasticities in the area function are drawn from other studies and are chosen to be 0.2 for all sectors across the 10 regions. Using this information, we calculate cross price elasticities in the area functions (or supply function in the non-crop production) from the following equation:

$$\varepsilon_{ij}^R = s_j^R \cdot \varepsilon_{ii}^R, i \neq j,$$

$$\text{where } s_i^R = \frac{p_i^R x_i^R}{\sum_{j=1}^I p_j^R x_j^R}, \text{ and } x_i^R \text{ is output of } i \text{ in region } R. \varepsilon_{ij}^R \text{ is constrained by the homogeneity}$$

condition such that  $\sum_{j=1}^I \varepsilon_{ij}^R = 0$ . Considering land constraint in a given year, the supply elasticities in the area function are further constrained by  $\sum_{i=1}^{CROP} \varepsilon_{ij}^R = 0$ . That is, if price for crop  $j$  falls, the aggregate response of all crops in terms of area changes in region  $R$  should be zero, though the farming area for crop  $j$  may fall and increase in the other crops. The price elasticities in the area functions (for the crops) and supply functions (for the non-crops) are in table A5.

**Table A5: Average price elasticity in area or supply function**

	<b>Maize</b>	<b>Rice</b>	<b>Sorghum/Millet</b>	<b>Cassava</b>	<b>Yam</b>
Maize	1.96E-01	-2.22E-03	-3.76E-03	-1.63E-02	-1.11E-02
Rice	-5.80E-03	1.37E-01	-1.12E-02	-1.56E-02	-1.46E-02
Sorghum/Millet	-5.71E-03	-8.37E-03	2.10E-01	-2.67E-03	-1.66E-02
Cassava	-9.84E-03	-3.60E-03	-6.90E-04	1.35E-01	-1.65E-02
Yam	-8.84E-03	-4.50E-03	-6.77E-03	-2.24E-02	1.69E-01
Cocoyam	-8.32E-03	-7.00E-04	-1.16E-05	-1.46E-02	-8.86E-03
Plantains	-8.12E-03	-1.31E-03	-1.19E-05	-1.58E-02	-1.24E-02
Groundnut	-5.67E-03	-8.20E-03	-2.77E-02	-5.91E-03	-1.76E-02
Beans	-6.85E-03	-9.91E-03	-3.21E-02	-4.27E-03	-2.14E-02
VegExp	-6.90E-03	-9.45E-04	0.00E+00	-1.38E-02	-4.07E-03
VegDom	-4.72E-03	-2.09E-03	-4.29E-03	-9.04E-03	-6.28E-03
Pineapple	-9.26E-03	-1.05E-03	-1.56E-05	-1.85E-02	-5.83E-03
Coconut	-5.81E-03	-7.95E-04	0.00E+00	-1.46E-02	-5.41E-04
FruitsExp	-8.67E-03	-1.21E-03	-1.72E-05	-1.74E-02	-5.94E-03
FruitsDom	-7.68E-03	-1.22E-03	-3.22E-05	-1.63E-02	-4.69E-03
Coffee	-3.66E-03	-7.48E-04	0.00E+00	-6.34E-03	-9.41E-04
Cocoa bean	-4.73E-03	-1.22E-03	-2.02E-05	-1.09E-02	-5.92E-03
Sugar	-7.57E-03	-1.41E-03	-3.18E-04	-1.78E-02	-1.72E-02
Tobacco	-4.33E-03	-5.15E-03	-1.24E-02	-9.50E-03	-8.52E-03
Nuts	-7.83E-03	-4.14E-04	0.00E+00	-1.59E-02	-1.20E-02
Oil palm	-7.09E-03	-1.30E-03	0.00E+00	-1.28E-02	-5.83E-03
Beef	-5.27E-03	-4.20E-03	-1.05E-02	-2.64E-03	-4.34E-03
Poultry	-1.71E-02	-2.82E-03	-6.28E-05	-4.83E-03	-1.06E-03
Sheep meat	-5.43E-03	-4.15E-03	-1.04E-02	-2.68E-03	-4.70E-03
Pork	-1.68E-02	-3.01E-03	-1.54E-04	-6.96E-03	-1.18E-03
Other meat	-1.76E-02	-2.32E-03	-1.06E-04	-6.77E-03	-1.20E-03
Milk	-7.07E-03	-5.08E-03	-7.86E-03	-5.08E-03	-6.73E-03
Eggs	-1.42E-02	-5.76E-03	-6.36E-05	-5.61E-03	-1.06E-03
Fish	-1.79E-02	-1.43E-03	-6.92E-04	-4.93E-03	-1.20E-03
CocoaPr	8.36E-05	7.91E-06	3.70E-07	6.14E-04	1.89E-04
FishPr	6.32E-05	5.20E-06	0.00E+00	4.88E-04	6.29E-05
OtherPr	5.58E-05	1.46E-05	2.59E-05	3.90E-04	1.14E-04
Cotton	-5.27E-03	-1.32E-02	-3.55E-02	-4.69E-03	-1.66E-02
Rubber	-6.45E-03	-1.02E-03	0.00E+00	-1.38E-02	-3.37E-03
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-1.88E-03	-1.19E-04	-1.72E-07	-3.49E-04	-7.27E-05
AgMfc	-1.75E-03	-1.84E-04	-6.46E-05	-3.49E-04	-1.11E-04
Manufacturing	-1.81E-03	-1.23E-04	-6.92E-05	-2.39E-04	-9.18E-05
Electric/water	-1.86E-03	-1.37E-04	-3.05E-06	-3.24E-04	-3.93E-05
Construction	-1.84E-03	-1.53E-04	-5.96E-06	-4.01E-04	-8.71E-05
Transport	-1.94E-03	-5.93E-05	-1.34E-06	-2.12E-04	-5.18E-05
Trade	-1.77E-03	-1.54E-04	-7.84E-05	-3.43E-04	-1.11E-04
Finance	-1.97E-03	-2.84E-05	-1.45E-06	-1.17E-04	-2.64E-05
Government	-1.85E-03	-1.44E-04	-5.30E-06	-3.83E-04	-1.01E-04
Community	-1.86E-03	-8.27E-05	-5.91E-05	-2.88E-04	-9.68E-05

**Table A5: Continued.**

	<b>Cocoyam</b>	<b>Plantains</b>	<b>Groundnut</b>	<b>Beans</b>	<b>VegExp</b>
Maize	-4.61E-03	-3.80E-03	-3.81E-03	-1.06E-03	-6.38E-05
Rice	-1.40E-03	-1.87E-03	-1.26E-02	-3.07E-03	-2.06E-05
Sorghum/Millet	-2.03E-06	-1.78E-07	-3.27E-02	-6.41E-03	0.00E+00
Cassava	-5.35E-03	-4.76E-03	-1.92E-03	-3.58E-04	-1.08E-04
Yam	-4.26E-03	-5.05E-03	-7.95E-03	-2.20E-03	-1.77E-05
Cocoyam	1.54E-01	-6.03E-03	-4.56E-04	0.00E+00	-1.44E-04
Plantains	-7.50E-03	1.36E-01	-3.72E-04	0.00E+00	-6.22E-05
Groundnut	-8.19E-04	-4.69E-04	1.52E-01	-5.69E-03	-6.62E-06
Beans	0.00E+00	0.00E+00	-2.90E-02	1.49E-01	0.00E+00
VegExp	-3.18E-03	-2.52E-03	-1.16E-04	0.00E+00	1.54E-01
VegDom	-3.53E-03	-2.57E-03	-4.34E-03	-5.60E-04	-2.78E-04
Pineapple	-5.52E-03	-4.24E-03	-2.79E-04	0.00E+00	-1.94E-04
Coconut	-3.02E-03	-2.36E-03	-5.43E-05	0.00E+00	-1.78E-04
FruitsExp	-4.04E-03	-3.52E-03	-3.02E-04	0.00E+00	-3.72E-04
FruitsDom	-5.02E-03	-4.66E-03	-3.24E-04	0.00E+00	-1.18E-04
Coffee	-6.11E-03	-3.36E-03	-1.17E-03	0.00E+00	0.00E+00
Cocoa bean	-5.88E-03	-7.34E-03	-3.51E-04	0.00E+00	-6.33E-06
Sugar	-5.76E-03	-3.98E-03	-2.11E-03	-4.13E-05	-2.46E-05
Tobacco	-1.91E-03	-1.88E-03	-1.06E-02	-2.56E-03	0.00E+00
Nuts	-8.66E-03	-1.46E-02	-2.26E-05	0.00E+00	-7.15E-05
Oil palm	-6.66E-03	-6.60E-03	-9.49E-06	0.00E+00	-2.96E-05
Beef	-8.71E-05	-1.02E-04	-1.89E-03	-8.59E-04	0.00E+00
Poultry	-1.08E-03	-1.24E-03	-6.99E-05	0.00E+00	0.00E+00
Sheep meat	-7.93E-05	-8.97E-05	-1.79E-03	-8.26E-04	0.00E+00
Pork	-1.46E-03	-1.79E-03	-5.55E-05	0.00E+00	0.00E+00
Other meat	-1.69E-03	-1.96E-03	-8.20E-05	0.00E+00	0.00E+00
Milk	-1.62E-04	-1.96E-04	-6.99E-04	-6.05E-04	0.00E+00
Eggs	-1.09E-03	-1.26E-03	-1.28E-04	0.00E+00	0.00E+00
Fish	-7.36E-04	-1.08E-03	-1.12E-04	-5.14E-05	0.00E+00
CocoaPr	1.68E-04	1.77E-04	9.11E-06	0.00E+00	1.05E-06
FishPr	7.53E-05	1.16E-04	8.36E-07	0.00E+00	9.54E-06
OtherPr	9.17E-05	1.02E-04	2.22E-05	7.78E-06	7.79E-06
Cotton	0.00E+00	0.00E+00	-3.15E-02	-7.87E-03	0.00E+00
Rubber	-3.92E-03	-4.96E-03	-1.43E-04	0.00E+00	-2.38E-04
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-1.78E-04	-1.81E-04	-6.52E-06	0.00E+00	-2.92E-05
AgMfc	-9.84E-05	-1.14E-04	-2.26E-05	-6.39E-06	-2.61E-04
Manufacturing	-5.70E-05	-6.73E-05	-9.68E-06	-5.30E-06	-3.42E-04
Electric/water	-9.18E-05	-1.08E-04	-4.28E-06	0.00E+00	-1.72E-04
Construction	-1.01E-04	-1.09E-04	-5.83E-06	0.00E+00	-1.98E-04
Transport	-7.37E-05	-6.86E-05	-3.98E-06	0.00E+00	-2.67E-04
Trade	-8.25E-05	-8.63E-05	-2.13E-05	-6.37E-06	-1.86E-04
Finance	-5.23E-05	-4.62E-05	-2.93E-06	0.00E+00	-2.57E-04
Government	-8.62E-05	-1.03E-04	-4.82E-06	0.00E+00	-2.29E-04
Community	-8.53E-05	-8.53E-05	-2.22E-05	-6.50E-06	-2.00E-04

Table A5: Continued.

	<b>VegDom</b>	<b>Pineapple</b>	<b>Coconut</b>	<b>FruitsExp</b>	<b>FruitsDom</b>
Maize	-1.10E-03	-6.03E-04	-1.84E-03	-5.41E-04	-2.91E-04
Rice	-1.55E-03	-3.78E-04	-7.96E-04	-4.22E-04	-1.48E-04
Sorghum/Millet	-1.38E-03	-3.79E-06	0.00E+00	-5.07E-06	-4.93E-06
Cassava	-1.16E-03	-1.13E-03	-3.06E-03	-1.27E-03	-4.20E-04
Yam	-1.10E-03	-3.48E-04	-1.87E-04	-4.42E-04	-1.17E-04
Cocoyam	-7.38E-04	-7.86E-04	-1.56E-03	-6.07E-04	-2.99E-04
Plantains	-5.88E-04	-7.92E-04	-1.50E-03	-7.21E-04	-2.33E-04
Groundnut	-1.96E-03	-8.25E-05	-6.06E-05	-6.46E-05	-6.67E-05
Beans	-1.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VegExp	-3.71E-03	-1.36E-03	-3.11E-03	-1.77E-03	-2.16E-04
VegDom	1.53E-01	-1.08E-03	-6.59E-04	-9.79E-04	-2.35E-04
Pineapple	-2.96E-03	1.62E-01	-5.44E-03	-1.84E-03	-3.60E-04
Coconut	-4.24E-04	-1.90E-03	1.46E-01	-1.63E-03	-6.65E-04
FruitsExp	-2.08E-03	-1.60E-03	-3.84E-03	1.53E-01	-2.86E-04
FruitsDom	-1.30E-03	-1.45E-03	-4.28E-03	-1.15E-03	1.59E-01
Coffee	-6.17E-04	-2.38E-04	-5.64E-04	-2.77E-04	-4.06E-04
Cocoa bean	-5.82E-04	-2.99E-04	-3.33E-03	-2.51E-04	-4.19E-04
Sugar	-1.17E-03	-4.00E-04	-1.11E-03	-4.00E-04	-2.49E-04
Tobacco	-1.50E-03	-1.62E-04	-1.78E-03	-1.99E-04	-3.04E-04
Nuts	-1.89E-04	-2.35E-03	-6.92E-03	-1.46E-03	-3.63E-04
Oil palm	-3.00E-04	-8.43E-04	-2.50E-03	-7.55E-04	-4.79E-04
Beef	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Poultry	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sheep meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pork	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Other meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eggs	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CocoaPr	3.30E-05	7.00E-06	1.09E-05	8.80E-06	7.56E-06
FishPr	5.49E-05	1.35E-05	4.16E-05	1.95E-05	1.28E-05
OtherPr	6.66E-05	1.01E-05	1.37E-05	1.51E-05	7.57E-06
Cotton	-2.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rubber	-3.40E-04	-7.48E-04	-7.45E-03	-8.05E-04	-4.35E-04
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-4.11E-03	-2.22E-03	-2.98E-03	-2.67E-03	-6.84E-04
AgMfc	-4.20E-03	-1.89E-03	-9.64E-04	-2.25E-03	-8.74E-04
Manufacturing	-3.97E-03	-7.91E-04	-2.67E-04	-1.15E-03	-6.05E-04
Electric/water	-5.42E-03	-1.38E-03	-1.29E-03	-2.32E-03	-6.00E-04
Construction	-5.44E-03	-1.53E-03	-1.02E-03	-2.08E-03	-8.55E-04
Transport	-3.34E-03	-1.51E-03	-9.39E-04	-1.92E-03	-4.27E-04
Trade	-4.99E-03	-1.43E-03	-1.03E-03	-1.75E-03	-7.14E-04
Finance	-3.00E-03	-1.23E-03	-2.92E-04	-1.69E-03	-1.38E-04
Government	-4.92E-03	-1.54E-03	-1.11E-03	-2.16E-03	-8.04E-04
Community	-5.11E-03	-1.96E-03	-6.99E-04	-2.74E-03	-4.13E-04

Table A5: Continued.

	Coffee	Cocoa bean	Sugar	Tobacco	Nuts
Maize	-4.64E-06	-6.70E-03	-3.31E-05	-1.03E-04	-4.49E-05
Rice	-1.43E-05	-6.25E-03	-3.21E-05	-1.52E-04	-1.92E-05
Sorghum/Millet	0.00E+00	-7.22E-05	-6.30E-06	-2.31E-04	0.00E+00
Cassava	-2.29E-05	-9.30E-03	-2.33E-05	-7.57E-05	-5.72E-05
Yam	-1.79E-05	-7.13E-03	-4.36E-05	-1.28E-04	-2.07E-05
Cocoyam	-9.22E-05	-1.40E-02	-7.80E-05	-1.14E-04	-8.06E-05
Plantains	-6.79E-05	-2.03E-02	-7.73E-05	-1.18E-04	-1.10E-04
Groundnut	-1.72E-05	-1.35E-03	-2.61E-05	-2.54E-04	-5.92E-07
Beans	0.00E+00	0.00E+00	-3.86E-06	-4.02E-04	0.00E+00
VegExp	0.00E+00	-1.88E-03	-1.57E-05	0.00E+00	-9.04E-05
VegDom	-6.90E-06	-6.53E-03	-4.12E-05	-1.76E-04	-1.66E-05
Pineapple	-1.84E-05	-4.01E-03	-2.85E-05	-1.87E-05	-1.16E-04
Coconut	-1.12E-05	-1.46E-02	-3.53E-05	-7.78E-05	-4.46E-05
FruitsExp	-1.81E-05	-3.07E-03	-2.83E-05	-1.90E-05	-4.92E-05
FruitsDom	-6.39E-05	-1.77E-02	-4.87E-05	-1.48E-04	-1.09E-04
Coffee	1.69E-01	-1.67E-02	-1.44E-04	-3.14E-04	-4.13E-05
Cocoa bean	-1.17E-04	1.22E-01	-6.19E-05	-1.17E-04	-6.14E-05
Sugar	-1.09E-04	-9.22E-03	1.70E-01	-1.28E-04	-3.26E-05
Tobacco	-8.61E-05	-1.19E-02	-1.15E-04	1.68E-01	-3.91E-05
Nuts	-3.33E-05	-3.00E-02	-2.85E-05	-1.27E-04	1.52E-01
Oil palm	-9.79E-05	-2.26E-02	-4.49E-05	-1.83E-04	-1.18E-04
Beef	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Poultry	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sheep meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pork	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Other meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eggs	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CocoaPr	3.52E-07	2.00E-02	1.41E-06	7.39E-08	7.29E-07
FishPr	3.51E-08	3.20E-05	2.87E-07	2.17E-08	1.97E-06
OtherPr	1.84E-07	2.15E-05	7.46E-07	6.63E-08	6.64E-07
Cotton	0.00E+00	0.00E+00	-2.10E-06	-2.50E-04	0.00E+00
Rubber	-4.26E-05	-2.74E-02	-2.41E-05	-2.26E-04	-1.65E-04
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-4.56E-05	-6.09E-03	-3.97E-04	-6.67E-06	-3.87E-05
AgMfc	-1.23E-05	-2.66E-03	-2.47E-04	-1.49E-05	-3.70E-05
Manufacturing	-1.71E-05	-1.18E-03	-7.71E-05	-2.44E-05	-9.40E-06
Electric/water	-1.40E-05	-2.54E-03	-2.23E-04	-4.89E-06	-7.24E-05
Construction	-2.38E-05	-2.81E-03	-2.71E-04	-8.49E-06	-3.04E-05
Transport	-9.33E-06	-1.78E-03	-2.15E-04	-2.42E-06	-7.20E-06
Trade	-1.81E-05	-2.38E-03	-2.55E-04	-1.73E-05	-4.12E-05
Finance	-9.37E-06	-1.29E-03	-1.81E-04	-2.38E-06	-2.38E-05
Government	-6.43E-06	-2.63E-03	-2.67E-04	-6.06E-06	-4.34E-05
Community	-5.54E-06	-1.92E-03	-3.39E-04	-6.99E-06	-3.67E-05

Table A5: Continued.

	Oil palm	Beef	Poultry	Sheep meat	Pork
Maize	-5.13E-05	-1.38E-02	-1.38E-02	-1.38E-02	-1.38E-02
Rice	-4.48E-05	-4.91E-03	-4.91E-03	-4.91E-03	-4.91E-03
Sorghum/Millet	0.00E+00	-1.07E-02	-1.07E-02	-1.07E-02	-1.07E-02
Cassava	-2.48E-05	-6.71E-03	-6.71E-03	-6.71E-03	-6.71E-03
Yam	-5.30E-05	-4.05E-03	-4.05E-03	-4.05E-03	-4.05E-03
Cocoyam	-1.27E-04	-2.94E-04	-2.94E-04	-2.94E-04	-2.94E-04
Plantains	-1.26E-04	-1.19E-03	-1.19E-03	-1.19E-03	-1.19E-03
Groundnut	-8.81E-06	-1.02E-03	-1.02E-03	-1.02E-03	-1.02E-03
Beans	0.00E+00	-4.36E-04	-4.36E-04	-4.36E-04	-4.36E-04
VegExp	-1.08E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VegDom	-4.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pineapple	-1.18E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Coconut	-9.53E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FruitsExp	-8.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FruitsDom	-1.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Coffee	-2.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cocoa bean	-8.45E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sugar	-7.46E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tobacco	-1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nuts	-1.69E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Oil palm	1.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beef	0.00E+00	4.85E-02	-1.64E-04	-5.27E-03	0.00E+00
Poultry	0.00E+00	-5.98E-05	4.81E-02	-6.72E-05	-4.74E-04
Sheep meat	0.00E+00	-4.29E-03	-1.50E-04	4.85E-02	0.00E+00
Pork	0.00E+00	0.00E+00	-2.81E-03	0.00E+00	5.14E-02
Other meat	0.00E+00	-4.36E-05	-2.91E-03	-1.08E-04	-7.23E-04
Milk	0.00E+00	-1.64E-03	-3.03E-04	-2.02E-03	0.00E+00
Eggs	0.00E+00	-6.12E-05	-3.80E-03	-6.69E-05	-4.76E-04
Fish	0.00E+00	-2.45E-04	-2.08E-03	-3.10E-04	-3.32E-04
CocoaPr	2.63E-06	1.68E-07	7.39E-06	2.86E-07	1.69E-06
FishPr	2.10E-06	0.00E+00	1.26E-05	0.00E+00	1.45E-06
OtherPr	1.64E-06	2.42E-06	1.32E-05	2.81E-06	1.16E-06
Cotton	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rubber	-2.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-4.13E-04	0.00E+00	-2.84E-04	0.00E+00	-6.86E-05
AgMfc	-3.13E-04	-5.79E-05	-2.53E-04	-5.92E-05	-3.99E-05
Manufacturing	-1.96E-04	-1.90E-05	-2.98E-04	-2.24E-05	-2.40E-05
Electric/water	-1.42E-04	-4.01E-07	-2.71E-04	-9.97E-07	-3.35E-05
Construction	-2.13E-04	-3.84E-06	-2.87E-04	-6.30E-06	-4.45E-05
Transport	-1.44E-04	-1.54E-06	-2.95E-04	-2.83E-06	-3.25E-05
Trade	-1.96E-04	-4.58E-05	-2.68E-04	-6.22E-05	-3.27E-05
Finance	-1.08E-04	0.00E+00	-3.29E-04	0.00E+00	-1.75E-05
Government	-1.71E-04	-6.24E-06	-2.57E-04	-8.70E-06	-3.99E-05
Community	-1.35E-04	-5.23E-05	-2.47E-04	-5.94E-05	-2.64E-05

Table A5: Continued.

	Other meat	Milk	Eggs	Fish	CocoaPr
Maize	-1.38E-02	-1.38E-02	-1.38E-02	-1.38E-02	0.00E+00
Rice	-4.91E-03	-4.91E-03	-4.91E-03	-4.91E-03	0.00E+00
Sorghum/Millet	-1.07E-02	-1.07E-02	-1.07E-02	-1.07E-02	0.00E+00
Cassava	-6.71E-03	-6.71E-03	-6.71E-03	-6.71E-03	0.00E+00
Yam	-4.05E-03	-4.05E-03	-4.05E-03	-4.05E-03	0.00E+00
Cocoyam	-2.94E-04	-2.94E-04	-2.94E-04	-2.94E-04	0.00E+00
Plantains	-1.19E-03	-1.19E-03	-1.19E-03	-1.19E-03	0.00E+00
Groundnut	-1.02E-03	-1.02E-03	-1.02E-03	-1.02E-03	0.00E+00
Beans	-4.36E-04	-4.36E-04	-4.36E-04	-4.36E-04	0.00E+00
VegExp	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VegDom	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pineapple	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Coconut	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FruitsExp	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FruitsDom	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Coffee	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cocoa bean	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-02
Sugar	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tobacco	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nuts	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Oil palm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beef	-1.72E-04	-6.90E-03	-1.36E-04	-2.70E-03	0.00E+00
Poultry	-4.18E-03	-4.65E-04	-3.08E-03	-8.37E-03	0.00E+00
Sheep meat	-3.48E-04	-6.92E-03	-1.21E-04	-2.77E-03	0.00E+00
Pork	-6.16E-03	0.00E+00	-2.28E-03	-7.90E-03	0.00E+00
Other meat	5.11E-02	0.00E+00	-2.37E-03	-3.63E-03	0.00E+00
Milk	0.00E+00	4.94E-02	-2.56E-04	-1.86E-03	0.00E+00
Eggs	-4.21E-03	-4.86E-04	4.86E-02	-4.45E-03	0.00E+00
Fish	-1.30E-03	-7.12E-04	-8.97E-04	2.69E-02	0.00E+00
CocoaPr	1.65E-05	7.56E-07	5.78E-06	2.22E-05	2.00E-01
FishPr	8.73E-06	0.00E+00	6.23E-06	1.88E-02	1.26E-06
OtherPr	9.11E-06	6.45E-06	6.70E-06	5.57E-05	2.54E-06
Cotton	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rubber	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-3.62E-04	0.00E+00	-2.14E-04	-1.07E-03	-6.83E-06
AgMfc	-2.19E-04	-5.27E-05	-1.31E-04	-1.19E-03	-3.90E-06
Manufacturing	-2.05E-04	-9.93E-05	-8.59E-05	-1.25E-03	-1.35E-06
Electric/water	-3.59E-04	0.00E+00	-1.43E-04	-1.19E-03	-4.10E-06
Construction	-4.02E-04	-1.86E-05	-1.63E-04	-1.07E-03	-3.82E-06
Transport	-1.46E-04	-5.78E-06	-1.09E-04	-1.41E-03	-3.56E-06
Trade	-2.73E-04	-7.73E-05	-1.36E-04	-1.11E-03	-3.26E-06
Finance	-9.44E-05	0.00E+00	-7.12E-05	-1.49E-03	-2.82E-06
Government	-2.99E-04	-3.90E-05	-1.23E-04	-1.23E-03	-3.78E-06
Community	-3.00E-04	-3.46E-05	-1.02E-04	-1.18E-03	-4.78E-06

Table A5: Continued.

	FishPr	OtherPr	Cotton	Rubber	Wood
Maize	0.00E+00	0.00E+00	-1.44E-04	-7.89E-05	0.00E+00
Rice	0.00E+00	0.00E+00	-7.02E-04	-3.05E-05	0.00E+00
Sorghum/Millet	0.00E+00	0.00E+00	-8.05E-04	0.00E+00	0.00E+00
Cassava	0.00E+00	0.00E+00	-4.98E-05	-1.66E-05	0.00E+00
Yam	0.00E+00	0.00E+00	-2.39E-04	-3.99E-05	0.00E+00
Cocoyam	0.00E+00	0.00E+00	0.00E+00	-8.38E-05	0.00E+00
Plantains	0.00E+00	0.00E+00	0.00E+00	-4.08E-05	0.00E+00
Groundnut	0.00E+00	0.00E+00	-8.59E-04	-3.10E-06	0.00E+00
Beans	0.00E+00	0.00E+00	-9.64E-04	0.00E+00	0.00E+00
VegExp	0.00E+00	0.00E+00	0.00E+00	-1.15E-04	0.00E+00
VegDom	0.00E+00	0.00E+00	-1.51E-04	-2.99E-05	0.00E+00
Pineapple	0.00E+00	0.00E+00	0.00E+00	-1.18E-04	0.00E+00
Coconut	0.00E+00	0.00E+00	0.00E+00	-1.09E-04	0.00E+00
FruitsExp	0.00E+00	0.00E+00	0.00E+00	-1.24E-04	0.00E+00
FruitsDom	0.00E+00	0.00E+00	0.00E+00	-2.07E-04	0.00E+00
Coffee	0.00E+00	0.00E+00	0.00E+00	-6.84E-05	0.00E+00
Cocoa bean	0.00E+00	0.00E+00	0.00E+00	-9.98E-05	0.00E+00
Sugar	0.00E+00	0.00E+00	-6.84E-06	-3.47E-05	0.00E+00
Tobacco	0.00E+00	0.00E+00	-4.40E-04	-9.41E-05	0.00E+00
Nuts	0.00E+00	0.00E+00	0.00E+00	-2.14E-04	0.00E+00
Oil palm	0.00E+00	0.00E+00	0.00E+00	-1.65E-04	0.00E+00
Beef	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Poultry	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sheep meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pork	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Other meat	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eggs	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fish	2.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CocoaPr	8.85E-07	4.73E-04	0.00E+00	3.89E-07	1.14E-04
FishPr	2.00E-01	7.67E-04	0.00E+00	1.07E-06	1.22E-04
OtherPr	2.88E-06	2.00E-01	8.64E-07	3.93E-07	8.17E-05
Cotton	0.00E+00	0.00E+00	1.67E-01	0.00E+00	0.00E+00
Rubber	0.00E+00	0.00E+00	0.00E+00	1.66E-01	0.00E+00
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01
Mines	-2.01E-06	-7.65E-04	0.00E+00	-5.27E-05	-1.42E-04
AgMfc	-2.71E-06	-8.98E-04	-4.78E-04	-5.27E-05	-5.99E-05
Manufacturing	-4.18E-06	-1.16E-03	-9.58E-04	-2.44E-05	-3.27E-05
Electric/water	-3.89E-06	-1.04E-03	0.00E+00	-1.51E-05	-4.57E-05
Construction	-2.94E-06	-9.06E-04	0.00E+00	-2.90E-05	-7.43E-05
Transport	-4.41E-06	-1.23E-03	0.00E+00	-1.72E-05	-3.67E-05
Trade	-3.09E-06	-9.47E-04	-5.63E-04	-2.64E-05	-5.75E-05
Finance	-4.68E-06	-1.43E-03	0.00E+00	-1.22E-06	-1.60E-05
Government	-3.49E-06	-9.57E-04	0.00E+00	-3.18E-05	-4.53E-05
Community	-3.26E-06	-1.08E-03	-2.69E-04	-7.03E-06	-1.54E-05



Table A5: Continued.

	Mines	AgMfc	Manufacturing	Electric/water	Construction
Maize	-4.01E-04	-5.36E-04	-5.39E-04	-2.70E-04	-5.27E-04
Rice	-9.72E-05	-1.84E-04	-1.84E-04	-1.21E-04	-1.37E-04
Sorghum/Millet	-1.91E-04	-4.46E-04	-4.46E-04	-1.91E-04	-1.91E-04
Cassava	-1.66E-04	-2.31E-04	-2.29E-04	-1.50E-04	-2.34E-04
Yam	-1.60E-04	-1.79E-04	-1.76E-04	-1.63E-04	-1.90E-04
Cocoyam	-9.68E-05	-1.07E-04	-1.03E-04	-8.69E-05	-1.07E-04
Plantains	-1.27E-04	-1.35E-04	-1.39E-04	-7.31E-05	-1.35E-04
Groundnut	-8.71E-05	-8.06E-05	-8.03E-05	-8.75E-05	-8.79E-05
Beans	-4.36E-05	-7.85E-05	-7.85E-05	-4.36E-05	-4.36E-05
VegExp	-5.89E-04	-5.23E-04	-5.23E-04	-5.69E-04	-5.23E-04
VegDom	-8.38E-03	-9.99E-03	-9.94E-03	-8.18E-03	-9.28E-03
Pineapple	-1.31E-03	-1.61E-03	-1.61E-03	-9.03E-04	-1.61E-03
Coconut	-6.30E-03	-6.42E-03	-6.39E-03	-4.07E-03	-6.39E-03
FruitsExp	-1.03E-03	-1.51E-03	-1.45E-03	-8.70E-04	-1.50E-03
FruitsDom	-7.25E-04	-1.10E-03	-1.14E-03	-5.49E-04	-1.14E-03
Coffee	-1.43E-04	-1.43E-04	-1.43E-04	-1.42E-04	-1.43E-04
Cocoa bean	-6.75E-03	-7.02E-03	-7.02E-03	-3.75E-03	-7.02E-03
Sugar	-3.27E-04	-3.70E-04	-3.49E-04	-3.56E-04	-3.70E-04
Tobacco	-5.12E-05	-7.02E-05	-7.06E-05	-5.40E-05	-5.47E-05
Nuts	-1.30E-04	-1.31E-04	-1.38E-04	-6.57E-05	-1.38E-04
Oil palm	-4.52E-04	-3.84E-04	-3.84E-04	-3.48E-04	-3.84E-04
Beef	-2.33E-04	-4.63E-04	-4.63E-04	-2.33E-04	-2.36E-04
Poultry	-3.07E-04	-3.27E-04	-3.29E-04	-2.79E-04	-3.31E-04
Sheep meat	-2.70E-04	-5.14E-04	-5.13E-04	-2.71E-04	-2.73E-04
Pork	-7.20E-05	-8.46E-05	-8.40E-05	-7.46E-05	-8.46E-05
Other meat	-7.74E-04	-1.02E-03	-8.38E-04	-9.70E-04	-1.02E-03
Milk	-6.96E-04	-1.39E-03	-1.39E-03	-6.96E-04	-7.45E-04
Eggs	-5.97E-04	-6.14E-04	-6.44E-04	-4.10E-04	-6.45E-04
Fish	-9.66E-04	-1.41E-03	-1.41E-03	-1.04E-03	-1.40E-03
CocoaPr	-3.41E-04	-1.99E-05	-6.31E-06	-3.95E-05	-1.45E-04
FishPr	-1.47E-04	-2.29E-05	-1.42E-05	-6.13E-05	-1.45E-04
OtherPr	-2.05E-04	-2.42E-05	-1.53E-05	-5.29E-05	-1.50E-04
Cotton	-3.38E-03	-7.34E-03	-7.34E-03	-3.38E-03	-3.38E-03
Rubber	-1.87E-04	-2.05E-04	-2.05E-04	-1.09E-04	-2.05E-04
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	5.99E-02	-1.31E-03	-2.64E-04	-2.34E-03	-7.73E-03
AgMfc	-1.56E-02	8.38E-02	-1.05E-03	-2.62E-03	-8.65E-03
Manufacturing	-6.20E-03	-2.07E-03	7.96E-02	-3.20E-03	-9.44E-03
Electric/water	-1.22E-02	-1.15E-03	-7.10E-04	7.86E-02	-1.04E-02
Construction	-1.43E-02	-1.34E-03	-7.42E-04	-3.70E-03	7.36E-02
Transport	-1.36E-02	-1.35E-03	-8.97E-04	-3.11E-03	-9.20E-03
Trade	-1.23E-02	-1.83E-03	-1.02E-03	-3.13E-03	-9.46E-03
Finance	-9.01E-03	-1.32E-03	-1.12E-03	-3.72E-03	-8.89E-03
Government	-1.12E-02	-1.43E-03	-7.53E-04	-3.85E-03	-1.06E-02
Community	-1.18E-02	-1.77E-03	-8.02E-04	-3.76E-03	-8.98E-03

**Table A5: Continued.**

	<b>Transport</b>	<b>Trade</b>	<b>Finance</b>	<b>Government</b>	<b>Community</b>
Maize	-5.43E-04	-5.37E-04	-2.95E-04	-2.32E-02	-5.37E-04
Rice	-1.37E-04	-1.85E-04	-9.40E-05	-1.97E-02	-1.85E-04
Sorghum/Millet	-1.91E-04	-4.48E-04	-1.91E-04	-4.66E-02	-4.48E-04
Cassava	-1.93E-04	-2.32E-04	-1.37E-04	-2.02E-02	-2.32E-04
Yam	-1.90E-04	-1.79E-04	-1.49E-04	-6.33E-02	-1.79E-04
Cocoyam	-1.03E-04	-1.07E-04	-9.43E-05	-9.26E-02	-1.07E-04
Plantains	-1.31E-04	-1.35E-04	-1.00E-04	-5.54E-02	-1.35E-04
Groundnut	-8.76E-05	-8.23E-05	-8.70E-05	-6.64E-02	-8.23E-05
Beans	-4.36E-05	-7.90E-05	-4.36E-05	-3.89E-02	-7.90E-05
VegExp	-5.23E-04	-5.23E-04	-5.69E-04	-1.05E-01	-5.23E-04
VegDom	-9.07E-03	-1.00E-02	-7.92E-03	-2.27E-02	-1.00E-02
Pineapple	-1.61E-03	-1.61E-03	-8.99E-04	-8.92E-02	-1.61E-03
Coconut	-6.42E-03	-6.42E-03	-3.56E-03	-4.66E-02	-6.42E-03
FruitsExp	-1.51E-03	-1.51E-03	-8.62E-04	-8.82E-02	-1.51E-03
FruitsDom	-1.10E-03	-1.14E-03	-5.74E-04	-8.35E-02	-1.14E-03
Coffee	-1.43E-04	-1.43E-04	-1.43E-04	-1.26E-01	-1.43E-04
Cocoa bean	-6.90E-03	-7.02E-03	-6.59E-03	-4.14E-02	-7.02E-03
Sugar	-3.06E-04	-3.70E-04	-3.29E-04	-9.81E-02	-3.70E-04
Tobacco	-5.43E-05	-7.02E-05	-5.09E-05	-9.39E-02	-7.02E-05
Nuts	-1.31E-04	-1.31E-04	-1.06E-04	-4.93E-02	-1.31E-04
Oil palm	-3.84E-04	-3.84E-04	-3.97E-04	-8.17E-02	-3.84E-04
Beef	-2.34E-04	-4.66E-04	-2.33E-04	-2.36E-04	-4.66E-04
Poultry	-3.23E-04	-3.31E-04	-2.81E-04	-3.31E-04	-3.31E-04
Sheep meat	-2.72E-04	-5.40E-04	-2.70E-04	-2.73E-04	-5.40E-04
Pork	-8.46E-05	-8.46E-05	-6.65E-05	-8.46E-05	-8.46E-05
Other meat	-1.02E-03	-1.02E-03	-8.71E-04	-1.02E-03	-1.02E-03
Milk	-6.96E-04	-1.39E-03	-6.96E-04	-7.45E-04	-1.39E-03
Eggs	-6.10E-04	-6.45E-04	-4.11E-04	-6.45E-04	-6.45E-04
Fish	-1.40E-03	-1.41E-03	-1.11E-03	-1.40E-03	-1.41E-03
CocoaPr	-7.24E-05	-1.45E-04	-4.52E-05	-2.20E-04	-5.75E-05
FishPr	-1.38E-04	-1.77E-04	-1.23E-04	-2.83E-04	-6.04E-05
OtherPr	-1.35E-04	-1.99E-04	-1.35E-04	-2.55E-04	-7.21E-05
Cotton	-3.38E-03	-7.34E-03	-3.38E-03	0.00E+00	-7.34E-03
Rubber	-2.05E-04	-2.05E-04	-1.40E-04	0.00E+00	-2.05E-04
Wood	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mines	-6.09E-03	-7.96E-03	-3.50E-03	-2.23E-03	-2.98E-03
AgMfc	-7.18E-03	-1.41E-02	-6.07E-03	-3.37E-03	-5.29E-03
Manufacturing	-9.44E-03	-1.55E-02	-1.02E-02	-3.51E-03	-4.74E-03
Electric/water	-7.25E-03	-1.05E-02	-7.52E-03	-3.98E-03	-4.93E-03
Construction	-7.61E-03	-1.13E-02	-6.36E-03	-3.90E-03	-4.17E-03
Transport	7.26E-02	-1.11E-02	-9.36E-03	-3.36E-03	-4.38E-03
Trade	-7.67E-03	7.01E-02	-6.96E-03	-3.40E-03	-5.08E-03
Finance	-1.08E-02	-1.16E-02	6.84E-02	-3.20E-03	-4.80E-03
Government	-7.58E-03	-1.11E-02	-6.24E-03	7.68E-02	-4.46E-03
Community	-7.81E-03	-1.31E-02	-7.39E-03	-3.52E-03	7.85E-02

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