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THE ROLE OF EXCHANGE RATE AND MONETARY POLICY IN THE MONETARY APPROACH TO THE BALANCE OF PAYMENTS: EVIDENCE FROM MALAWI

EXLEY B. D. SILUMBU

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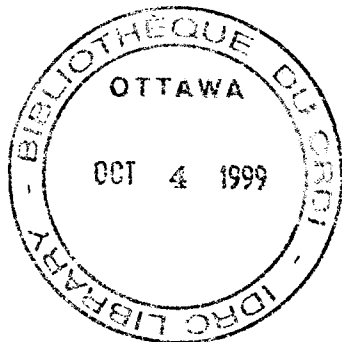
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The role of exchange rate and monetary policy in the monetary approach to the balance of payments: Evidence from Malawi

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Abstract

This study tests the reserve flow equation (RFE) of the monetary approach to the balance of payments using Malawi as a case study. Within the RFE the study investigates the roles of relative prices, defined as the ratio of the product of the nominal exchange rate (NER) and the foreign currency prices to the price of nontraded goods, and domestic credit control. The nontradables price is found to be negatively related to the balance of payments implying the dominance of relative price effects over money demand effects.

The NER is found to exert perverse effects in the initial year prior to positively influencing the balance of payments in the following year. This means that a devaluation first leads to a loss of reserves before they can rebuilt. This is also the case with the real exchange rate (RER) on a quarterly basis although it is well-behaved on an annual basis. Domestic credit is revealed to have the expected negative impact followed by a positive coefficient which suggests the effective use of selective credit policy stance which favoured the export-oriented plantation sector.

The potential for sterilization operations is rejected on an annual basis but weakly supported on a quarterly basis. Although causality is observed to be from credit to reserves and not from reserves to credit on an annual basis, it is found to be in both directions on a quarterly basis.

I. Introduction

The roots of what has come to be known as the monetary approach to the balance of payments (MABP) have been traced to Hume's specie flow mechanism which was re-discovered, revived and popularised in the 1960s as an alternative approach to balance of payments (BOP) adjustment mechanisms.¹ Briefly stated, this model postulates that the overall balance of payments, for example measured by international reserves, is influenced by imbalances prevailing in the money market between demand for and supply of money. Under a relatively stable or controlled exchange rate system, excess money supply induces increased expenditure, which manifests itself in increased purchases of foreign goods, services and assets by residents, which in turn have to be financed by running down foreign exchange, thereby worsening balance of payments. The outflow of reserves itself reduces money supply until it is equal to demand, thereby restoring monetary equilibrium and halting movements in international reserves. An excess demand for money, however, leads to opposite adjustments, which in turn induce reserve inflow, domestic monetary expansion and eventually to a restored BOP equilibrium position.

The MABP is quite controversial in the light of its assumptions, stated later, especially when applied to Sub-Saharan African (SSA) countries with underdeveloped money and asset markets. We should, however, recognize that the approach is habitually used in financial programming as a *sine qua non* for the diagnosis of macroeconomic problems, for example in the design and implementation of stabilization programmes pursued under the auspices of the International Monetary Fund (IMF) (Khan, Montiel and Haque, 1986). Moreover, the MABP is currently recognized as a major component of, if not an alternative to, open-economy macroeconomics as far as the conceptualization of balance of payments problems is concerned.

Although SSA countries have increasingly implemented IMF-supported schemes during the 1980s and the MABP has been seriously appraised in the context of other less developed countries (LDCs), especially in Latin America (Barletta, et. al, 1983), a large research gap exists in evaluating the approach against the SSA experience. The objective of this study is to establish the relevance of MABP in the Malawian context and to study the significance of the roles of the exchange rate, relative prices and credit policies in the determination of balance of payments within the MABP. The results should be of interest to both policy-makers and students of open-economy macroeconomics.

The plan of the paper is as follows. In Section II we outline and discuss the monetary model and the existing evidence on it. A survey of salient macroeconomic trends in Malawi is provided in Section III, with particular emphasis on the evolution of

the exchange rate, incomes and prices, the monetary sector, and the balance of payments. Empirical results on the basic MABP are presented and discussed in Section IV. Concluding observations and policy implications are presented in Section V.

II. The monetary model

Of interest to this study is the basic reserve flow equation (RFE) variant of the MABP. The basic MABP model assumes that there is a stable long-run demand for money (L) which positively depends on the domestic price level (Pd) and real income (y), but negatively depends on the interest rate (r) as the opportunity cost of holding cash balances or as an inducement to wealth accumulation. The demand for money is traditionally expressed in product form as:

$$L = Pd \ y r \quad (1)$$

On the supply side of the money market, the supply of money (M^s) is a multiple of the high powered money (money base or H) and the money multiplier (h). In turn, the high powered money has two components: the domestic, which comprises domestic credit (DC), and the external, which comprises international reserves (R). Thus:

$$M^s = hH = h(R + DC) \quad (2)$$

Monetary equilibrium requires that supply of money equals demand for money, that is:

$$M^s = hH = h(R + DC) = Pd \ y r = L \quad (3)$$

Expressing the balance of payments as a reserve-flow equation, relation (3) can be reduced to:²

$$\frac{R}{H} \dot{R} = b_1 \dot{P}d + b_2 \dot{y} + b_3 \dot{r} + b_4 \dot{h} + b_5 \frac{DC}{H} \dot{DC} \quad (4)$$

where a (.) above a variable is a rate of growth operator.

In empirical studies the MABP has been popularly tested by expressing (4) in logarithmic terms as:³

$$\frac{R}{H} \Delta / nR = b_0 + b_1 \Delta / nPd + b_2 \Delta / ny + b_3 \Delta / nr + b_4 \Delta / nh + b_5 \frac{DC}{H} \Delta / nDC + u \quad (5)$$

where Δ is a first difference operator and u is a disturbance term.

According to the MABP it is expected that $b_0 = 0$; $b_1, b_2 > 0$; $b_3, b_4, b_5 < 0$ and $b_4, b_5 = -1$.

Empirical evidence and estimation problems

A number of studies have been undertaken to test the MABP using data from both the developed market economies (DMEs) and LDCs. Kreinin and Officer (1978) surveyed 37 studies that tested the MABP in general and found that the number of studies they considered yielded negative results and the number of studies that supported the MABP were approximately equal, suggesting that the empirical evidence then was inconclusive. In the same survey, 14 studies tested the reserve-flow model specified in Equation (5) above. Three studies produced negative, seven mixed and four positive results. Out of these 14 studies, five used data from LDCs and one study reported negative (Cheng and Sargen, 1975), three mixed (Connolly and Taylor, 1975 and 1979; and Aghevli and Khan, 1977) and one reported positive (Cox and Wilford, 1978) results. Further examination of these five studies reveals that the Cheng and Sargen study, which produced negative results, and the Cox and Wilford study, which produced positive results, used annual time series data while those with mixed results used cross-section data. All of them applied ordinary least squares (OLS) regression technique, except Aghevli and Khan who, in one of their two specifications, used correlation analysis. Rivera-Batiz and Rivera-Batiz (1985, p. 456) have also concluded that 'a large number of empirical studies exists on the monetary approach, covering a wide range of countries and time periods. The weight of this evidence does not overwhelmingly support or reject the monetary approach.'

As to the predictions of the MABP, some unanimity has been reported on the existence of a demand for money function as hypothesised by the approach. Johnson (1977, p. 13), for example, points out, following Mundell (1968), that: 'The most robust specific proposition is that, contrary to Keynesian predictions, the fastest-growing countries will have the strongest (surplus) balance-of-payments positions because their demand for money will tend to grow faster than the supply of domestic credit.' This observation is supported by the studies reviewed by Kreinin and Officer (1978, p. 74) who find that the evidence on the effect of exogenous movements in income and the price level supports the monetary approach. They, however, observe that the approach is less favourably supported on the other predictions.

Others, however, conclude that the signs of the estimated coefficients confirm the postulated ones, that is, inflation and income growth turn out to be positively associated with the balance of payments while domestic credit creation, multiplier growth and interest rate increases are negatively related to the balance of payments. Further, while the signs turn out as predicted, the magnitudes of the coefficients are different from

those predicted by the approach as specified in Equation (5) (Rivera-Batiz and Rivera-Batiz, 1985, p. 457).

Monetary policy implications and sterilization

Although the money demand arguments have proved quite robust in tests of the MABP as reviewed above, Magee (1976), has, however, pointed to a fundamental econometric problem inherent in models, such as the one specified in Equation (5). That is:

The small country, long-run, full-employment assumptions allow empiricists to assume that y , P_d and r are exogenous and unaffected by the supply of money. But if they are not, OLS estimates ... lead to simultaneous equation bias.

Thus without proper specifications and estimation, we don't know whether the coefficients ... reflect the demand for money or the effects of the supply of money on y , P_d and r . All of these money supply phenomena work in the same direction as the demand side and make single equation estimates ... overly favourable to the monetary approach hypothesis. (Magee, 1976, p. 165).

The ability of a central bank to sterilize reserve flows is another factor that might make irrelevant the MABP assumption of the exogeneity of domestic credit. When a central bank pursues a sterilization operation, for instance, it deliberately expands credit in order to counteract the contractionary effects of reserve loss; domestic credit no longer becomes completely exogenous, as represented in Equation (5). The endogeneity of domestic credit arises because of a central bank's reaction designed to neutralize the direct link between reserve flow and domestic money supply. In this case, overall balance of payments feeds back to credit changes, which is contrary to the process represented in Equation (5). This reverse adjustment is normally represented by a reaction function such as the one shown by Equation (6); if the central bank completely succeeds in conducting sterilization operations, the sterilization coefficient indicated by q_1 in Equation (6), which links reserve flows to domestic credit, will tend to be -1. A zero association as postulated by the MABP would imply perfectly frustrated or no sterilization.

$$\dot{DC} = \dot{DC}_0 + q_1 \dot{R} + q_i \dot{Z}_i \quad (6)$$

where Z represents other possible determinants of DC .

Empirical studies (Herring 1977; Hausman 1978; Obstfeld, 1980, 1982 and 1983) show

that central banks tend to have some leverage, though imperfect, in controlling money supply in the short-run. In their test of the sterilization hypothesis, Connolly and Taylor (1979, pp. 287-288) estimated Equation (6) by two-stage least squares (2SLS) together with Equation (5) and, using cross-section data, rejected the hypothesis that the sterilization coefficient, q_1 , is zero for developed countries. Tests of the exogeneity assumption for the UK have shown that domestic credit is the major source of endogeneity and the major cause of the rejection of the exogeneity assumption (Taylor, 1987, pp. 658-660).

Some economists have cast doubt on the plausibility and feasibility of sterilization in LDCs: implausible because the rate of domestic credit expansion in these countries is presumed to be largely determined by the fiscal deficit financing requirements (Cooper, 1971; Caves, Frankel and Jones, 1990, pp. 438-439), and unfeasible because of scarcity of reserves (Magee, 1976). Further, the 'no-sterilization' assumption has been theoretically rationalized on the basis that small, dependent open economies lack appropriate monetary instruments because their financial sectors are not sufficiently deepened (Caves, Frankel and Jones, 1990, pp. 438-439).

Empirical evidence on the sterilization question for LDCs, however, is scanty and mixed. Using cross-section data, Connolly and Taylor (1979) accepted the hypothesis that $q_1 = 0$ for LDCs, thereby supporting the no-sterilization assumption. This assumption, however, has been empirically challenged using time series data for India (Kannan, 1989; Raghavan and Sagggar, 1989). The same studies on India, however, have reported mixed results on causality between reserves and domestic credit, with Kannan finding support for causation from credit to reserves and Raghavan and Sagggar finding stronger reverse causation from reserves to credit.

The price level and the exchange rate

Of interest to this study, in addition to overall tests of the MABP, is to explore the role of the exchange rate in influencing BOP within the MABP. To account for the role of exchange rate variations in influencing the demand for money and ultimately the balance of payments, the domestic price level (P_d) can be defined as a weighted average of traded goods prices (P_t) and non-traded goods prices (P_n). In turn, P_t is an average of exportables and importables price in foreign currency (P_t^*) converted by the nominal exchange rate (NER) measured in local currency units. That is:

$$P_d = P_n^a NER^b P_t^{*c} \quad (7)$$

where

$$P_t = NER^b P_t^{*c} \quad (7a)$$

However, what is also important from the BOP angle is the relative price of tradables

which can be represented by the real exchange rate as:

$$RER = \frac{P_t}{P_n} = \frac{NER \cdot P_t^*}{P_n} \quad (8)$$

In growth terms (7) and (8) become, respectively:

$$\dot{P}d = \dot{P}n + N\dot{E}R + \dot{P}t^* \quad (9)$$

$$R\dot{E}R = \dot{P}t - \dot{P}n = N\dot{E}R + \dot{P}t^* - \dot{P}n \quad (9a)$$

Equations (7) and (8), though seemingly introducing an ambiguity, are valid given the evolution and extensions of the MABP. Extreme monetarism (Whitman, 1975), which assumed 'the law of one price', denied the role of non-traded goods price so that $a = 0$ in (7) and said there is no role for relative prices to influence balance of payments. Current monetarist thinking has incorporated the role of non-traded goods price in two respects. First, from the money demand side, a rise in any component of the domestic price level $\dot{P}n, \dot{P}t$ (due to devaluation and/or exogenous rise in (P_t^*)) raises the nominal demand for money, other things being equal, relative to the domestic monetary base, and therefore leading to an improvement in the BOP. This is the real balance effect.

Second, modern brands of MABP have recognized the role of non-traded goods prices and therefore the importance of relative prices. A rise in the relative price of tradables (or $RFR > 0$) means that at constant domestic expenditures, more tradables are produced and less consumed, while more of the relatively cheaper non-tradables are consumed, thereby generating a favourable current account position. Given the assumption of a relatively small open economy, with inelastic external capital account, reserve inflow will be directly associated with current account improvement. (Caves, et. al., 1990, Chapter 19).

While the introduction of non-tradables is an improvement on the earlier MABP, the approach has been criticized for using a Hicksian concept of a composite commodity representing traded goods and therefore being incapable of handling trade policy. This can be handled by splitting traded goods into exportables and importables (Bevan, Collier and Horsnell, 1990, pp. 8-9). The broad view of the MABP we have adopted in this study does not allow for distinguishing between exportables and importables or terms of trade movements as a separate relative price. However, to gauge the empirical role of tradables and non-tradables prices in influencing BOP within the RFE of the MABP, the inflation components of (9) and (9a) are substituted for the domestic price in (5). It should be recognized that a positive coefficient for P_n , as in (9), implies money demand effect while its negative coefficient, as in (9a), means relative price effect on BOP.

It is in the context of the preceding review that this study, using Malawi as a case study, seeks to accomplish the following tasks: first, to test generally the relevance of

the RFE of the MABP; second, to establish the roles of relative prices and domestic credit within the RFE; third, to explore the role of the exchange rate in overall BOP determination; and fourth, to conduct the sterilization and causality tests between reserves and credit.

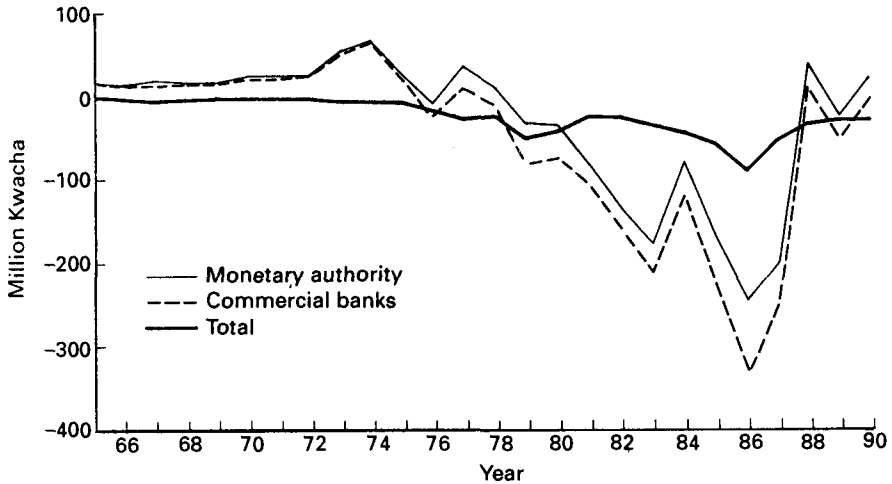
III. Macro policy and trends in Malawi: 1965-90⁴

The aim of this section is two-fold; first, it reviews the evolution of key macroeconomic variables used in the study and provides a brief background of the performance of the Malawian economy within which the MABP is tested. Second, it concurrently describes the nature of the data to be used in empirical investigations conducted in Section IV.

Macro-credit policy

From policy statements, indications can be seen of a tightening of the domestic credit conditions in Malawi during 1965-90 for demand management. In this regard, three phases can be distinguished in terms of the credit policy stance adopted, its design and implementation. In the initial phase, 1965-75, a piecemeal approach, albeit in an experimental fashion, was adopted by the monetary authorities to regulate credit conditions in the form of the isolated institution of monetary instruments. Three crucial changes were effected during this period, especially between 1970-75. First, the banking sector was partially nationalized. Second, to make it responsive to indigenous corporate enterprise, a selective credit approach was adopted which favoured the rehabilitation of the tobacco plantation subsector which had stagnated since the Great Depression of the 1930s. Third, instruments were implemented to be used for financing government schemes.

The worsening of balance of payments during 1976-79 led the monetary authorities to adopt a package-deal approach to macro-credit control. In 1976, for the first time since independence in 1964, the net foreign assets of the monetary authorities turned negative and could not be relied on to offset the net external indebtedness of the commercial banks (see Figure 1). In a concerted effort to reconstitute foreign reserves, which became the major goal of credit policy, the monetary authorities abandoned the piecemeal credit approach of the pre-1976 period in favour of a package-deal approach. The 1976 package⁵ included the traditional instruments of restrictive monetary policy, including increases in interest rates; for the first time the redefinition and enforcement of the liquid asset ratio (LAR) of 25%; issuance of directives to commercial banks to exercise utmost restraint in extending credit; and pursuit of a selective credit stance in favour of priority sectors, mainly agriculture.

Figure 1: Net foreign reserves of the banking system

In spite of the 1977 recovery, the balance of payments position worsened during 1978. The monetary authorities diagnosed the problem as being due to an 'excessive rise in domestic credit, particularly to the private sector in the second half of the year (1978).'⁶ This led to the reinforcement of the 1976 restrictive credit measures in November 1978, which included directives to commercial banks to quantitatively reduce credit expansion to 1.5% per month and to selectively give priority to agriculture while reducing credit to the financing of consumption goods and imported non-agricultural and non-essential intermediate goods.⁷ These measures were in force throughout the first quarter of 1979.⁸

Further worsening of BOP led to the introduction of a comprehensive credit policy package on 10 August, 1979. This package⁹, consolidated in the latter half of 1979, further tightened the instruments incorporated in the 1976-78 package and introduced some new elements and started a new phase in macro-credit management. First, recourse was made to exchange control.¹⁰ Second, for the first time, the public sector, comprising the public enterprises and the fiscal budget, was recognized as an integral component in the resolution of balance of payments crises. A concerted policy stance in credit management since 1979 has been to restrain, in a targeted fashion, credit to the public sector while reducing the fiscal deficits relative to GDP to restrain aggregate demand and release resources for the stimulation of private sector activity and export-led growth, thereby partly contributing to the resolution of the balance of payments crises. Third, the package was not only the basis for the first stand-by arrangement (SBA1) with the IMF, but through its implementation problems, it also paved the way for a series of stabilization-cum-structural adjustment packages. Since June 1981, Malawi

has been continuously on a structural adjustment programme (SAP) spearheaded by the World Bank and the IMF.

Changes in gross domestic credit to the public and private sectors are shown in Figures 2 and 3. Prior to 1975, credit movements to both sectors showed remarkable stability. With the advent of the first oil shock, private sector credit steadily grew up to 1979. In spite of stated goals of reducing domestic credit, public sector credit substantially exceeded private sector growth during most of the adjustment period of the 1980s. The trend was reversed in 1987 in favour of the private sector, mainly reflecting exchange control and trade liberalization facilitated by increased external public finance.

Exchange Rate Policy

From the point of view of exchange rate regimes Malawi has experimented with a number of currency pegging options. In November 1964, four months after independence in July 1964, Malawi adopted its own currency, the Malawi pound, which was pegged at par to British sterling. Since then a number of changes to the exchange rate have been made, which have occasionally reflected trends in international exchange rate changes. Following the devaluation of the British pound on 18 November, 1967, Malawi was one of the sterling area members which also devalued their currencies. Malawi accordingly devalued its pound by 14% on 20 November.¹¹ On 14 February 1971 the currency was decimalised and a new currency, the Malawi kwacha (MK), was adopted and pegged at MK2 to sterling, which lasted up to 18 November 1973.

It should be recognized that this was during the last stages of the Bretton Woods system, established in 1944, based on a fixed but adjustable exchange rate regime, which broke up in March 1973 with the advent of generalised, managed floating (legitimized in January 1975). Under the Smithsonian Agreement - which lasted from 18 December 1971 to March 1973 - the British pound was realigned from US\$2.40 to US\$2.60 and Malawi followed suit. However, on 23 June 1972, Britain broke away from the Agreement and floated sterling, which depreciated against the dollar in the process.

With the floating of sterling and the introduction of generalised dirty floating in March 1973, Malawi abandoned the single currency pegging system in favour of a basket pegging regime. Three experiments with this system have been made so far. The first one involved pegging the kwacha to a weighted average of sterling and the dollar from 19 November 1973 to 8 June 1975. The justification for this move was twofold. First, it was designed to prevent depreciation of the kwacha and, second, to reduce wide fluctuations which the kwacha experienced as it floated *pari passu* with sterling.¹²

Figure 2: Changes in domestic credit: 1965-90

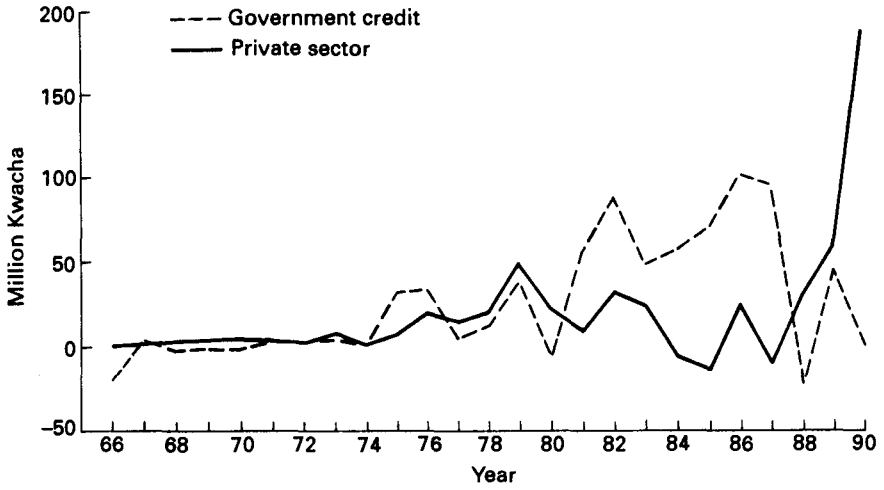
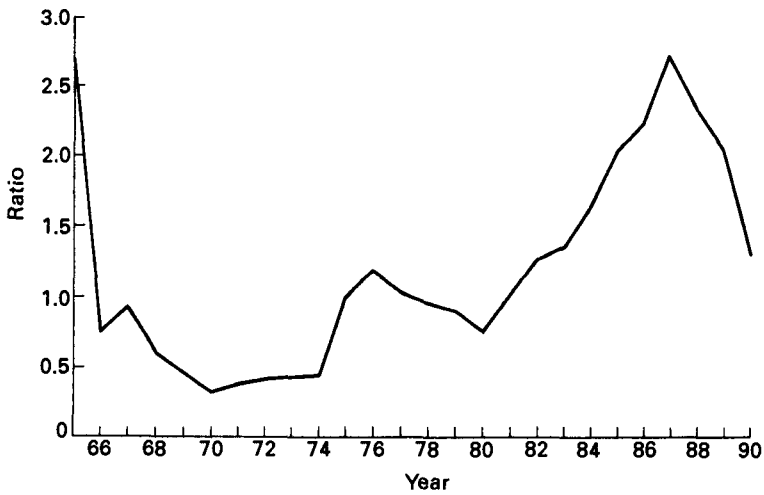


Figure 3: Government/private credit ratio: 1965-90



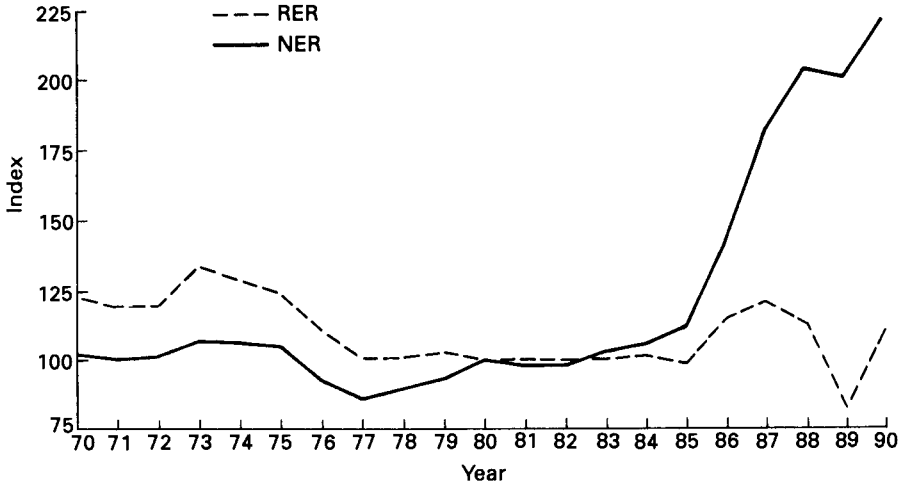
Following the shift by the IMF in the valuation of the Special Drawing Rights (SDRs) from gold and the dollar to a basket of currencies on 1 July, 1974, Malawi adopted an SDR peg at MK1.0541 to the SDR, which lasted from 9 June 1975 to 16 January 1984. Again, the purpose was to avoid further excessive fluctuations and depreciations of the kwacha as sterling progressively depreciated in early 1975.¹³ Further, it was thought that the transmission into the country of imported inflation would be attenuated considering the oil shocks of the mid-1970s.¹⁴ To take account of Malawi's changing trading position, the kwacha has been pegged to a basket of seven currencies since 17 January 1984: the US dollar, the British pound, the German deutschmark, the South African rand, the French franc, the Japanese yen and the Dutch guilder.

There was a marked change of policy in exchange rate management in 1980s Malawi from that of the 1970s described above. In the 1980s depreciations and devaluations were accepted as realistic measures for the enhancement of the balance of payments based on a number of considerations. First, as a price of foreign exchange it is expected that a realistic exchange rate is a necessary instrument for appropriately conditioning supply of and demand for foreign exchange. Second, exchange rate actions are supposed to alter relative prices, thereby inducing expenditure-switching effects. Indeed, recent devaluations in Malawi have been instituted to maintain the international competitiveness of Malawi's products in the light of rising costs due to external transportation stocks. As a primary commodity exporter, currency devaluations in Malawi have been used for restoring domestic producers' profitability in relation to competing external primary producers.

Third, the exchange rate has been used to complement structural adjustment measures. Two examples can be cited in this respect, one being that exchange rate policy has been used to reform producer prices of smallholder primary producers who sell to the Agricultural Development and Marketing Corporation (ADMARC). Pass-through devaluations have been anticipated to enhance incentives in this sub-sector. The other example is that devaluations have been used to effect diversification of the production base, especially in the promotion of non-traditional exports.

A summary measure of the overall degree of international competitiveness often used in the design of stabilization packages and SAPs is the real effective exchange rate (RER).¹⁵ Figures 4 and 5 show total trade-weighted nominal and real effective exchange rates (NER and RER) for the Malawi kwacha per unit of a basket of four currencies (German deutschmark, South African rand, British pound sterling, and U.S. dollar). It can be seen from the figures that the NER and the RER were only sharply depreciated mainly between 1985 and 1988. The appreciation of the kwacha towards the end of the period led to a mini-devaluation of 7% on 24 March 1990 which managed to reverse the currency appreciation trend.

If sound exchange rate management means maintaining the real exchange rate in order to preserve international competitiveness, then prior to the second quarter of 1985, Malawi's exchange rate management, in practice, fared poorly on this criterion. For example, the early 1982 devaluation raised the RER for only one quarter while the 1983 devaluation did so for only two quarters and then the exchange rate appreciated sharply during the last six quarters of the sub-period. The de-pegging of the kwacha

Figure 4: Annual nominal and real exchange rates: 1970-90

from the SDR marginally helped for only one quarter. The relationship between the exchange rate and the domestic price level is explored below.

Income and Prices

It has become conventional to analyse economic growth performance in Malawi in two phases: the pre-1979 and the post-1979. Figure 6 charts the evolution of income and prices. The economy experienced an impressive record of economic growth from independence through 1978. Indeed, the 1970s remains the 'golden age' for Malawi's economy. For instance, having accelerated from 4.3% in 1964-69 to 6.1% during 1970-79, real gross domestic product (GDP) registered a negative growth rate of 2.4% in 1980-81 before recovering in 1982-85 to a 3.6% growth rate, which is less than that of the 1970s. In fact, the recovery from 1982, which peaked at 4.5% in 1984, lost steam and decelerated sharply to about 1.25% during 1986-87 before rising to 3.3%, 4.1% and 4.8% in 1988, 1989 and 1990, respectively.

Figure 5: Quarterly nominal and real exchange rates, 1980-90

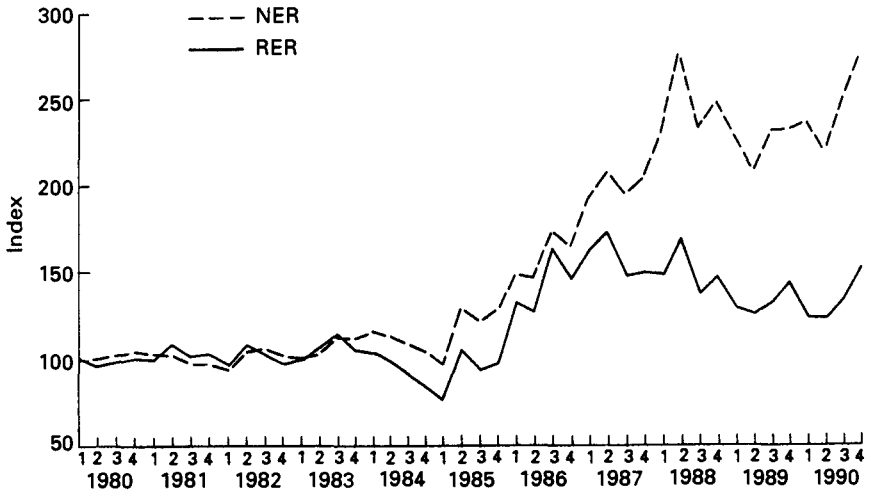


Figure 6: Growth and inflation

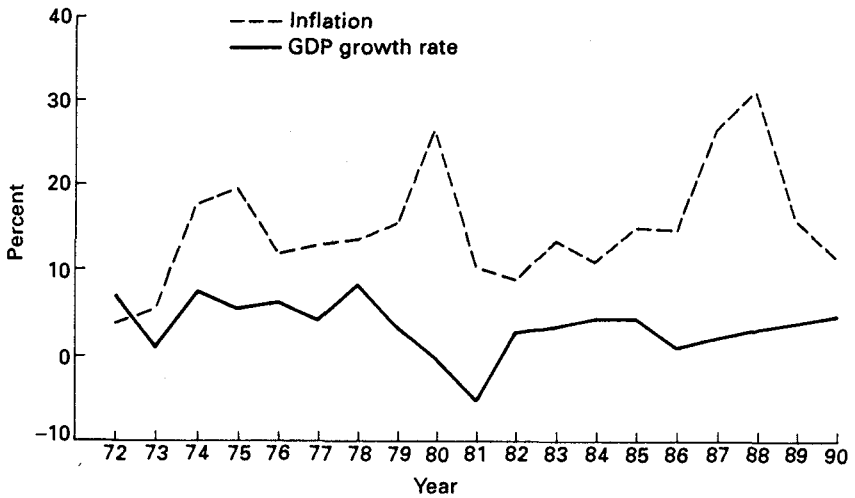


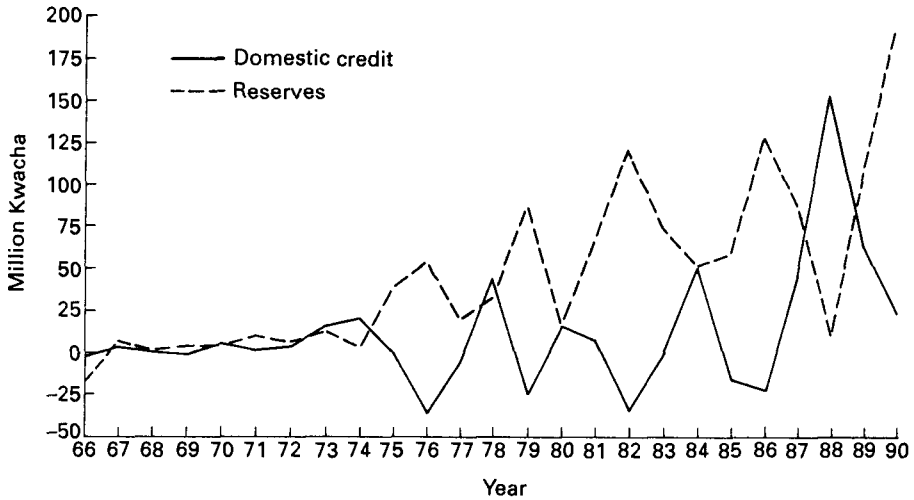
Table 1: Exchange rate and prices

Dependent variable - Pd									
Equation Number	Const.	Pn	NER	NER ₁	NER ₂	Pt*	R ²	F	DW
(1-1)	-2.57 (-2.82)	0.33 (1.22)	0.03 (0.12)	0.37 (1.66)*		0.89 (3.35)	.99	655.41	2.06
(1-2)	-2.52 (-3.26)	0.35 (1.58)*		0.38 (1.96)		0.88 (3.88)	.99	931.22	2.06
(1-3)	-0.01 (-2.27)	0.58 (7.46)			0.11 (1.95)	1.29 (17.98)	.91	126.82	1.91

Notes: Equations (1-1) and (1-2) are based on annual data (1970-90) in logarithmic levels while (1-3) is based on quarterly data 1980(1) - 1990(4) in growth rates. Figures in parentheses are student t-statistics. An * means coefficient is statistically significant at 10% level and t-statistics higher than those marked are significant at 5%. PC - GIVE software was used in all the econometrics computations reported in this study (Hendry, 1989).

Overall price trends in the 1970s in Malawi were greatly influenced by the oil shocks. Having risen from about 5% in 1973, inflation rose to 18% in 1974 as measured by changes in the Blantyre City high income consumer price index (CPI). Although it declined somewhat it suddenly rose from 16% in 1975 to 27% in 1979-80. These trends occurred in spite of extensive price and wages controls administered in the 1970s. Five factors have often been cited to have shaped price trends in the 1980s: deterioration in external terms of trade, external transport shocks, a series of devaluations of the kwacha, the price liberalization programme (PLP) initiated in December 1983, and government deficit financing as repeatedly cited by the monetary authorities. On average, inflation, measured by changes in the composite CPI for Blantyre and Lilongwe Cities, accelerated from 11% during 1982-84 to 19% during 1985-87 and to 32% in 1988. From their anti-inflationary expectations campaign launched in early 1989, the monetary authorities expected inflation to go down to 12% in 1989. However, the actual rate settled at 15.7% and decelerated further to 11.6% in 1990.

The relationship between domestic prices and its components as defined in Equations (7) and (9) is shown in Table 1. The domestic price is the high income Blantyre CPI and the non-tradables price comprises the food, housing and transport components of low-income Blantyre CPI. Both were reweighted using 1980 weights. The foreign currency tradables price is the trade weighted CPIs for the UK, USA, South Africa and the former West Germany. As can be seen from Table 1, the NER has delayed annual influence on the domestic price level which tends to be instantly determined by the foreign currency price of tradables. Quarterly data for the 1980s, however, reveals that the sensitivity of the domestic price level to non-tradables and the foreign price level is

Figure 7: Changes in total credit and official reserves

quite strong. It should, however, be appreciated that although the law of one price does not hold because of the significance of the constant and the price of non-tradables, the foreign currency price exerts an overwhelming influence on the domestic price level.

The Balance of Payments

The position of Malawi's balance of payments reflects certain underlying factors during different periods. First, the export base is limited to a few export primary commodities and some form of 'immiserization-of-growth' phenomenon could be in the making, as revealed by increasing dependence on tobacco exports whose domestic export share, for example, rose from 52%, 60% and to 70% during 1976-80, 1986-88 and 1990, respectively. Second, while the 1960s up to mid-1970s were characterized by modest import substitution, the latter period (late 1970s to date) has been characterized by the heavy importation of industrial inputs accounting for in excess of 35% of the total import bill. Third, the rise in international indebtedness of the latter half of the 1970s, was intermediated by the government, and has resulted in a debt crisis in the face of dried-up private capital flows and highly conditional multilateral and bilateral aid. Finally, disruptions to the external transport system have led to significant non-factor service payments, inflation and loss of export competitiveness.

The interest rate policy of the pre-1976 period was designed to induce commercial banks to borrow from their head offices in London. Consequently, the net international indebtedness of the banks has since then been negative (Figure 1). During that

period the monetary authorities registered positive net foreign assets which could easily finance the banks' indebtedness. This position dramatically changed in 1976 when the authorities' net foreign assets turned negative and could therefore not be relied upon to automatically finance the banks' external indebtedness. This explains why the monetary authorities have repeatedly emphasized the use of the credit and exchange rate policy instruments reviewed above for targeting and enhancing the balance of payments. The substantial inflows of multilateral and bilateral resources to support structural adjustment contributed to the build-up of reserves towards the end of the 1980s.

The relationship between total gross (government plus private) credit and international reserves is shown in Figure 7. A pattern emerges from the figure which clearly suggests that the two variables move in opposite directions. However, this is not a one-to-one relationship as the correlation between current (annual) reserves and current credit was found to be -0.58 , which was distributed over time to -0.32 and 0.37 when credit was lagged once and twice, respectively. This points to the fact that the relation between reserves and credit is not a simple identity and can be positive with lapse of time. This issue is explored further in the next section.

IV. Estimation of the MABP model

This section reports empirical results on the MABP. The nature, sources, and transformations of the data used to conduct empirical investigations are described in the Appendix. This section reports some of the problems encountered and modifications made when fitting the RFE to the data, before proceeding to report on specific issues pertaining to the nature of the results. To minimise the endogeneity problem, real income was estimated from investment using an Almon lag.¹⁶

When the RFE as stated in Equation (5) was tested to the letter as is traditionally done, the results were extremely disappointing and the approach could have been rejected outright. It was therefore decided to adopt the strategy of starting from the general to the specific through over-parameterization of distributed lags. Traditional test statistics were used in guiding the search process. Insignificant variables were deleted, except in cases where their inclusion improved the overall performance of the model.¹⁷ Due to limited annual observations, adequate over-parameterization was limited and in some cases only variables of interest could be over-parameterized or retained in econometric testing.

It has been suggested that since both sides of Equation (5) include share weights of R and DC (that is, R/H and DC/H , respectively), a spurious simultaneity might be generated. A suggested way of alleviating the potential seriousness of this problem involves the specification of a linear demand for money function (Johannes, 1981, p. 32). However, not much information could be gained using this approach except in the case of testing RFE using the domestic price level on annual data as shown in Table 2. The results reported in Tables 2, 3 and 4 differ in terms of the domestic price and relative price components used. Table 2 results are based on the domestic price level, P_d . Table 3 equations incorporate non-tradables, P_n , and tradables price which is decomposed into the NER and the foreign currency price, P . Table 4 results are based on the RER.

Starting with the price variables, the annual domestic price level's coefficients were found to be statistically significant (at 5% level) and of the expected positive signs using the linear money demand function (LMD) specification (Table 2).¹⁸ The lagged values were found to be reinforcing the current values. On a quarterly basis it is only the lagged domestic prices that were found to be statistically significant (at 1% level) with expected signs. While on an annual basis the BOP effect of the price level vanishes after one year, the same effect lasts for only three quarters. The strict MABP postulates a unitary coefficient of contemporaneous price with respect to BOP. Quarterly results show that this is achieved in only two quarters, implying stronger impact of the domestic price level than postulated.

Table 2: MABP - Domestic price level

Dependent Variable - R		
Expl.	Equation number and type	
	Annual Data (2-1)LMD	Quarterly Data (2-2)RFE
Const.		0.087 (2.431)
P_d	0.250 (1.953)	
P_{d-1}	0.577 (2.277)	0.579 (2.324)
P_{d-2}		0.481 (1.908)
Y	0.333 (2.068)	
Y_{-3}		0.131 (2.067)
r	-13.527 (-3.007)	
r_{-3}		-0.771 (-2.182)
h	-24.995 (-1.189)	
h_{-1}		0.329 (2.163)
h_{-2}		0.466 (2.760)
h_{-3}		-0.287 (-1.867)
DC	-0.482 (-3.697)	-0.594 (-5.605)
DC_{-1}	0.462 (3.857)	0.333 (2.939)
R^2	.879	752
F	12.43	10.09
DW	2.49	1.97
N	19	40

Note: RFE means equation based on the standard reserve flow equation while LMD means equation based on linear money demand or first differences of variables. Figures in parentheses below coefficients are student t-statistics.

Table 3: MABP - Non-tradables price and nominal exchange rate

Dependent variable = R

Expl. var	Equation Number	
	Annual Data (3-1)RFE	Quarterly Data (3-2)RFE
Const.	0.354 (4.987)	0.039 (0.867)
Pn		-0.696 (-1.636)*
Pn-1	-0.599 (-3.049)	
Pn-2	-0.532 (-3.113)	0.806 (1.624)*
NER	-0.359 (-2.155)	
NER-1	0.412 (2.359)	
NER-2		1.015 (2.944)
NER-3		0.639 (1.910)
Pt*	-0.940 (-1.844)	
Pt*-2		0.683 (1.696)*
Y	0.836 (3.132)	
r		
r-3		-0.714 (-1.941)
h		
h-2		0.244 (1.401)
h-3		-0.345 (-2.069)
DC	-0.707 (-4.422)	-0.469 (-3.664)
DC-1		0.339 (2.857)
R ²	0.837	.745
F	7.33	8.47
DW	1.90	2.01
N	18	40

Note: An * means statistically significant at 10% level and t-statistics above those are significant at 5% level.

Table 4: MABP - Real exchange rate

Dependent variable = R

Expl. var	Equation Number	
	Annual Data (4-1)RFE	Quarterly Data (4-2)RFE
Const.		0.123 (3.967)
RER-1	0.281 (2.180)	-0.552 (-2.518)
RER-3	0.226 (1.509)*	0.613 (2.820)
RER-5		
Y	0.910 (4.077)	
Y-3		0.166 (2.668)
r		
r-3		-0.556 (-1.639)*
h-1	-0.234 (-3.321)	0.388 (2.649)
h-2		0.512 (3.180)
h-3		-0.289 (-1.990)
DC	-0.292 (-3.576)	-0.675 (-6.922)
DC-1		0.316 (2.882)
DC-2	0.335 (3.483)	
R ²	.880	.777
F	13.46	11.65
DW	1.94	2.08
N	17	40

Note: An * means statistically significant at 10% level and t-statistics above those are significant at 5% level.

In terms of non-tradables and tradables prices (and recalling Equations (9) and (9a), the non-tradables price yielded negative and significant coefficients on an annual basis up to two lags (Table 3). This means that the BOP effect of P_n from a relative price point of view dominates its BOP effect through the money demand side. Opposite results were found using quarterly data in the sense that relative price effect tended to be followed in the third quarter by even stronger money demand effects. Since within a year the money demand impact was found to be negligible on an annual basis, we may conclude that over time the relative price BOP effect of non-tradables outweighs the demand-side effects.

We now turn to the components of the tradables price. The NER yielded perverse results during the current year which were offset by expected results in the following year, leaving only a net 5% BOP impact. However, on a quarterly basis the NER yielded favourable though declining effects during the third and fourth quarters only. Surprisingly, the foreign currency price, which exerts significant influence on the domestic price level (Table 1), exhibited a wrongly signed coefficient in the current year and the positive coefficient observed in the third quarter was only significant at the 10% level. This may mean that the foreign currency price influences the overall BOP more from the money demand side than from the relative price side.

As a summary measure of relative prices and international competitiveness, the RER was found to exert positive BOP effects only in the second and fourth years (Table 4). No contemporaneous effect was found when both annual and quarterly data sets were used. However, as in the case of the non-tradables price, the RER exhibited sign switching on a quarterly basis. The perverse effect of the second quarter was more than slightly offset by the positive effect in the fourth quarter.

The switching of signs exhibited by the impacts of price variables, especially NER on annual data and the quarterly RER, are particularly noteworthy. Although the causes of the dynamics involved are not clearly known, three disturbing consequences may ensue. First, the price dynamics may be unstable, revealing foreign exchange instability caused by relative prices. Second, the source of instability may be due to the fact that the incentive structure between traded and non-traded sectors may have been in a state of flux, especially in the 1980s. Third, the negative coefficients could be interpreted as initial deflationary BOP effects of a devaluation or real exchange rate depreciation. This may not be a farfetched interpretation in a commodity-dominated economy such as Malawi's, since devaluations have generally been found to exert initial negative BOP consequences prior to yielding favourable medium-term effects (Khan, 1990, p. 222).

On the credit side, it can be seen that the expected negatively signed coefficient precedes the 'wrong' positively signed coefficient in a majority of the tests (Tables 2 - 4). Note also that credit control tends to have instantaneous expected impact on overall BOP even on a quarterly basis. This means that from the MABP viewpoint credit control tends to be initially beneficial in improving overall BOP but it is 'counterproductive' to the same objective in subsequent periods.

The MABP hypothesises a coefficient of -1 for domestic credit. However, a careful observation of the results shows that on an annual basis the negative coefficient

which is less than absolute one is followed by a positive coefficient of almost equal magnitude. Quarterly results show mixed support for the MABP. Equation (2-2) of Table 2 supports the approach since the net coefficient of -0.26 per quarter amounts to almost -1 per annum. This is not, however, the case with equation (3-2) which yields -0.52 and equation (4-2) with -1.44 per annum.

Because of its aggregative nature, the RFE of the MABP may not be a useful guide to explain the channels of these seemingly conflicting BOP credit effects. In the Malawian context, however, both outcomes can be rationalized from a policy viewpoint as follows. As discussed earlier, strict credit and exchange controls instituted since the late 1970s selectively favoured the export-oriented plantation sub-sector which absorbed the largest credit allocation to the private sector. Therefore, while restricted credit to the non-plantation sectors may have had positive impact in directly suppressing the demand for foreign exchange, the productive credit to the favoured sub-sectors may have had favourable supply-side effects, thereby generating increased export volume and foreign exchange. However, since net reserves declined during most of the period under analysis as shown in Figure 1, the latter effect may have been overwhelmed by insufficient credit restraint, especially to government. If this interpretation holds, then judicious selective credit management, as opposed to across-the-board credit squeeze, has to be recommended.

Although our interest is primarily in the exchange rate and credit, the other variables of the MABP, especially on the demand side, yielded expected results in most cases. In spite of the shallow financial sector, the interest rate variable exerts expected BOP effects which are revealed especially in the third quarter. The money multiplier, however, was found to exert perverse net effects in two out of three cases on a quarterly basis.

Sterilization and causality tests

To test the sterilization assumption of the MABP, 2SLS was applied and the estimated sterilization equations are given in Table 5. Alternative specifications were tested across-the-board. The results were statistically poor for annual data, although the sterilization coefficient had a negative coefficient. Although these results indicated that over the period 1970-90 the RBM may have been incapable of pursuing active sterilization operations, the results from quarterly data using the LMD model, though not satisfactory on overall goodness of fit, revealed statistically significant sterilization coefficient. A straightforward interpretation could be that the RBM attempted to neutralize reserve flows during the 1980s. However, only a third of reserve flows could be so sterilized.

Another contentious issue in testing the MABP is the direction of causation as between reserve flows and domestic credit. The most widely used procedure is the Granger-causality test based on two null hypotheses: domestic credit changes do not cause reserve movements, and reserve flows do not lead to credit changes. To test the first hypothesis an autoregressive-distributed lag (ADL) model was used with reserve

Table 5: Sterilization equations

Dependent Variable - DC				
Expl. var	Equation number			
	Annual Data		Quarterly Data	
	(5-1)	(5-2)	(5-3)	(5-4)
Const.	(0.354) (4.987)			
DC-2		0.687 (2.520)	0.04 (0.25)	
R	-0.309 (-0.985)	-0.300 (-0.587)	-0.35 (-1.96)	-0.33 (-2.02)
R ²	.057	.356	.10	.10
F	0.97	4.15	2.03	4.10
DW	2.05	1.79	1.31	1.28
N	18	17	39	39

Notes: Equation (5-1) was tested with Equation (3-1) of Table 3; Eq. (5-2) with Eq. (4-1) of Table 4; Eqs. (5-3) and (5-4) with LMD specifications with instruments RER_{-1} , RER_3 , RER_5 , Y and a constant. Annual data equations are based on the RFE model while quarterly data equations are based on the LMD model.

changes as the dependent variable, while the second hypothesis was tested using domestic credit changes as the dependent variable. Up to three and four lags were allowed for annual and quarterly data, respectively. Total domestic credit and its components - government credit from the Reserve Bank of Malawi (GRBM), and private sector credit from commercial banks (PCBC) - were used in the tests, separately.

The F-statistics are reported in Table 6. The results based on annual data show that the direction of causality is from DC to reserves and not the reverse. This is due to the heavy proportion of public sector credit in total credit which also yielded the same results as the latter. It is private sector credit which instead indicated direction of causation from reserves to credit. Quarterly data, however, revealed that total credit and government credit are each in interdependent causation with reserves, while private sector credit maintained its results.¹⁹ From a statistical point of view these findings create serious problems regarding the interpretation of results of the MABP, especially those based on quarterly data.

Table 6: Granger-causality tests

Null Hypothesis	F-values: Annual Data		
	ARL	ADL	GCT
DC does not cause R	1.585	3.696*	4.13*
R does not cause DC	6.977**	5.827**	2.52
GRBM does not cause R		3.941*	4.45*
R does not cause GRBM	0.132	1,049	1.72
PCBC does not cause R		2.105	2.09
R does not cause PCBC	2.254	7.024**	7.32**

Null Hypothesis	F-values: Quareterly Data		
	ARL	ADL	GCT
DC does not cause R	3.069*	3.754**	3.43*
R does not cuase DC	3.303*	6.904**	7.33*
GRBM does not cause R		3.275**	2.79*
R does not cause GRBM	0.356	2.712*	4.45**
PCBC does not cause R		2.042	1.16
R does not cause PCBC	5.317**	4.440**	2.68*

Notes: ARL stands for autoregressive lag model, ADL is autoregressive-distributed lag, and GCT refers to Granger-causality test. * and ** denote significant at 5% and 1% level, respectively. DC = total domestic credit, R = international reserves, GRBM = Reserve Bank of Malawi credit to Malawi Government, and PCBC = Commercial bank credit to the private sector. Variables are changes in levels.

V. Concluding observations

This study has attempted to examine the relevance of the monetary approach to the balance of payments (MABP) using Malawi as a case study. Of particular interest is the overall balance of payments effects of the exchange rate, relative prices and domestic credit within the reserve flow equation (REF) variant of the MABP. Both quarterly and annual data sets were used in the investigations. No restrictions were imposed on the parameters of the regressors except on the dependent variable and for the small sample nature of annual data. This over-parameterization allowed us to report both the expected and perverse results from the MABP perspective.

Price components seem to exhibit significant lagged impact on the overall BOP. The MABP's postulate of a unitary elasticity for the domestic price level was confirmed using quarterly data with a coefficient of 1.06 achieved in two quarters. In a number of cases, however, the coefficients switch signs, sometimes at different intervals. The BOP impact of the non-tradables price was found to be stronger from the relative price side than from the money demand side as the negative coefficients persisted up to year three.

From the point of view of relative prices there are indications that a mismatch of traded and non-traded goods price movements exists which could have resulted from misalignment of incentives. The negative coefficients which tend to precede positive ones for the NER and the RER on annual and quarterly series, respectively, suggest initial deflationary effects of devaluation. There are, however, two observations as far as the BOP objective is concerned. First, the fact that the RER has been found to be well-behaved on an annual basis means that it is real exchange depreciation that matters rather than nominal devaluation. Second, the medium-term (more than a year) perspective is more important than the short-term (quarter-to-quarter) relative price effects.

On the domestic monetary base side, domestic credit was also found to have expected and 'wrong' signed coefficients, with the latter frequently succeeding the former. This seemingly contradictory outcome tends to support both the use of monetary policy as a direct and indirect instrument for balance of payments support. Direct credit control has quick BOP consequences. However, productive (export-oriented) credit measures have delayed positive effects. Very often in times of BOP crisis, monetary authorities institute tight credit conditions in order to ease pressure on the BOP. While this leads to the initial suppression of reserve demand, our results show that selective credit to the export-oriented sectors (in Malawi) may have had reinforcing positive supply-side BOP effects. If this reading of the results is correct then selective credit management, especially for purposes of export diversification, should be encouraged.

Two surprising results should be recorded. First, in spite of the general nature of the MABP, the significance of relative prices, which is a trade balance phenomenon, is

highlighted. In a commodity-based economy such as Malawi's, this may be a reflection of the dominance of the trade (current account) balance changes in the overall BOP. Second, the interest rate variable has been found to be a significant determinant of the overall BOP in some tests, even though Malawi's financial sector has been relatively shallow and relatively unintegrated to the international financial system. This strengthens government efforts of deepening the sector to enhance the application of indirect market-based monetary policy instruments.

Tests of the 'no-sterilization' assumption yielded mixed results. Results based on annual data supported the assumption while those based on quarterly data rejected it. This latter result may have been influenced by the rise in government credit due to fiscal control problems during most of the 1980s, especially before 1988, in the face of increased reserve losses which may have acted as a policy of sterilization. Another factor would be that while sterilization is possible over relatively short periods, it becomes relatively difficult to conduct over longer periods.

Causality tests between credit and reserves based on the Granger-causality procedure also revealed mixed results. While results based on annual data supported the MABP, the assumption of causality from credit to reserves and not the other way around for total credit and RBM credit to the government was massively rejected by results on quarterly data for the same credit types. On both data sets, causality was established from private sector credit to reserves and not vice versa. Serious doubts about the relevance of the MABP in the context of developed market economies have been mainly based on the switch to managed floating. Our results indicate that reduction of the size of the public sector in favour of the private sector may also invalidate the applicability of the MABP even in an LDC context.

In spite of the preceding useful observations, the MABP seems to be limited for purposes of interpreting even its own results. Knowledge of economic structures, processes and policy stance is quite imperative to the interpretation of some of the results from the model. While the MABP seems to yield unreliable results based on quarterly data, our findings based on annual data show that it is difficult to reject completely.

The study's original mandate was confined to testing the relevance of the RFE in general and, specifically, to explore the BOP impacts of relative prices, the exchange rate and macrocredit policies. Although useful results have been extracted as reported above, it was found in the course of research that these results suggest areas of further research. First, it has been shown that both money demand and supply sides exhibit both perverse and expected signs when extended lags are permitted. Further, different results have been reported for annual (1970-90) and quarterly 1980:1-1990:4) data sets. This may be due to policy shifts discussed in Section III. These factors suggest testing for the stability of the RFE. Second, traditional tests of the MABP have used the RFE which may not be a reflection of the long-run solution which the approach seeks to characterize. This aspect may need to be explored. Third, related to these two research directions, a related BOP aspect which may be examined is the stability of the central bank's demand for international reserves in the light of the shocks and policy switches of the 1980s.

Appendix:

Sources and nature of data used in the empirical investigations

International reserves are Reserve Bank of Malawi's (RBM's) foreign reserves. Annual reserves are simple averages of end-of-quarter reserves. Domestic credit is total credit to government and the private sector from the banking system with annual credit represented by an average of end-of-quarter credit. The money multiplier is the ratio of the sum of currency in circulation (nonbank) and demand deposits at commercial banks to the sum of currency and commercial bank vault cash plus domestic reserves held against monetary policy requirements. The interest rate used is the commercial bank savings deposit rate.

The annual domestic price is the Blantyre City high income consumer price index (CPI) with the 1970s series rebased at 1980. The quarterly domestic price is the one reported in the IMF's *International Financial Statistics*. The annual and quarterly non-tradables prices comprises the food, transport and housing components of low-income Blantyre City CPI using 1980 weights. The foreign currency price is the total trade-weighted index of CPIs for South Africa, the United Kingdom, the United States of America and former West Germany as reported in the *IFS*. The nominal exchange rate is also a total trade-weighted index of the bilateral rates between the Malawi kwacha and the rand, the pound sterling, the US dollar and the deutschmark. The real exchange rate is the total trade-weighted index of bilateral real exchange rates defined as the nominal exchange times the respective country foreign currency price divided by the domestic price level. Note that the domestic price and the real exchange rate used in econometric computations are not generated according to Equations (7) and (8), respectively.

Notes

1. On the origins and essence of the monetary approach to MABP see Frenkel and Johnson (1976); IMF (1977); Kreinin and Officer, (1978); Rivera-Batiz and Rivera-Batiz (1985 Chaps. 14 and 15).
2. Growth in money demand is

$$\dot{L} = \dot{P}d + \dot{Y} - \dot{r}$$

where $\dot{L} = \frac{dL}{dtL}$ and so on. Growth in money supply is:

$$\dot{M}^s = \dot{h} + \dot{H}$$

note that $H = R + DC$ so that:

$$\dot{H} = \frac{dH}{H} = \frac{dR + dDC}{H} = \left(\frac{R}{H}\right)\left(\frac{dR}{R}\right) + \left(\frac{DC}{H}\right)\left(\frac{dDC}{H}\right) = \frac{R}{H}\dot{R} + \frac{DC}{H}\dot{DC}$$

Monetary flow equilibrium of Equation (1) in the test now becomes:

$$\dot{M}^s = \dot{h} + \frac{R}{H}\dot{R} + \frac{DC}{H}\dot{DC} = \dot{L} = \dot{P}d + \dot{Y} - \dot{r}$$

Expressing the overall balance of payments as proportionate changes in external reserves, we get:

$$\frac{R}{H}\dot{R} = \dot{P}d + \dot{Y} - \dot{r} - \dot{h} - \frac{DC}{H}\dot{DC}$$

which gives Equation (2). See also Rivera-Batiz (1985) pp. 450-458, and Taylor (1987).

3. Kreinin and Officer, 1978, p. 35.
4. Studies on general macroeconomic performance and strategy of Malawi include: Humphrey (1973); Thomas (1975); Kydd and Christiansen (1982); Kydd and Hewitt (1986), Laslett (1984); Malawi Government (1987).
5. The 1976 package can be found in FER Vol. VIII, No. 2, 1976 and in RBM, Annual Report, 1976.
6. RBM, Annual Report, 1978, p. 24.
7. Ibid, p. 24; see also FER, Vol. X, No. 4, pp. 11-12.
8. FER, Vol XI, No. 1, 1979, p. 4.
9. FER, Vol. XI, No. 3, 1979,
10. This involved: 1) cancellation of approvals due to expire by 3 September, 1979 and new approval had to be sought; 2) selective exchange control to reduce by half the importation of goods thought to have been excessively stock-piled; and 3) introduction of an import deposit scheme in the form of 20% deposit with commercial banks of the value of goods prior to the acceptance of letters of credit and bills, and a 50% deposit on customs duties and clearing charges at the ports collected by clearing agent. Ibid., pp.12-13 and RBM, *Annual Report*, 1979, p.21.
11. Ibid., p. 30. See Blades (1972) for an evaluation of this devaluation.
12. Annual Report (1975), pp. 11, 29.
13. Ibid., p. 30.
14. Ibid., p. 11.
15. For a discussion of the role of the real exchange rate in the design of adjustment programmes see Johnson (1985).
16. For examples on the practical estimation of Almon lags see Almon (1965), and Gujarati 1978).
17. The equations and parameters were not subjected to encompassing and stability

tests, respectively.

18. Problems were encountered in fitting the RFE to annual data with the domestic price level. We suspected serious multicollinearity and the domestic price level was found to be significant when only regressed together with domestic credit
19. Sims causality tests yielded mixed results.

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