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Sanusi, Aliyu Rafindadi

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## **An Empirical Analysis of the Money Supply Process in Ghana: 1983-2006**

**Aliyu Rafindadi Sanusi\***

Department of Economics,

Ahmadu Bello University, Zaria

Email: [aliyurafindadiz@yahoo.com](mailto:aliyurafindadiz@yahoo.com)

Mobile: +234 (0) 7065656101

### ***Abstract***

*This paper examines the major drivers of the asset counterpart of the observed money supply in Ghana since the adoption of the Economic Recovery Programmes in Ghana. Using the traditional money multiplier approach, the relative contributions of fiscal financing and capital inflows to the money supply process were examined. It is found that until the mid nineties, fiscal deficit financing was the major driver of the money supply process. In the later years, however, changes in the Net Foreign Assets of the Bank of Ghana, driven largely by foreign aid and remittances inflows, appear to be the major cause of monetary expansion. Until 2003 when discipline improved, government borrowing was also the major component and source of changes in the net domestic assets of the BoG. This, the paper argues, implies that the use of foreign exchange market intervention could be an effective way of controlling money supply.*

**Keywords:** *Money Supply Process, Capital flows, Money Multiplier, Ghana*

**JEL Classification codes:** *E51, E52, E58, F35*

## **1 Introduction**

Ghanaian Economic Reforms Programme that started in 1983 has been adjudged by several assessors as one of the few success stories in Africa, and indeed the only in West Africa (see for instance IMF, 1994)<sup>1</sup>. According to the IMF, Ghana is among a group of few Sub-Saharan African countries that now have a successfully unified floating exchange rate regime, liberalised external sector, and reasonably high real GDP growth, sustained now for over a decade. One problem, however, that initially prove to be difficult for the Ghanaian authority is the persistence of inflation, which, although has fallen significantly from its pre-reform era, remain quite high and volatile (see Table 1). Throughout the reform period, the monetary policy framework was monetary aggregate targeting, and the monetary authority had tough time trying to meet targets (see Dordunoo and Donkor, 1998). There are two features of the Ghanaian economy during the reform period that dominated its money supply process, and have been shown in the literature to explain its inflationary process. These are the fiscal deficit financing and rising capital inflows. However, given the substantial increase in capital inflows, in the form of foreign aid and remittances, over the years, the relative role of these factors might have changed. The major objective of this paper, therefore, is to empirically examine the relative role of these factors in

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\* Dr. Aliyu Rafindadi Sanusi is a lecturer in the Department of Economics, Ahmadu Bello University, Zaria, Nigeria.

<sup>1</sup> Some of the not-so-successful reforms in the SSA include those of Nigeria, Kenya, Sierra Leone, Senegal, Namibia, Congo and Malawi.

the money supply process since the beginning of the reforms. Specifically, the paper examines the major drivers of the observed monetary aggregates. The empirical knowledge of the major drivers of money supply is important for effective control of inflation, especially in the context of the monetary targeting framework that Ghana adopted during the reform period. Indeed, an important issue for monetary management in such framework is the identification of dominant component of the money supply. In Ghana, the role of fiscal deficit financing and capital inflows, especially foreign aid, has dominated academic and policy discourse (see for example Leith and Soderling, 2000; Younger, 1992; Tsikata, 1999; Dordunoo and Donkor, 1998; Addison, 2001 and Sowa, 2004). It has been argued that these two factors have been the major causes of monetary expansion, and therefore the failure of the monetary authority to curb inflation. This paper therefore attempts to empirically examine the role of fiscal deficit financing and foreign exchange inflows in the money supply process using the money multiplier approach.

To preview the results, it is observed that although both the multiplier and monetary base do play important roles in accounting for changes in the observed money stocks, the role of the latter is more important. While the effect of changes in the net domestic assets of the BoG dominated changes in the monetary base in the early years of the ERP, changes in the net foreign assets of the bank of Ghana appear to be the major cause of monetary base expansion since 1996. Until 2003, government borrowing was also the major component and source of changes in the net domestic assets of the BoG.

The rest of the paper is organised as follows. Section 2 reviews monetary management strategy in Ghana. Section 3 presents the theoretical framework and outlines the methodology. Section 4 presents empirical decomposition of the money supply process. Section 5 concludes the paper.

## **2 Monetary Policy Strategy in the Pre-Inflation Targeting Era**

Monetary targeting had been the policy framework in Ghana prior to its formal adoption of inflation targeting in 2007. Under this framework, monetary management involved determining an appropriate rate of growth of (some) money supply aggregates. This rate of growth is then targeted using a combination of various instruments. Monetary management in Ghana, since the launch of the ERP, has changed considerably in line with changes in the financial system. While the major objective of monetary policy - price stability – has remained unchanged, there have been some changes in the set of instruments used towards those that are more indirect and market based. The intermediate target has been the broad money supply, although the definition has been adjusted to reflect the growth of new financial assets, resulting from the liberalisation, that have functioned as close substitutes for the monetary assets. Foreign currency deposits are of particular relevance in this connection. One major constraint of monetary policy has been the persistent need to accommodate unplanned fiscal requirements. In addition, the inflows of foreign aid, as well as foreign loans for the purchase of cocoa (in the fourth quarter of every year since 1994) have made monetary management more complicated.

The BoG's strategy for inflation management is based on the view that inflation is a monetary phenomenon, and therefore adopts money supply growth as its intermediate target of monetary policy. The financial programming framework used by the BoG is derived from the quantity theory equation, which assumes that prices adjust to movements in money supply with velocity

determined outside the model<sup>2</sup>. The BoG, in consultation with the ministry of finance, determines the targets for growth and inflation with the policy implications drawn from the financial programme (Addison, 2001)<sup>3</sup>. This framework implicitly assumes that the exchange rate will be permitted to equate demand for and supply of foreign exchange, including aid-sourced flows.

Attempts to achieve the ultimate target of monetary policy (low inflation) have, in principle, determined the actual growth of the intermediate targets (money supply, defined as  $M_2$  and later  $M_2^+$  to include foreign currency deposits) and its components. The main operating targets of policy have therefore been Net Domestic Assets (NDA) and Monetary Base ( $M_0$ ) of the BoG, with a floor set for Net Foreign Assets (NFA) under the financial programme. Earlier in the reform period, NFA were not considered as a major source of liquidity as export earnings and other capital flows were low. The major source was net credit to the central government (NCCG) and net credit to the private sector (NCPS). However, as exports recovered and confidence of international donors in the reforms was restored, foreign exchange inflows became a major source of liquidity. The BoG therefore shifted to the use of  $M_0$  as the operational target, under which primary and secondary targets were set for both the NDA and NFA components of the  $M_0$ . The shift in the use of operational target to  $M_0$  to include NFA of the Bank of Ghana is based on the central bank's balance sheet identity, which is discussed in the following section.

### 3 Theoretical Framework and the Model

The theoretical foundation of the Ghanaian monetary policy strategy, and therefore, of our model is the standard theory of money supply determination, i.e., the monetary base model. It can be seen as a simple extension of the traditional bank deposit multiplier approach to deposit creation. Consider the following balance sheet identity (see Addison, 2001):

$$M_2 = mm_2 \times M_0 \quad 1$$

Where  $mm_2$  is the broad money multiplier,  $M_2$  is the broad money supply, and  $M_0$  is the monetary base.

The multiplier  $mm_2$  is not unique, its components depends on the definition of the money supply used. However, for brevity,  $M_2$  multiplier can be written as:

$$mm_1 = \frac{1+c}{r+c} \quad \text{and} \quad mm_2 = \frac{1+tsfd}{r+c+r*tsfd}$$

Where  $c$  currency-deposit ratio;  $r$  is the reserve ratio;  $tsfd$  is the ratio of time, savings and foreign currency deposit to total deposit ratio.

<sup>2</sup> Velocity is unlikely to be constant. In fact, the empirical evidence suggests that it is not. It is however stable rather than constant in the short run. One implication of non-constancy of the velocity is that monetary policy will tend to be more restrictive if velocity falls faster than the model assumes.

<sup>3</sup> The final target of monetary policy in Ghana has been the rate of inflation, with the growth of monetary aggregate as the intermediate target while the operational target has been NDA and sometimes reserve money.

Assuming that the multiplier can be predicted fairly accurately, or is stable, and then the  $M_2$  target can be achieved by setting the corresponding level of  $M_0$  through OMO or foreign exchange reserve management. This is because the monetary base can be decomposed as follows:

$$M_0 = NFA_{bog} + NDA_{bog} \quad 2$$

$$NDA_{bog} = NCCG_{bog} + NICBP_{bog} + OIN_{bog} \quad 3$$

$$M_0 = NFA_{bog} + NCCG_{bog} + NICBP_{bog} + OIN_{bog} \quad 4$$

where:  $NFA_{bog}$  is the net foreign asset of the Bank of Ghana;  $NDA_{bog}$  is the net domestic asset of the Bank of Ghana;  $NCCG_{bog}$  is the net credit to central government;  $NICBP_{bog}$  is the net claims on Banks and public; and  $OIN_{bog}$  is other items (net) of the BoG.

Equation 4 above represents the model. Given the multiplier, it suggests that money supply expansion can be driven by either rising net foreign asset of the Bank of Ghana, net lending to the government by the Bank of Ghana, net lending to banks and public. Because these are net claims on the government, the banks and the public, open market sales have contractionary effects on NCCG and NICBP, while open market purchases have the opposite effect. Similarly, sales of foreign currency by the central bank have a contractionary effect on the NFA, while purchases expand it. Thus, OMO and foreign exchange market intervention can be used through the balance sheet of the BoG to regulate the level of monetary base and, given the multiplier, the money supply. However, instability or unpredictability of the multiplier may hinder the attainment of a desired monetary target.

The model, equations 1 to 4, can also be represented in terms of the rate of growth of the broad money supply as follows:

$$\Delta M_2 = mm_2 \times \Delta M_0 \quad 1b$$

$$\Delta M_0 = \Delta NFA_{bog} + \Delta NDA_{bog} \quad 2b$$

$$\Delta NDA_{bog} = \Delta NCCG_{bog} + \Delta NICBP_{bog} + \Delta OIN_{bog} \quad 3b$$

$$\Delta M_0 = \Delta NFA_{bog} + \Delta NCCG_{bog} + \Delta NICBP_{bog} + \Delta OIN_{bog} \quad 4b$$

In the next section, the model is empirically applied to the pre-inflation targeting period in Ghana.

## 4 Empirical Analysis

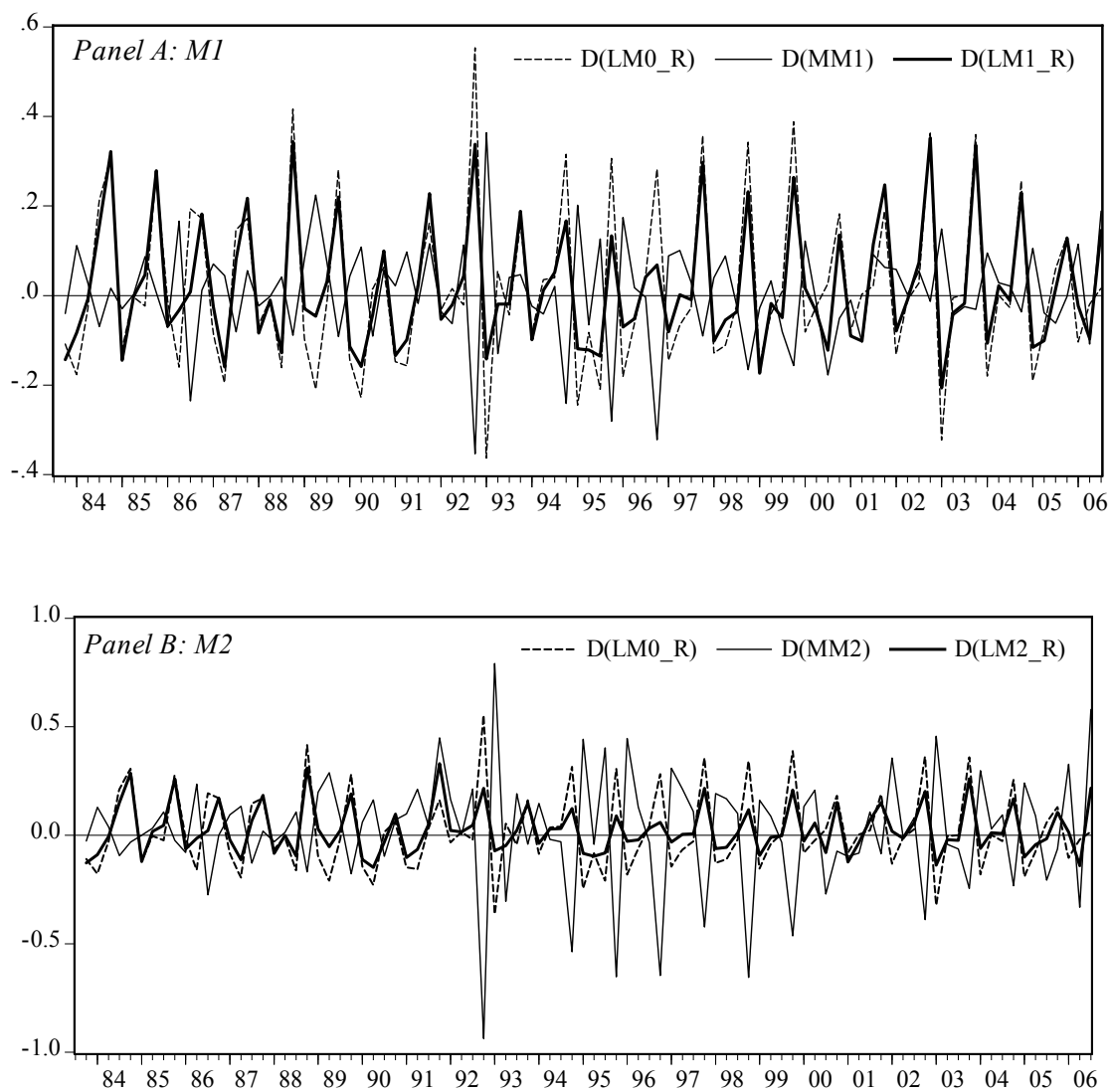
### 4.1 The Data

In this section, the model estimated using the quarterly data of the Ghana's monetary survey obtained from the IMF's International Financial Statistics for the period 1983Q2-2006Q4. The choice of this period is informed by the need to cover the post 1983 reform period before the formal adoption of inflation targeting in December, 2006.

### 4.2 Decomposition of $M_1$ and $M_2$ (Equation 1b)

Figure 1 plots the estimates of Equation 1b, showing changes in real  $M_1$ , real  $M_0$  and the  $M_1$  multiplier. It could be observed that the changes in multipliers and monetary base tended to be somewhat offsetting, as would be expected given some stability in the demand for real money balances. However, the quarterly fluctuations in both  $M_1$  and  $M_2$  tend to be associated with *net movements* dominated by either the multiplier or the monetary base (Figures 1). *Except in a very few cases, net changes in  $M_0$  tend to contribute a relatively higher share of the observed fluctuations in both aggregates, especially  $M_1$  after 1992.* In the case of  $M_2$ , the money multiplier offset tends to matter more in the later years – a jump in  $M_0$  is offset partially by a fall in the  $M_2$  multiplier (Figure 1 panel B)<sup>4</sup>.

**Figure 1. Quarterly Change in Real  $M_1$ , Real  $M_0$  and Multiplier**



Source: Computed by the author with data obtained from International Financial Statistics

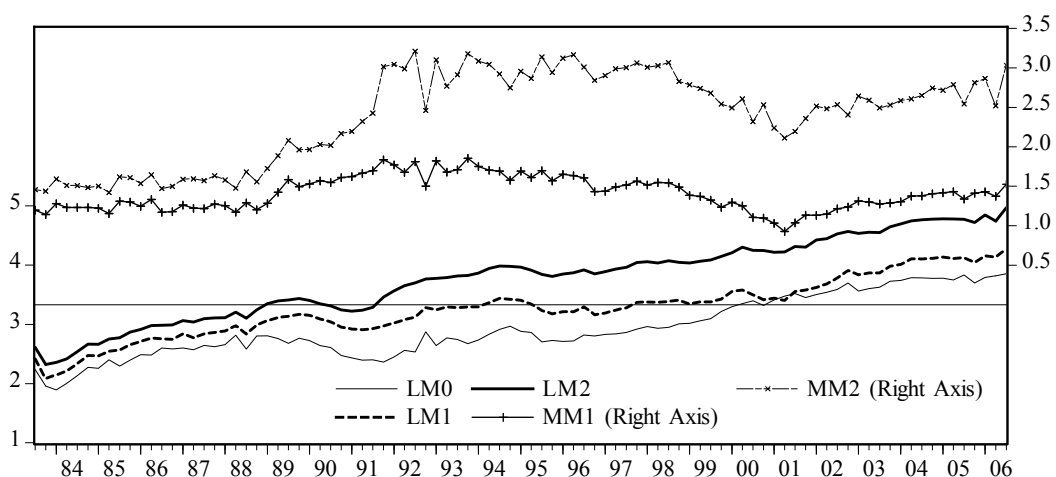
<sup>4</sup> The increased volatility observed after 1992 reflects the disruption of foreign support by the IMF/World Bank, leading to temporary slippage in monetary discipline (see Figure A1 in the Appendix).

Figure 2 plots (seasonally adjusted) money supply, monetary base and the multipliers, motivated by equation 1. It is clear that the multipliers have been subject to both short-term fluctuations and long term trend variation. Earlier in the reform period (1983Q3 to 1988Q3) both  $M_1$  and  $M_2$  multipliers have been somewhat stable, hovering around 1.2 and 1.5 respectively. This is due to stability in the reserve (R) and time, saving and foreign currency deposit (TSFD) ratios (Figure 3, panel A). However, the effective implementation of the first phase of the Financial Sector Adjustment Programme (FINSAP-I) between 1988 and 1991 led to a significant increase in the multipliers, with that of  $M_2$  becoming more variable (see Figure 1 and 2; and IMF, 1999). The  $M_1$  and  $M_2$  multipliers rose to around 1.5 and 3.0 respectively during this period, due to the decline in the public's cash holding (as both TSFD and demand deposits, DD, rose) and to a decline in the bank's reserves reflecting, in part, the restoration of confidence in the banking system (Figure 3, panels A and B)<sup>5</sup>. This movement of money into the banking system was facilitated by the increase in the BoG's rediscount rate (in stages, reaching around 35%) thereby encouraging banks to seek deposits elsewhere. As inflation was also declining, real interest rates on deposits had become substantially positive for the first time since the launch of the ERP (except briefly in 1985; Sanusi, 2009).

Between 1998Q2 and 2001Q1, however, both multipliers declined steadily from around 1.6 and 3.3 in 1998 to around 1.05 and 2.2 in 2001 for  $M_1$  and  $M_2$  respectively. This mainly reflects bank reserves and currency rising faster than demand deposits, (Figure 3, Panels A and B) with both reserves ratios reaching their peak in 2001. After 2001, the multipliers rose again to stabilise at around 1.4 and 2.7, respectively for  $M_1$  and  $M_2$ , as the currency and reserve ratios declined.

In summary, although the multipliers have not empirically been constant as the programming model had assumed, they have been fairly stable and predictable. Changes in the money supply have tended to be more as a result of changes in the monetary base. The next section therefore returns to the analysis of the components of the monetary base.

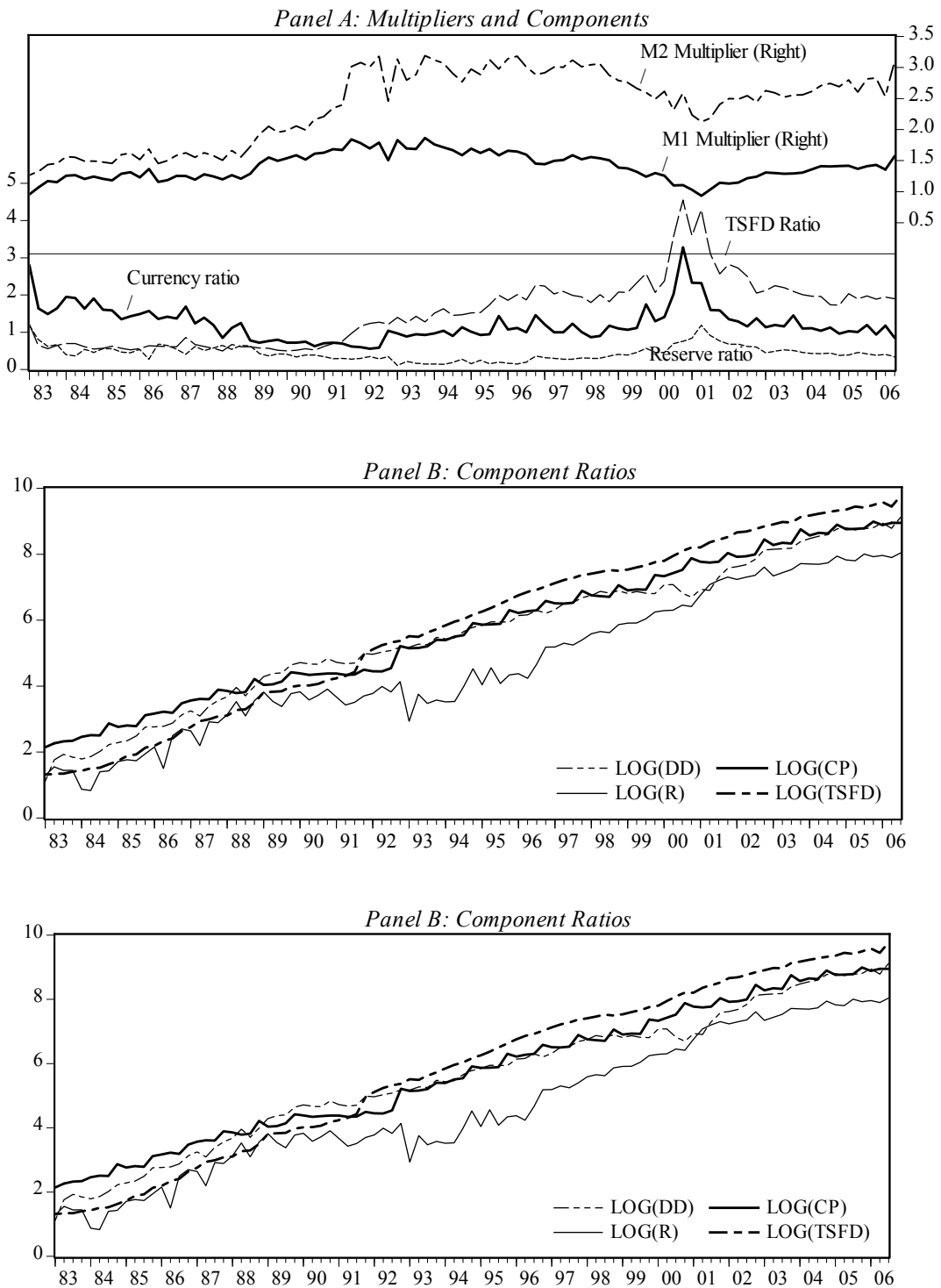
**Figure 2. Monetary Aggregates (in Logarithm)**



Source: Author's calculations with data obtained from International Financial Statistics

<sup>5</sup> The decline in the bank's reserves ratio has been both due to reduction in both the required reserves and the excess reserves during this period (see Figure 3. panel A).

**Figure 3. Multipliers, Ratios and their Components**



Source: Author's calculations with data obtained from International Financial Statistics

**4.3 Sources of Monetary base (Equation 2b)**

It was observed above that changes in monetary base contribute comparatively more than the changes in multipliers to changes in the monetary aggregates. In this section, the various sources of the monetary base expansion are examined since the launch of the programme.



In Figure 4, we plot equation 2b showing the two components of the changes in monetary base, i.e.  $\Delta NFA_{bog}$  and  $\Delta NDA_{bog}$ . It is noteworthy that over the sample period, the changes in NDA and NFA tended to be inversely related and, in some quarters, almost offsetting, leading to small or no change in  $M_0$ . This is suggestive of the use of one or the other of NDA and NFA for sterilisation purposes<sup>6</sup>. For instance, in the early years of the reforms, when foreign exchange inflows were not a major source of liquidity, the excessive lending to government for deficit financing was sterilised mainly through the sales of donor supplied foreign exchange (Sowa, 2004)<sup>7</sup>. The predominant use of NFA (or foreign exchange intervention) to sterilise expansions in NDA is reflected in Figure 4 by the tendency of NFA to fall when NDA was rising (negative  $\Delta NFA$  and positive  $\Delta NDA$ ), especially up to the end of 1995. The use of foreign exchange intervention during this period was made easier for at least two reasons: first, the net foreign exchange inflows were relatively small. Hence, the BoG's sales of foreign exchange were not generally enough to satisfy the foreign exchange market, to which it was a major supplier. Therefore, increased sales of foreign exchange to sterilise NDA expansion could not have seriously hampered the programmes' objective of a depreciated cedi. Secondly, given the shallowness of the financial market, there were few, if any, alternatives to foreign exchange sterilisation (such as sales of securities).

However, since 1996, the NFA by itself had become a source of liquidity due to the increased inflows of foreign exchange from foreign aid and external loans for cocoa purchase financing and remittances. This is reflected in panel B of Figure 4 as increases in  $M_0$  are now associated with increases in NFA (see also the decomposition of equation 2 in Figure A1 in the Appendix). The BoG, therefore, replaced NDA with  $M_0$  as its operational target. The task for the BoG has since been to control the growth of monetary base (when both NDA and NFA are expanding) without appreciating the cedi in the process. Accumulation of NFA was therefore used to the extent that it does not lead to the appreciation of the cedi. The burden of controlling the growth of  $M_0$  was therefore placed generally on limiting NDA. However, as will be shown later, because of the persistence of large public sector borrowing requirement (PSBR) that had to be mostly financed by the BoG, the control of NDA to reduce  $M_0$  growth had been initially very difficult<sup>8</sup>. As such, many  $M_0$  growth targets have been missed as both NFA and NDA grew simultaneously<sup>9</sup>. As shown in Figure 4, the reductions in NDA have predominantly been quite

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<sup>6</sup> Alternatively, if most of the NFA accrue to government, then increases in NFA would be associated with decreases in NDA simply because the BoG balance sheet would show a fall in NDA (as government deposit rises) with the rise in NFA. In the more recent years (Fig 4.4) the negative correlation appears to be less – perhaps because NFA being monetised, or because other sources of foreign exchange inflows (for example cocoa earnings, FDI, private remittances, etc.) became increasingly important in NFA increases.

<sup>7</sup> This is especially so during the first phase of the ERP (1983-1986), when the bank of Ghana was the major supplier of foreign exchange in the weekly auctions. In addition, the financial market was still very shallow with very few instruments available to the BoG for sterilisation operations.

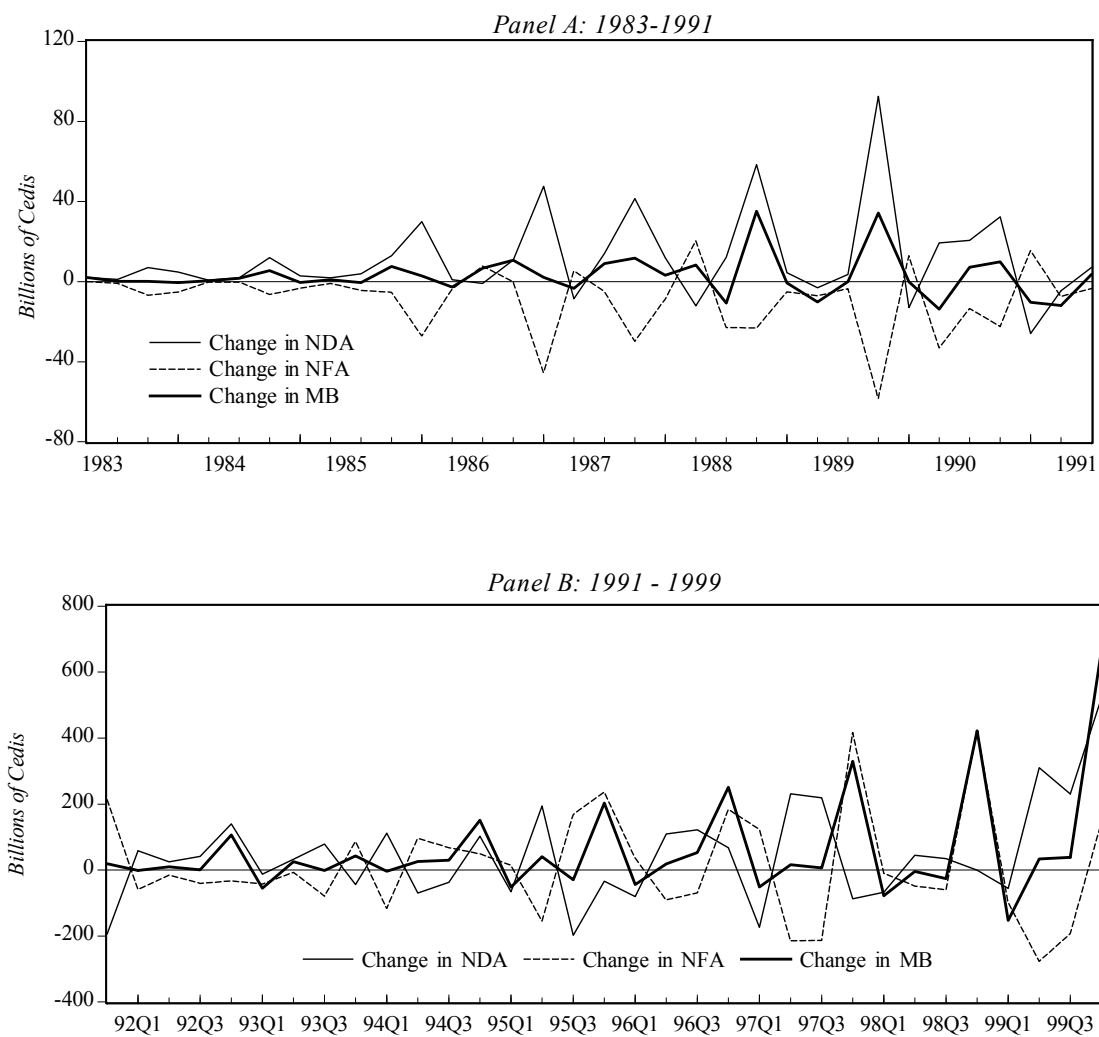
<sup>8</sup> Attempts to meet these monetary targets by the BoG resulted in the accumulation of domestic payment arrears. Indeed, refusal by the BoG to extend overdraft to government resulted to government's cheques bouncing (see CEPA, 2003).

<sup>9</sup> Between 1996 and 2003 both NDA and NFA had predominantly been positive, except in 2000 and 2001 (Figure 5), when due to the adverse terms of trade shock (since 1999) coupled with delays in aid disbursement and huge debt repayment (equivalent to 9.2 percent of GDP in 2000), the foreign reserves were depleted. Indeed, the year 2000 was especially problematic in Ghanaian monetary management as the TOT shock of 1999 intensified. The price of crude oil prices tripled to over US\$30 per barrel, the world market cocoa prices descended sharply to a 27-year low; and the price of gold, the leading export earner, fell to below US\$300 per ounce. This, coupled with low divestiture receipts, seriously weakened the government's revenue base. The ensuing fiscal deficits resulted in accumulation of

insufficient (and sometime impossible) to offset the increase in NFA<sup>10</sup>, leading to large increases in the M<sub>0</sub>.

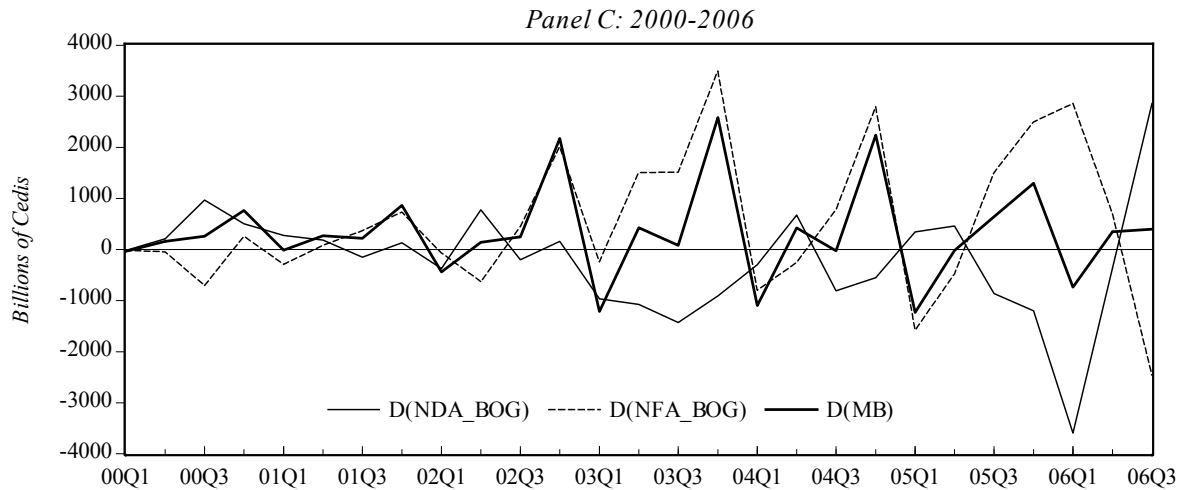
Since 2003 when the BoG was granted *de jure* independence, the inverse relationship between NFA and NDA started to appear regular again. This suggests that the BoG during this period has been better able to achieve reduction in the NDA. As we shall see later, this is partly because of a reduction in lending to government, and intensive use of OMO as the financial market has deepened. In the next section, the NDA will be decomposed in order to examine its major drivers.

**Figure 4. Contribution of Changes to NDA and NFA to Changes in MB**



domestic payment arrears (about 4.1% of GDP as at 2000, CEPA, 2001) when the BoG refused to extend overdraft in attempt to meet monetary targets. Additionally, the inability of the authorities to meet those targets resulted to suspension of aid and loan disbursements thereby compounding the problems (see CEPA, 2003). In fact, between 1999 and 2001, NDA constituted around 80% of the Monetary Base.

<sup>10</sup> This was mainly due to near absence of market for government securities, and the rising domestic debt burden.



*Source: Data obtained from International Financial Statistics*

#### **4.4 Decomposition of NDA (Equation 4)**

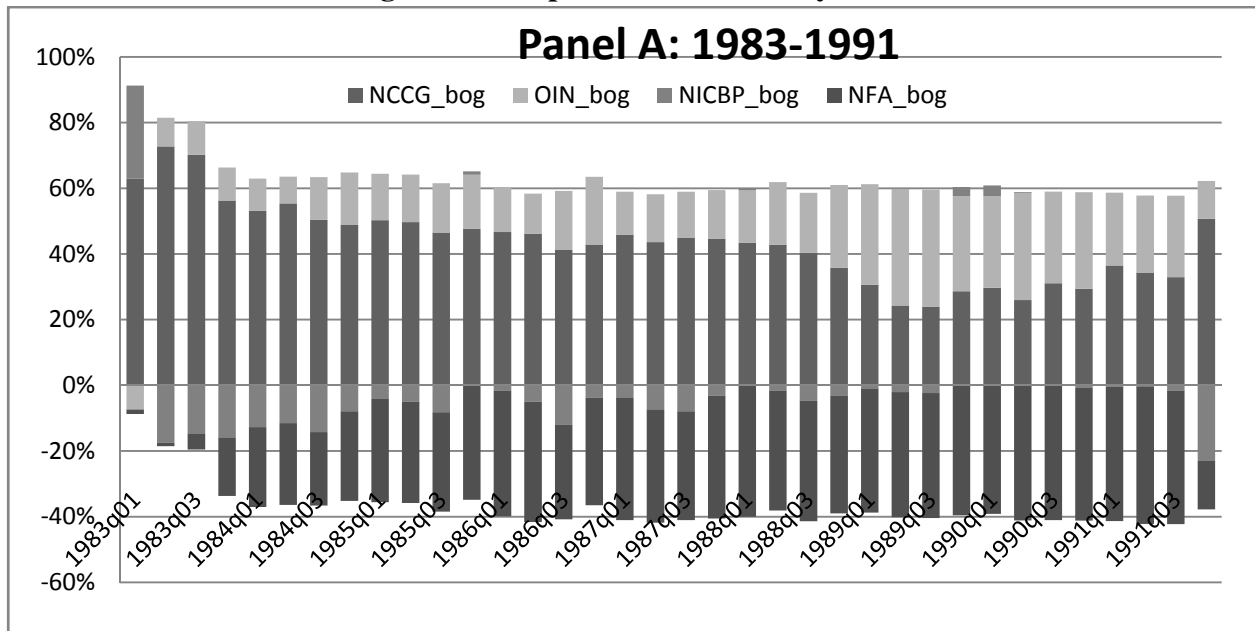
In Figure 5, we decomposed money base into NFA and the various components of the NDA over the sample period (i.e., net credit to central government, NCCG, net indebtedness to banks and public, NICBP and other items net, OIN). It can be observed that prior to 2003 (except between 1989 and 1991) the NCCG had been predominantly the largest component of the monetary base. NFA and NICBP have mainly been negative, thus serving as offsetting factors. This reflects the BoG’s use of both foreign exchange market intervention and sales of securities to the private sector as well as reserve requirement for monetary management. For example, since 1990, the steady increases in the secondary reserves requirement (reaching 35% in 2004) has increased commercial banks holding of government securities, and hence the BoG’s indebtedness to the commercial banks<sup>11</sup>. Later, when the NFA became a major source of liquidity, there was pressure on the BoG to sterilise via reduction in the NDA. However, because of the inherent fiscal weakness and the resulting persistent PSBR, reduction in the NDA has been mainly via decreased NICBP. As noted earlier, this reduction is achieved first by forcing banks to acquire government’s securities and BoG’s bills using their primary and secondary reserve requirements<sup>12</sup>. Later, the BoG resorted to OMO as the major instrument of monetary management. Between 2001 and early 2002, government’s official borrowing was mainly from the non-bank public, and moved from a net borrower to a net depositor in the banking system as its fiscal position improved.

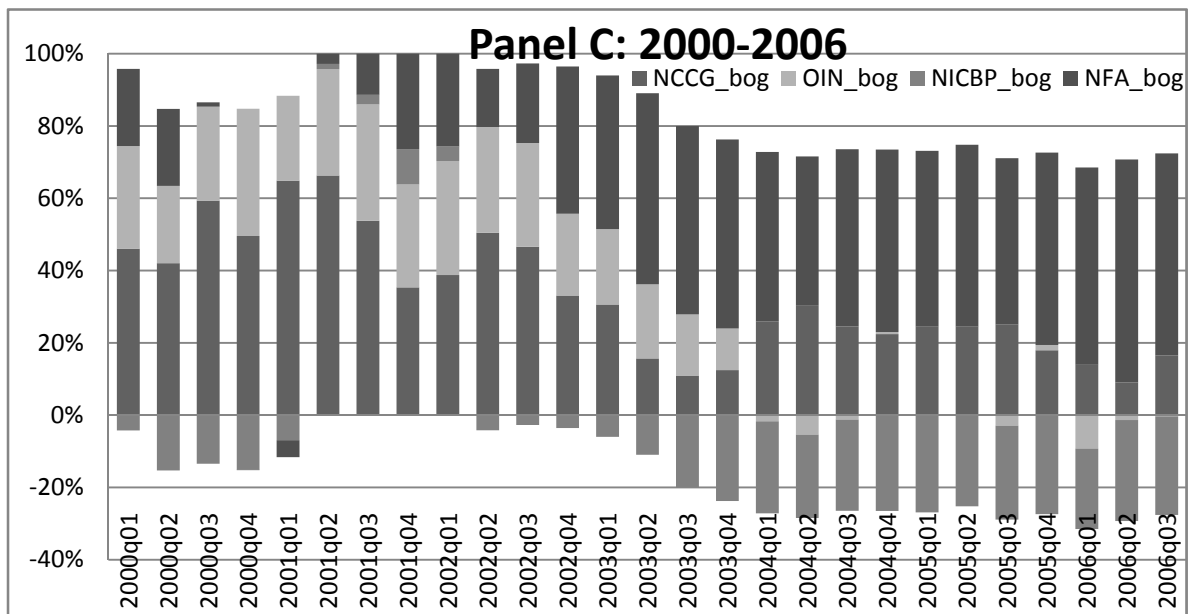
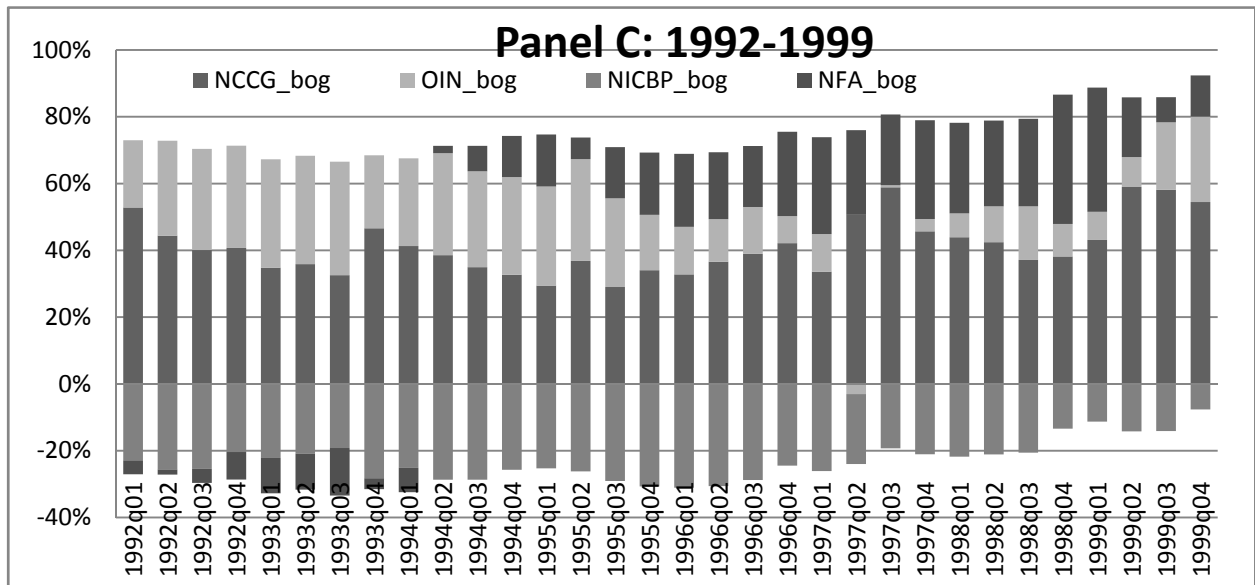
<sup>11</sup> In Ghana, two kinds of reserves are required: cash/primary and secondary reserves. Assets that satisfy the cash requirement are only domestic cash at the BoG (it excludes banks’ cash in vault). For secondary reserves, only government of Ghana bonds, treasury bills and bank of Ghana bills are eligible. These reserves as percent of total deposits have been quite high (8% and 35% respectively as of 2004).

<sup>12</sup> For instance, in 1993, additional temporary secondary reserve requirement of 15% was imposed on banks, making the total secondary requirement 47% of all deposits

Since the end of 2001, there have been some dramatic changes in the monetary management and outcomes in Ghana, particularly in terms of the sources of monetary base expansion. Owing to the recovery of foreign exchange inflows from aid, remittances and cocoa purchase loans, the expansion of NFA started to be a major source of monetary base expansion. Indeed by the second quarter of 2003, NFA had taken over from NCCG (and the NDA) as the major counterpart of  $M_0$  expansion. There are identifiable reasons for these developments: first, the resumption of huge external financial support, good cocoa harvests and increased domestic revenue generation had strengthened the government's fiscal position, leading to declining PSBR. For instance by 2003, zero net domestic financing of the fiscal deficit was over-achieved, with a net repayment equivalent of 0.4% of GDP (CEPA, 2004). Second, the conferment of legal independence to the BoG, and the capping of government financing to a limit of 10 percent of its revenue encouraged budget financing from the non-bank public. For instance, several securities of different maturities were introduced into the market. These include the Government of Ghana Inflation Linked bond (in 2001), cocoa bills (in 2002) and the 2-year and 3-year fixed and floating government bonds (in 2004). With these, and as the financial market deepened, the BoG had become more able to sterilise any increases in the NDA that might result due to NCCG (see Figure 5 Panel C). Consequently, there has been decline in both the level of NDA and its contribution to the expansion of the monetary base.

Figure 5. Components of Monetary Base





Source: Data obtained from International Financial Statistics

## 5 Conclusions

This paper examined the money supply process since the adoption of the ERP with the aim of identifying the major asset counterparts of the changes in the observed monetary aggregates. The major findings can be summarised as follows: first, the money multipliers have been subject to short-term fluctuations and long-term trend movements, but the *net* changes in money shock seems to be mainly driven by changes in monetary base. Second, changes in monetary base appear to reflect changes in both NDA and NFA of the BoG. However, while changes in NDA dominated before 1996, NFA started to have a major influence subsequently and, by 2003, changes in NFA were the major counterparts of changes in monetary base. Third, changes in the NCCG have been the major driver of NDA expansion throughout the sample. Finally, there is evidence that the BoG used both foreign exchange market interventions and open market operations to sterilise the monetary impacts of NCCG and inflows of foreign exchange. With the

evidence of substantial rise in the demand for real money balances, the effectiveness of these interventions can be expected to increase, especially as the recent GDP growth is sustained (hence lower inflation). One policy implication of the increasing dominance of the NFA in the money supply process is that foreign exchange intervention would be an effective tool of monetary control.

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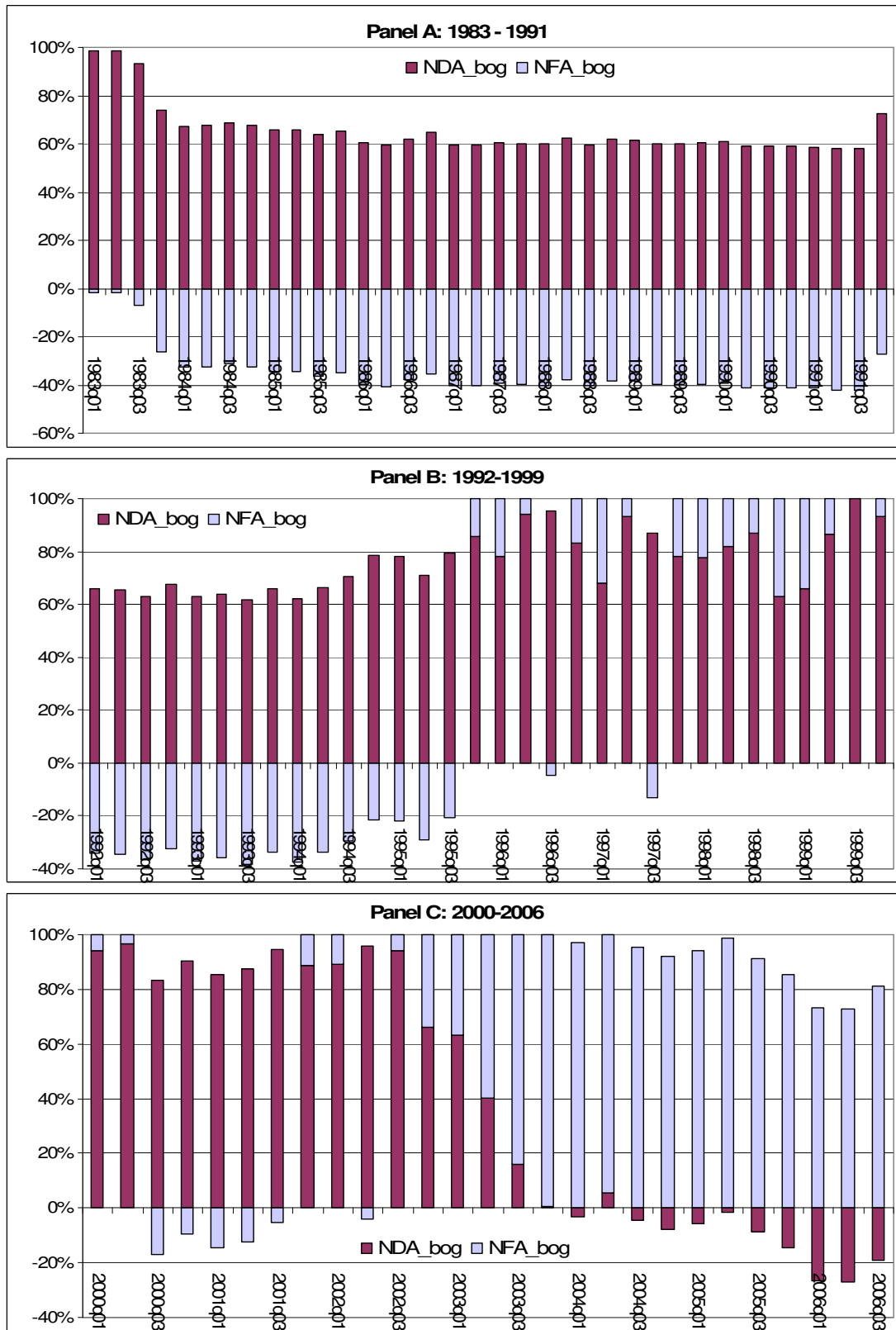
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APPENDIX

Figure A1. Contribution of NDA and NFA to MB



Source: Data obtained from International Financial Statistics