THE IMPACT OF BUDGET DEFICIT ON INFLATION IN EGYPT

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Abstract

This paper investigates the short-run dynamics and long-run relationship between budget deficit, its sources of financing and inflation in Egypt using annual data for the period 1981/82-2005/06. The empirical results of Johansen cointegration analysis suggest that in the long-run inflation is not only related to the budget deficit but also to its sources of financing, real output growth and the exchange rate. In a vector error correction model (VECM), significant error correction coefficients suggest a two-way dynamic interaction between the budget deficit, credit to the government, exchange rate and inflation in Egypt.

The paper concludes that budget deficit and its sources of financing remain important drivers of inflationary pressures in Egypt, making targeting price stability problematic. Strengthening the fiscal position by reducing the budget deficit and net government debt, promoting economic growth and introducing greater exchange rate flexibility are crucial for supporting monetary policy in curbing inflationary pressures in Egypt.

ملخص

تبحث هذه الدراسة في العلاقة طويلة الأجل بين عجز الموازنة العامة للدولة، ومصادر تمويله ومعدل التضخم في مصر، ومدى تأثر هذه العلاقة بالتفاعل الديناميكي بين تلك المتغيرات في الأجل القصير باستخدام بيانات سنوية للفترة من ١٩٨٢/١٩٨١ إلى ٢٠٠٦/٢٠٠٥. وتشير نتائج تحليل يوهانسن للتكامل المشترك إلى أنه في الأجل الطويل لا يعد التضخم مرتبطا فحسب بعجز الموازنة بل أيضا بمصادر تمويله، ونمو الناتج الحقيقي وسعر الصرف. وبتطبيق نموذج تصحيح الخطأ لمتجه الانحدار الذاتي، تشير معاملات تصحيح الخطأ المعنوية إلى وجود تفاعل متبادل بين عجز الموازنة، والائتمان الممنوح للحكومة، وسعر الصرف والتضخم في مصر.

وتخلص الدراسة إلى أن عجز الموازنة ومصادر تمويله من العوامل المهمة التي تغذي الضغوط التضخمية في مصر، الأمر الذي يؤدي إلى صعوبة استهداف استقرار الأسعار. ومن ثم، تؤكد الورقة على أهمية تقوية الوضع المالي من خلال تخفيض عجز الموازنة وصافي الدين الحكومي، وتعزيز النمو الاقتصادي، وإضفاء مزيد من المرونة على سعر الصرف لتدعيم دور السياسة النقدية في الحد من الضغوط التضخمية في مصر.

1. INTRODUCTION

Despite growing consensus that the Central Bank of Egypt should pursue price stability as its foremost goal, targeting macroeconomic stability could be problematic in the context of a weak fiscal position.

The recent acceleration of inflation has triggered renewed interest in exploring whether the large budget deficit and the high level of domestic public debt are driving prices in Egypt. During 2001/02-2006/07, the change in consumer prices rose from 2.4 percent to 11 percent and budget deficit averaged 9.2 percent of GDP, with domestic public debt reaching 93.1 percent of GDP in 2006/07.

Some empirical studies on the nature and causes of inflation in Egypt (Metwally and Al-Sowaidi 2004; El-Sakka and Ghali 2005) acknowledged that monetary financing of the budget deficit did matter as a determinant of inflation. Other researchers (Fanizza and Soderling 2006) made the case that despite relatively moderate money growth during 1998-2005, unaddressed fiscal issues were a key reason why Egypt did not succeed in curbing price pressures, which led to a significant real exchange rate appreciation and eventually a breakdown in its fixed exchange rate regime. Thus, the two former studies maintain that fiscal policy changes prices because of its effect on money growth (i.e., inflation is ultimately a monetary phenomenon), while Fanizza and Soderling (2006) argue that changes in fiscal policy alter the price level even though money growth remains relatively unchanged (i.e., inflation is not necessarily a monetary phenomenon).

The purpose of this paper is to empirically investigate the short-run dynamics and long-run relationship between the budget deficit, its sources of financing and the inflationary process in Egypt's economy from 1981/82 through 2005/06, using Johansen cointegration analysis and a vector error correction model (VECM).

The paper is organized as follows. Section 2 offers a review of theoretical and empirical literature of the relationship between budget deficit, its sources of financing and the inflationary process. Section 3 analyzes recent developments in the stance of fiscal policy and inflation dynamics in Egypt during 2001/02-2006/07. Section 4 empirically explores the short-run dynamics and long-run relationship between the budget deficit, its sources of financing and inflation dynamics from 1981/82 through 2005/06, using cointegration analysis and VECM. Finally, Section 5 concludes with some policy implications.

2. BUDGET DEFICIT AND INFLATION: THEORY AND EMPIRICAL EVIDENCE

This section offers theoretical background and empirical literature review of the relationship between budget deficit and the inflationary process.

2.1. Budget Deficit and Inflation: Theoretical Links

At the theoretical level, extensive literature (e.g., Metzler 1951; Friedman 1968; Sargent and Wallace 1981; Dwyer 1982; Miller 1983; Saleh 2003; Mishkin 2006) has argued that the inflationary effect of budget deficit depends on the impact of the deficit on aggregate demand and the means by which the deficit is financed.

The two-way dynamic interaction between budget deficit and inflation was theoretically established by considering the feedback effect of high inflation on budget deficit, through the adverse impact of inflation on real tax revenues. In economic literature, this is usually referred to as the Olivera-Tanzi effect (Tanzi 1991; Sachs and Larrain 1993; Solomon and de Wet 2004).

Recently, the fiscal theory of the price level has emerged as an alternative analytical framework for the role of fiscal policy as a key factor in macroeconomic stabilization. This theory argues that inflation is not the sole province of the central bank, but is also controlled by the fiscal authority. The fiscal theory implies that the central bank may be unable to commit to an inflation target, either because money growth is dictated by the fiscal authority, or because fiscal policy independently affects the price level and inflation rate (Woodford 1994; Carzoneri, Cumby, and Diba 1998; Carlstrom and Fuerst 1999; Komulainen and Pirttila 2000; Fanizza and Soderling 2006).

Theoretical links between budget deficit, its sources of financing and inflation will be elaborated below.

2.1.1. Budget deficit, aggregate demand and inflation

According to the monetarist perspective, if monetary policy is accommodative to a budget deficit, money supply will continue to rise for a long time; the aggregate demand schedule will shift to the right, causing output to increase above the natural level. Growing labor demand then pushes wages up, leading to a shift in aggregate supply leftwards until it reaches the point where the economy has returned to the natural level of output. However, this happens at the expense of permanently higher prices (Solomon and de Wet 2004).

The Keynesian analysis predicts the same movements in aggregate demand and aggregate supply curves. The only difference lies in the timing. Monetarists stress that the reaction of aggregate supply would be quick so that output would not remain above its natural level for a long time, while Keynesians believe this adjustment to be much slower.

2.1.2. Sources of financing budget deficit

In case of insufficient revenue collection, the government has various options to cover its budget deficit: to print new money (government borrowings from the central bank) and use it to pay for the goods and services it buys (i.e., seigniorage[1]), to go into debt (by issuing interest-bearing debt to both domestic bank and non-bank institutions and/or borrowing money from international financial markets), to run down foreign exchange reserves, or to accumulate arrears. The source of finance implies a different effect of a budget deficit on inflation (Piontkivsky et al. 2001; Solomon and de Wet 2004; Alavirad and Athawale 2005; Agha and Khan 2006)

- Borrowing from the central bank

In the monetarist perspective, inflation is driven by money growth. Continuing and persistent growth of prices (high inflation) is necessarily preceded or accompanied by a sustained increase in money supply. According to Milton Friedman's famous proposition "inflation is always and everywhere a *monetary* phenomenon".

If monetary policy is accommodative to a persistent budget deficit, the central bank may directly finance budget deficit by lending funds to the government to pay its bills; or the central bank purchases government debt at the time of issuance or later in the course of open market operations. In both cases, the central bank simply increases the stock of high-powered money to finance the budget deficit.[2] This growth of monetary base and money supply is often referred to as "printing" money. The channels through which printing money leads to

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[1] $\text{Seigniorage}_t = dM_t / P_t$, where dM_t represents changes in money stock while P_t represents prices in period *t*. Seigniorage is the total revenue collected by the government from money creation, which includes two components: The "inflation tax" which is the inflation rate multiplied by real money balances and "pure seigniorage," which represents the growth in real money balances (El-Refaie 2001 and 2002; Subramanian 1997).

[2] It may also be the case that the government first borrows from the public or from the banking system. However, if the central bank then intervenes and either buys out the debt from the public by means of open market operations or accommodates additional demand for liquidity from the banking system, the equivalent amount of reserves gets injected into the economy as if the government originally borrowed from the central bank. In either case, budget deficit is financed by increases in high-powered money.

inflation differ under different exchange rate regimes (Piontkivsky et al. 2001; Solomon and de Wet 2004).

Under a fixed exchange rate regime,[3] printing money will require the central bank to run down foreign exchange reserves because it has to intervene in the foreign exchange market to maintain the fixed exchange rate. A persistent need of financing and foreign exchange exhaustion will result in an upward pressure on exchange rate and may end up in currency devaluation and a significant increase in inflation.

Under a floating exchange rate regime,[4] when the government finances the deficit by printing money, the public seeks to offset the effects of inflation by holding more and more nominal money from period to period so as to keep real money balances and thus purchasing power constant in the long run. In this situation, the government finances the budget deficit through an "inflation tax" and collects no "pure seigniorage". Thus, under a pure floating exchange rate regime, budget deficit ends up in inflation and the size of the deficit and inflation rate are very closely connected (Sachs and Larrain 1993; Piontkivsky et al. 2001).

To summarize, a budget deficit can be the source of sustained inflation if it is persistent and if the government finances it by creating money (Mishkin 2006).

- Borrowing from banks

Government borrowing puts pressure on banks' reserves and banks may demand more liquidity from the central bank. If the central bank supplies banks with additional reserves, the monetary base increases causing a rise in money supply through deposit multiplication and an increase in inflation. However, if the central bank does not accommodate the extra demand for credit from banks, the banks will be forced to reduce credit to the private sector in order to meet the higher demand for government credit by purchasing debt. This reduction is often referred to as crowding out of private spending and may not lead to inflation.

- Borrowing from non-bank domestic public

Borrowing from non-bank domestic public (households, companies and financial institutions other than banks) by issuing debt may keep the monetary base unchanged with no influence on money supply or inflation. However, after extensive bond financing of the deficit, it may

[3] Assuming that purchasing power parity and quantity theory of money hold (Sachs and Larrain 1993).
[4] Assuming that the government cannot borrow from the public and has no foreign exchange reserves.

well be the case that the public will be reluctant to acquire more government debt, because they will doubt the government's ability to service it (real stock of debt relative to the size of the economy, measured by its gross domestic product, has reached an upper limit). This would result in additional inflation because the principal and interest on the debt accumulated up to now must be financed, at least partially, by printing money and collecting seigniorage (Sargent and Wallace 1981).

In addition, financing a persistent budget deficit by borrowing from the public implies an increase in the supply of government bonds. In order to improve the attractiveness of these bonds, the government offers them at a lower price, which leads to higher interest rates. The higher cost of borrowing increases debt service payments and future budget expenditures. If the central bank considers the rise in interest rates undesirable, it would then tend to buy bonds to prop up their prices and reduce interest rates. Continuous open market operations by the central bank will continuously increase the money supply and ultimately lead to rising prices (Barro 1978 and 1979; Darrat 1985).

As Sachs and Larrain (1993) put it, "borrowing today might postpone inflation, but at the risk of even higher inflation in the future".

- Borrowing from international markets

The impact of the budget deficit on money supply and inflation when government borrows from foreign public crucially depends on the exchange rate regime. *Under a fixed exchange rate*, foreign borrowing must be sterilized so as to maintain the exchange rate at the prescribed level and mitigate inflationary pressures. *Under a floating exchange rate regime*, external borrowing to finance budget deficit allows the government to avoid the increase in monetary base and money supply and thus prevent inflationary pressures. However, the appreciation of exchange rate deteriorates the competitiveness of tradable goods in international markets.

- Running down foreign exchange reserves

The central bank may inject additional reserves into the economy to purchase government debt on primary or secondary market or grant a loan to the government and then the central bank trades foreign exchange reserves for domestic currency to offset the increase of monetary base and money supply. However, financing a persistent deficit may dry up foreign

exchange reserves, resulting in capital flight, exchange rate depreciation and inflationary pressures.

- Accumulation of arrears

Although government expenditure arrears (i.e., delays in government payments to suppliers or creditors) can lead to underestimates of spending and government's borrowing requirements, they adversely affect expectations. Economic agents may anticipate an increase in tax pressure, higher inflation and an overall deterioration of financial conditions.

To sum up, theoretically, it is established that sustained inflation may stem only from a persistent rather than a temporary budget deficit that is eventually financed by printing money rather than by borrowing from the public or through accumulation of arrears (Sargent and Wallace 1981; Mishkin 2006). However, borrowing from domestic private markets or from international markets or financing through running down foreign exchange reserves or accumulation of arrears may lead to inflationary pressures in the future, or even immediately through expectations formation, if government lacks credibility.

2.1.3. Olivera-Tanzi effect

The "budget deficit-inflation" link exhibits a two-way interaction. That is, not only does budget deficit produce inflationary pressure through its impact on money aggregates and public expectations, but also high inflation then has a feedback effect pushing up the budget deficit.

High inflation during significant time lags in tax collection (i.e., the fact that the time of tax obligations' accrual and the time of actual payment do not coincide, with payment usually made at a later date) reduces real tax revenues. Fall in real revenues, in itself, is a contributing factor in the inflationary process by increasing the money supply needed to finance this inflation-induced deficit.

Therefore, there exists a self-strengthening process: persistence of budget deficit props up inflation, which in turn lowers real tax revenues; a fall in the real tax revenues then necessitates a further increase in budget deficit and so on (Tanzi 1991; Sachs and Larrain 1993; Solomon and de Wet 2004).

2.1.4. The fiscal theory of the price level

The fiscal theory of the price level (FT) maintains that the price level is largely determined by fiscal considerations. FT comes in two versions: The traditional *weak-form FT* and the new *strong-form FT*. Weak-form FT posits that inflation is indeed a monetary phenomenon, but that money growth is dictated by the fiscal authority. Thus, the central bank does not control the money supply. Strong-form FT argues that even if money growth is unchanged, fiscal policy independently affects the price level and inflation rate. Thus, strong-form FT implies that the central bank may be unable to commit to an inflation target, because inflation is not necessarily a monetary phenomenon (Sargent and Wallace 1981; Woodford 1994; Carzoneri, Cumby, and Diba 1998; Carlstrom and Fuerst 1999; Komulainen and Pirttila 2000).

Weak-form FT assumes fiscal dominance. That is, the fiscal authority independently sets its budget deficit and thus determines the revenue generation through taxes, bond sales and seigniorage. Under these conditions, the fiscal authority is the first to make a move (increasing fiscal deficit), the monetary authority is then left with a difficult choice in order to balance the inter-temporal budget (generate the seigniorage necessary to maintain solvency). The need of the government to finance its large budget deficit results in either an increase of current money (a one-time increase in the price level), or an increase in future money growth (future inflation). If future inflation is held constant, an increase in current and future budget deficits requires increasing current money stock and hence nominal price level, lowering the real value of outstanding government debt. Holding current money constant, the central bank must increase future inflation. To summarize, the weak-form FT maintains that while the cause of high inflation is always monetary as inflation is associated with high rates of growth of money, the true structural cause of persistent high inflation is a fiscal deficit that is not eliminated with cuts in spending and/or increases in (non-seigniorage) taxes. In other words, fiscal policy is exogenous, while money supply movements are endogenous in order to satisfy the government's budget constraint (Carlstrom and Fuerst 1999).

Strong-form FT maintains that fiscal policy affects the price level and the path of inflation independently of monetary policy changes. This new version of the fiscal theory is possible, because most monetary models do not have determinate predictions for the path of inflation. The initial price level is not pinned down; different initial price levels are consistent with different paths for future inflation. According to the strong-form FT, the government

budget constraint[5] eliminates this multiplicity and pins down the initial price level (i.e., the government budget constraint can be used to select which of these many paths actually occurs). Thus, changes in fiscal policy can alter the price level path even though money growth remains unchanged. This is in sharp contrast with the weak-form FT, where fiscal policy changes prices only because of its effect on money growth.

2.2. Budget Deficit and Inflation: Review of Empirical Evidence

Empirical literature has examined the relationship between the budget deficit and inflation. Numerous models have been developed to analyze this relationship in various developing countries and emerging economies (e.g., Egypt and other countries in the Middle East and North Africa [MENA] region, Greece, Iran, Pakistan, Tanzania, Turkey, Ukraine, and 23 emerging economies), in addition to the United States.

In Egypt, the nature and causes of inflation were empirically investigated by Metwally and Al-Sowaidi (2004) during the period 1986-2002 and El-Sakka and Ghali (2005) for the period 1969-2000. The fiscal determinants of inflation in the MENA region, including Egypt, were researched during the period 1998-2005 by Fanizza and Soderling (2006).

Metwally and Al-Sowaidi (2004) examined the interaction between the rate of change in prices, the rate of change in wages and the rate of change in real output. Main regression results suggested that prices in Egypt increase due to increases in wages and costs of imports on the one hand and due to expansionary monetary and fiscal policies on the other hand. Moreover, there was some evidence that the rate of price change was more sensitive to expansionary fiscal and monetary policies than to increases in wages and import prices during the period of study.

El-Sakka and Ghali (2005) tested for the existence of a long-run relationship between the consumer price index, real gross domestic product (GDP), the exchange rate, interest rate, money supply and world prices, using a vector error correction model. Findings of this study showed that money supply growth has a significant positive effect on inflation. Because money supply growth in Egypt is mainly to finance the budget deficit, a continuous budget

[5] The government budget constraint states that the current real level of debt must be equal to the present value of current and future real income from taxes and seigniorage (Fanizza and Soderling 2006).

deficit is complicating the problem of price stability. The paper suggested that reducing the budget deficit and credit to the government is crucial for controlling inflation.

Fanizza and Soderling (2006) analyzed the role of fiscal policy as a key factor in macroeconomic stabilization in some countries of the MENA region, including Egypt. Their analysis showed that despite relatively moderate money growth during 1998-2005, Egypt did not succeed in curbing price pressures, which led to a significant real exchange rate appreciation and eventually a breakdown in its fixed exchange rate regime. They made the case that unaddressed fiscal issues are a key reason why Egypt's exchange rate peg did not hold.

The authors did not deny the importance of monetary policy, but suggested that fiscal policy and public debt dynamics merit a particularly prominent place in the context of ensuring price stability. They argued that prudent monetary policies are not enough to guarantee price stability, if not supported by a reasonably strong fiscal position[6] (Fanizza and Soderling 2006).

The previously surveyed studies on Egypt as well as some of the empirical research carried out on the fiscal determinants of inflation elsewhere are summarized in Table 1 by considering their sample period, empirical method and main results.

The main conclusion to be drawn from the surveyed studies is that fiscal policy is an important determinant of inflation. In the long run, inflation is not only related to fiscal imbalances but also to the sources of financing fiscal deficit, particularly financing from the central bank. A two-way causal relationship between budget deficit and inflation was supported by some of the studies. A key policy implication of the surveyed empirical literature is that reducing the budget deficit, public debt and credit to the government is crucial for controlling inflation.

[6] The FT argues that if the fiscal outlook is such that economic agents no longer have confidence in the government's ability or willingness to generate primary surpluses sufficient to repay outstanding debt, even a relatively tight monetary stance may not be sufficient to guarantee price stability.

Table 1. Budget Deficit and Inflation: A Summary of Surveyed Empirical Literature

Study	Estimation Period	Country	Econometric Technique	Major Finding
Darrat (1985)	Post-1960	US	OLS[2]	Monetary growth and federal deficits had a significant influence on inflation. In addition, federal deficits bore a stronger and more reliable relationship to inflation than monetary growth.
Ahking and Miller (1985)	1950-1980	US	Trivariate autoregressive model	The time series relationship between Federal government deficits, base-money growth and inflation was modeled as a trivariate autoregressive process. For the 1960s, both government deficits and inflation were econometrically exogenous. But for the 1950s and 1970s, government deficits, money growth and inflation were all causally related.
Hondroyiannis and Papapetrou (1994)	1960-1992	Greece	Granger-Sims Causality test	There is a long-run relationship between the budget deficit and the price level. The study supports the hypothesis of a bi-directional causality between the two variables.
Chaudhary and Ahmad (1995)	1970s	Pakistan	An extensive model based on the quantity theory of money	Domestic financing of the budget deficit in Pakistan, particularly from the banking system, is inflationary in the long run. Execution of monetary policy is heavily dependent on the fiscal decisions made by the government. In order to control inflationary pressure, the government needs to cut the size of budget deficit.
Metin (1995)	1950-1988	Turkey	ECM[3]	Fiscal expansion dominated the determination of inflation. Turkish inflation could be reduced rapidly by eliminating the budget deficit.
Metin (1998)	1950-1987	Turkey	OLS	Budget deficits (as well as real income growth and debt monetization) significantly affect inflation in Turkey.
Darrat (2000)	1957-1993	Greece	ECM[3]	Budget deficits in Greece have had significant positive and direct impact on inflation, independent of any role of money supply in the inflationary process.
Catao and Terrones (2001)	1970-2000	23 emerging economies	ARDL[5]	Lowering the ratio of budget deficit to GDP by 1 percent leads to a decrease of the long-run inflation rate by 1-6 percent, depending on the initial inflation rate and the size of the inflation tax base (measured by the ratio of narrow money to GDP).
Piontkivsky et al. (2001)	1995-mid 2000	Ukraine	VAR[4]	Fiscal imbalance, apart from other purely monetary factors, did play a role in determining inflation.
Solomon and de Wet (2004)	1967-2001	Tanzania	Cointegration analysis	Due to monetization of the budget deficit, significant inflationary effects were found for increases in the budget deficit.
Alavirad and Athawale (2005)	1963-1999	Iran	ARDL, Phillips-Hansen methods and ECM[3]	Budget deficits as well as liquidity do have a significant impact on inflation rates in Iran.
Agha and Khan (2006)	1973-2003	Pakistan	Cointegration analysis and VECM[6]	In the long run, inflation is not only related to fiscal imbalances but also to the sources of financing the fiscal deficit (particularly government's bank borrowing for budgetary support), assuming the impact of real GDP and exchange rate as exogenous. Therefore, in Pakistan, fiscal sector is dominant in explaining price movements.
Metwally and Al-Sowaidi (2004)	1986-2002	**Egypt**	A simultaneous-equations model	Egypt witnessed a combination of demand-pull (expansion in monetary and fiscal policies) and cost-push inflation (increases in wages and costs of imported capital, materials and consumer goods).
El-Sakka and Ghali (2005)	1969-2000	**Egypt**	ECM[3]	Reducing the budget deficit and credit to the government is crucial for controlling inflation.
Fanizza and Soderling (2006)	1998-2005	**MENA[1]**	A model based on the FTPL[7]	A sound fiscal position constitutes a necessary condition for macroeconomic stability.

Source: Empirical literature was reviewed and compiled by the author.
Notes: 1= Middle East and North Africa, including Egypt; 2= Ordinary least squares; 3= Error correction model; 4= Vector auto regression model; 5= Autoregressive distributed lag model; 6= Vector error correction model; 7= The Fiscal Theory of the Price Level.

3. BUDGET DEFICIT AND INFLATION IN EGYPT: AN ANALYSIS OF RECENT DEVELOPMENTS

Despite real economic growth at 7.1 percent in 2006/07, a large budget deficit, rising public debt and high inflation rate remain serious concerns.[7] The relationship between the budget deficit, its sources of financing and inflation dynamics in Egypt during 2001/02- 2006/07, according to the New Budget Classification (NBC),[8] is investigated in this section.[9]

3.1. Budget Deficit and Inflation Dynamics

The impact of recent developments in budget deficit and net government debt on inflation in Egypt is assessed below.[10]

3.1.1. Large budget deficit and inflation

Between 2001/02- 2006/07, inflation (measured as the change in consumer prices) accelerated from 2.4 percent to 11 percent and overall budget deficit increased from LE 38.4 billion to LE 54.7 billion, as shown in Figure 1.

As a percent of GDP, overall and primary[11] budget deficits have been considerably high, averaging 9.2 percent and 3.1 percent annually, during the same period. However with the economy picking up, the ratio of overall budget deficit to GDP has declined from 10.2

[7] In the macroeconomic pillar of the World Economic Forum's global competitiveness index (GCI), Egypt dropped from rank 50 in the 2005/06 report to 108 in 2006/07, mostly reflecting the high fiscal deficit and rising public debt (Enders 2007).

[8] In FY 2005/06, a new budget classification (NBC) in line with the International Monetary Fund's (IMF) Government Finance Statistics Manual (GFSM-2001) has been adopted. The authorities made significant revisions to the historical series, and also reclassified some operations as above-the-line items (primarily operations of extra budgetary funds), properly accounting for many expenditures as above the line. These revisions, starting in 2001/02, resulted in a large upward adjustment of the previous deficit estimates for 2001/02-2003/04. Adoption of the NBC and the move to a cash basis explain a smaller part of the upward revision in the deficit estimates. It is worth mentioning that the old budget classification (OBC) was applied since 1998/99 till 2004/05, and reported on both cash and accrual bases (Ministry of Finance 2007; International Monetary Fund 2005, 2006, 2007c and d).

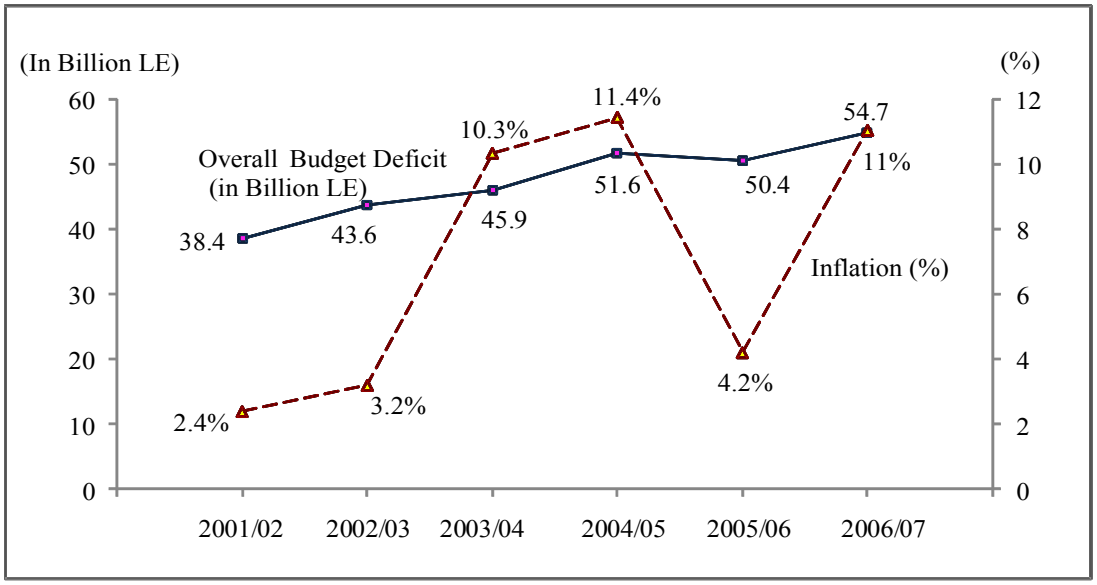
[9] However, in evaluating the influence of budget deficit and its means of financing on inflation, the inflationary effects on the economy of supply-side shocks, such as the increases in energy prices implemented in 2004 (for mazot by 37 percent in April, asphalt by 37 percent in August and diesel and mazot by 50 percent and 20 percent respectively in September), the rise in energy prices implemented in July 2006 (the prices of diesel, gasoline and kerosene increased by 25, 30 and 88 percent, respectively), the avian flu outbreak and imported inflation should not be denied.

[10] Budget sector includes: central administration, local governments and services authorities. The overall budget deficit measures revenues less expenditures plus net acquisition of financial assets (Ministry of Finance 2007 and 2008). Net government debt stands for net budget sector debt.

[11] Primary deficit is the overall deficit net of interest payments (Ministry of Finance 2007 and 2008).

percent in 2001/02 to 7.5 percent in 2006/07, and that of the primary deficit from 4.4 percent to 1 percent, during the same period.[12]

Figure 1. Overall Budget Deficit (in Billions of LE) and Inflation Rate (as a % Change in CPI) in Egypt during 2001/02-2006/07



Sources: The Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

As Egypt's exchange rate was pegged to the US dollar (within horizontal bands), the impact of this weak fiscal position has not caused significant overall inflation but was rather seen in the relative price of tradables to nontradables, leading to a significant real exchange rate appreciation and eventually a breakdown in Egypt's fixed exchange rate regime (Fanizza and Soderling 2006).[13] The Egyptian pound was allowed to float on January 29, 2003, immediately depreciating by 20 percent. By the end of fiscal year (FY)[14] 2002/03, the cumulative depreciation of the pound reached 31 percent.[15] As a result, CPI inflation rate

[12] The government plans to reduce the budget deficit by at least one percentage point of GDP annually over the coming five years, effectively halving the deficit as a ratio of GDP by 2011, through a range of detailed measures to be gradually phased in beginning of 2006/07 (International Monetary Fund 2006).

[13] It is worth mentioning that broad money (M2), adjusted for valuation effects, grew modestly by nearly 11 percent annually on average during 1998-2005 (Fanizza and Soderling 2006).

[14] In Egypt, the fiscal year starts on the first of July and ends on June 30th.

[15] The real trade-weighted depreciation between 2000 and 2005 was effectively a reversal of the large appreciation between 1995 and 2000 (World Bank 2007).

trended upwards to double-digit levels, reaching 10.3 percent in 2003/04 and 11.4 percent in 2004/05.

To rein in the accelerating inflation rates, the Central Bank of Egypt tightened monetary policy and a new interbank foreign exchange market was launched in December 2004. As a result of these measures, the Egyptian pound appreciated by about 7 percent between December 2004 and March 2005, with a corresponding disinflationary impact on domestic prices. The inflation rate moved downwards to low single-digit level (4.2 percent) in 2005/06.

Despite partial sterilization of external capital inflows[16] and relatively moderate broad money growth,[17] inflation started to rise and spiked in March 2007 (the change in CPI reached 13 percent). This increase in price level could be attributed to some supply-side shocks (the rise in energy prices implemented in July 2006, the avian flu outbreak and imported inflation), in conjunction with public expectations of monetization resulting from the weak fiscal position and lack of credibility in government debt management.

To summarize, curbing price pressures requires reducing the budget deficit, greater exchange rate flexibility to make monetary policy an effective tool for liquidity management and lower sterilization costs that are currently approaching 1 percent of GDP (International Monetary Fund 2007c).

3.1.2. High net government debt

With the budget running overall and primary deficits, the outstanding stock of net government debt (domestic and external) has increased from LE 294.7 billion in 2001/02 to LE 560.2 billion in 2006/07,[18] averaging 80.8 percent of GDP over this period (Figure 2).

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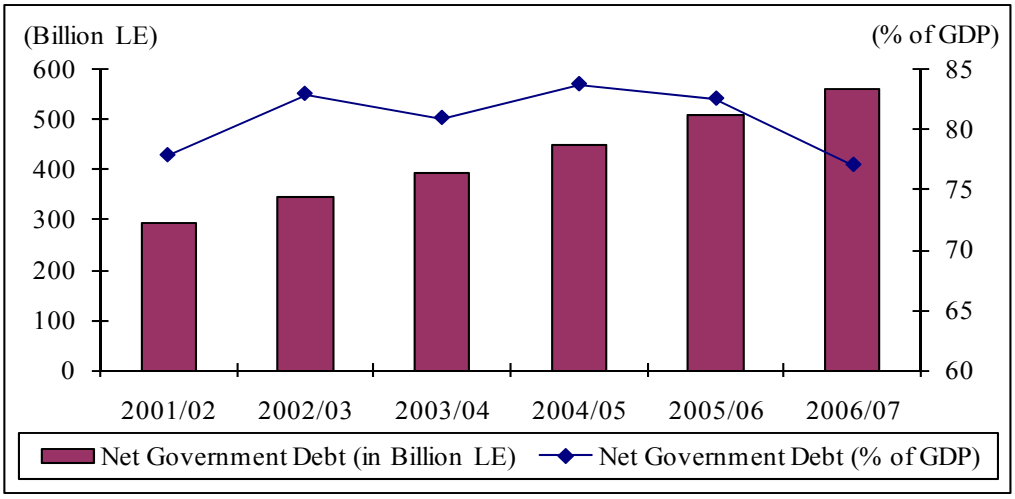
[16] Although the Central Bank of Egypt has announced the floatation of the pound, the exchange rate is de facto not on a float as it remains managed by the Central Bank through interventions in the foreign exchange market, in response to strong external capital inflows. This is shown by the considerable buildup of international reserves from close to $15 billion in late 2004 to $19.3 billion in June 2005, $23 billion in June 2006 and further to $28.6 billion in June 2007 (Central Bank of Egypt 2008; International Monetary Fund 2007b; World Bank 2007). The 3-month T-bills were mainly issued to sterilize capital inflows, as the volume of their issuance largely exceeded the financing needs of the government (World Bank 2007).

[17] Broad money growth was kept in the 13-15 percent range until April 2007, but subsequently surged to 18 percent as less external inflows were sterilized (Central Bank of Egypt 2007).

[18] Net domestic government debt is defined as gross domestic government debt minus net government deposits with banks, while external debt is equal to gross external debt minus the blocked accounts (Ministry of Finance 2007).

Figure 2. Net Government Debt in Egypt (Stocks as of End-June, in Billions of LE and as a Percent of GDP)

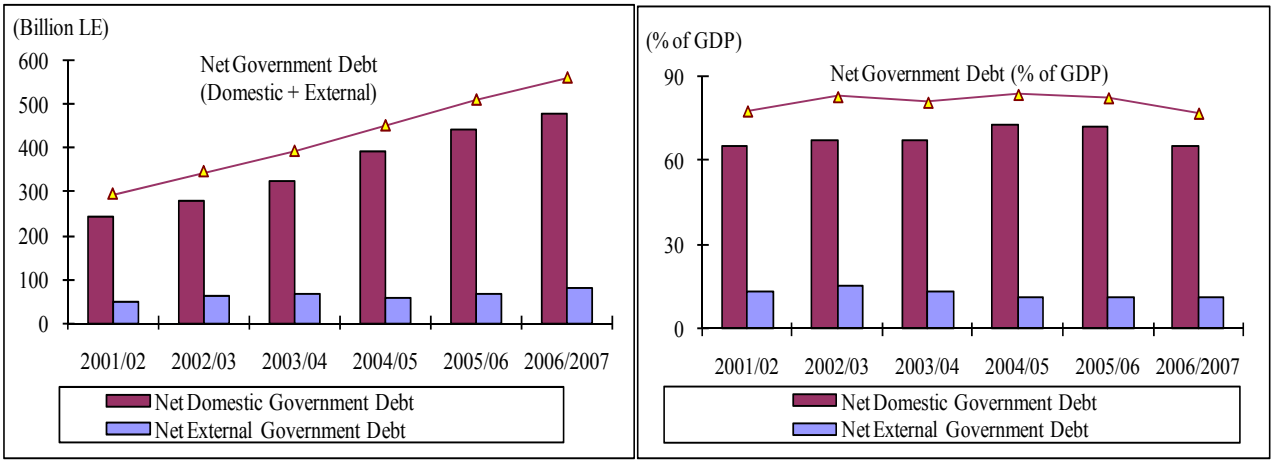


Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

Nearly 85.4 percent of net government debt was domestic in 2006/07. As a result of both monetizing the budget deficit and sterilizing capital inflows, net domestic government debt averaged 68 percent of GDP during 2001/02-2006/07 (Figure 3).

Figure 3. Net Domestic and External Government Debt (Stocks as of End-June)

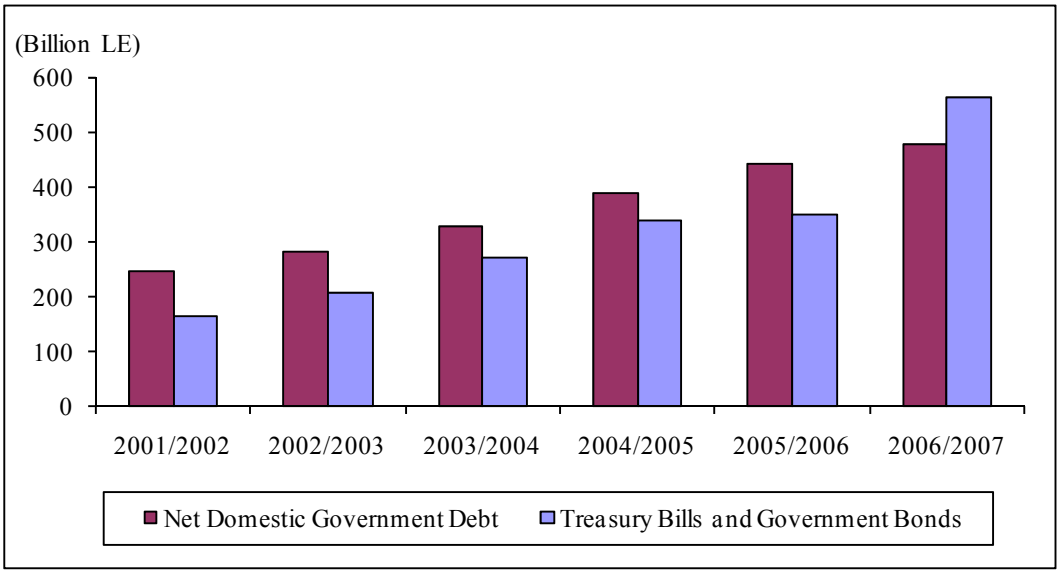
(3a.) In Billions of LE **(3b.) As a Percent of GDP**



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

As Figure 4 shows, the increase in net government domestic debt has been mostly in the form of T-bills and government bonds.[19] In 2006/2007, the outstanding debt on the Treasury to the Social Insurance Funds (SIFs), through the National Investment Bank, was registered as a direct liability on the Treasury to the SIFs. This was associated with the issuance of two Treasury bonds in interest of the SIFs, worth LE 197.725 billion in July 2006 and a third bond, worth LE 74.5 million at end of June 2007. As a result, T-bills and government bonds exceeded net domestic government debt in 2006/07 (Ministry of Finance 2008).

Figure 4. T-Bills and Government Bonds are the Main Components of Net Domestic Government Debt (During 2001/02-2006/07, in Billions of LE)



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

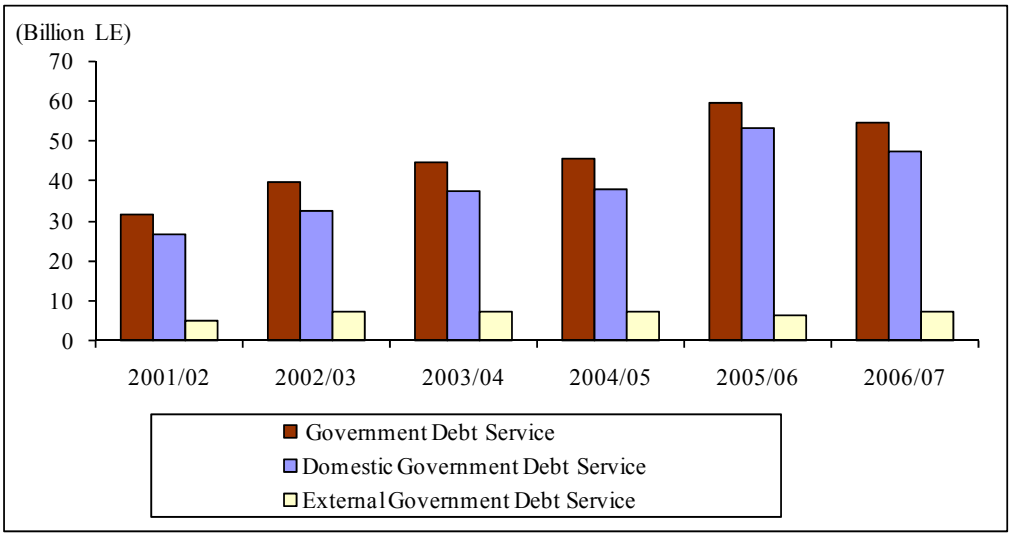
Government debt servicing obligations have increased from LE 31.6 billion to LE 54.7 billion during the period 2001/02-2006/07, as shown in Figure 5. Nearly 87 percent of these obligations were in the form of domestic debt in 2006/07. The accumulated principal and interest on the debt need to be financed, at least partially, by printing money and collecting seigniorage resulting in inflationary pressures.

A large net government debt coupled with high servicing thereof have a role in determining inflation and inflation expectations by further increasing future budget

[19] In July 2007, Egypt issued its first international local-currency bond (worth LE 6 billion), which would provide a benchmark interest rate, thus helping domestic capital market development.

expenditures, monetization expectations or convincing the markets that they eventually will be paid through an inflation tax in case the public may seek to hold more and more nominal money from period to period to maintain real balances and thus purchasing power constant in the long run so as to offset the effects of inflation.

Figure 5. Government Debt Service Obligations in Egypt (During 2001/02-2006/07, in Billions of LE)



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

3.2. Sources of Financing the Budget Deficit and Inflation Dynamics

As discussed earlier in Section 2 of this paper, different sources of financing the budget deficit affect prices in different ways. Looking at how the budget deficit is financed in Egypt gives a realistic picture of the inflationary effect of this deficit.

3.2.1. Direct financing from the Central Bank of Egypt

The part of the monetary base expansion due to fiscal imbalance could be approximated by the change in net domestic credit of the Central Bank of Egypt (CBE) to the government.

During 2000/01-2006/07, the average ratio of net credit to the government to M2 was 37 percent. The average annual change of net credit to the government (16 percent) was higher than that of M2 (15 percent).[20] This may indicate the extent of fiscal dominance in

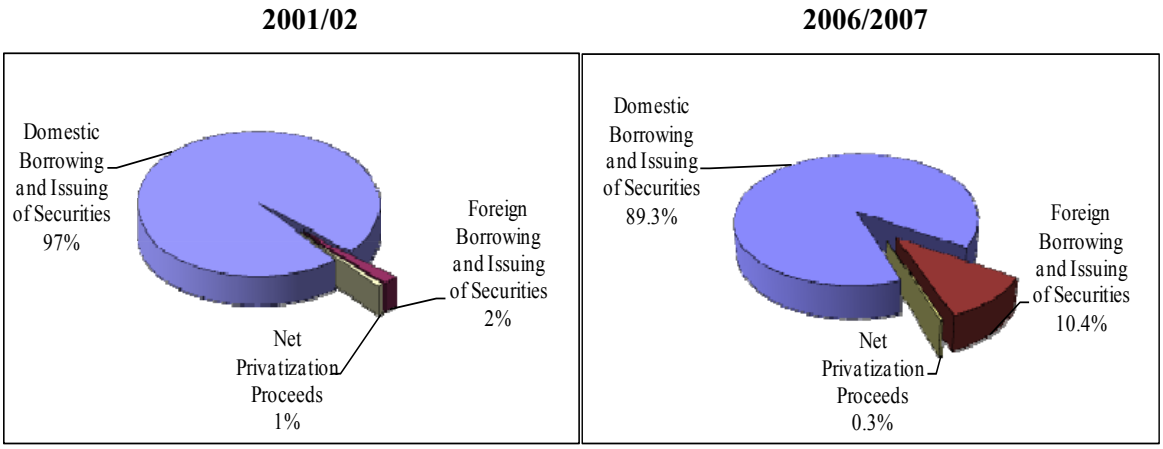
[20] Author's calculations based on: International Monetary Fund 2007a; and Ministry of Finance 2008.

money growth in Egypt, implying that financing the large persistent budget deficit is making targeting price stability problematic.

3.2.2. Borrowing from the domestic market

During 2001/02-2006/07, the budget deficit was mainly financed from borrowing and issuing securities in the domestic market, as shown in Figure 6. Net privatization receipts are a minor component of the financing of the deficit.[21]

Figure 6. Sources of Financing the Budget Deficit in Egypt (2001/02 and 2006/07)



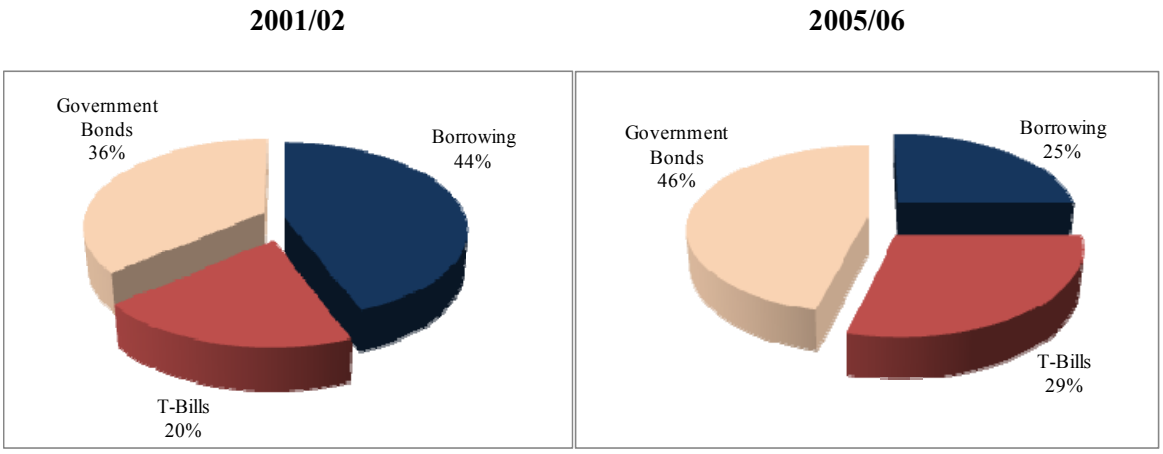
Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

Domestic financing of the budget deficit has shifted from heavy reliance on borrowing mainly from the National Investment Bank, to increased issuance of government bonds and T-bills,[22] as shown in Figure 7.

[21] Combined with privatization receipts (now considered a component of the financing of the deficit, according to the New Budget Classification [NBC]) and the drawdown of idle cash balances following the consolidation of most government accounts into a Treasury Single Account (TSA), budget borrowing requirements fell dramatically, contributing to the decline in T-bill yields (from 10.1 percent in 2004/05 to 8.8 percent in 2005/06). Introducing the TSA and the settlement of circular debts among the Central Government, the National Investment Bank and the Social Insurance Funds are expected to help improve cash and debt management and increase control over off-budget resources kept by budget entities in the banking system (Law no. 139 of 2006).

[22] In December 2003, a new primary dealer system was launched with 12 banks as the primary dealers. Through the new system, the government is able to issue T-bills and bonds tradable in the stock market. This avails the Ministry of Finance of the opportunity to obtain financing at lower cost.

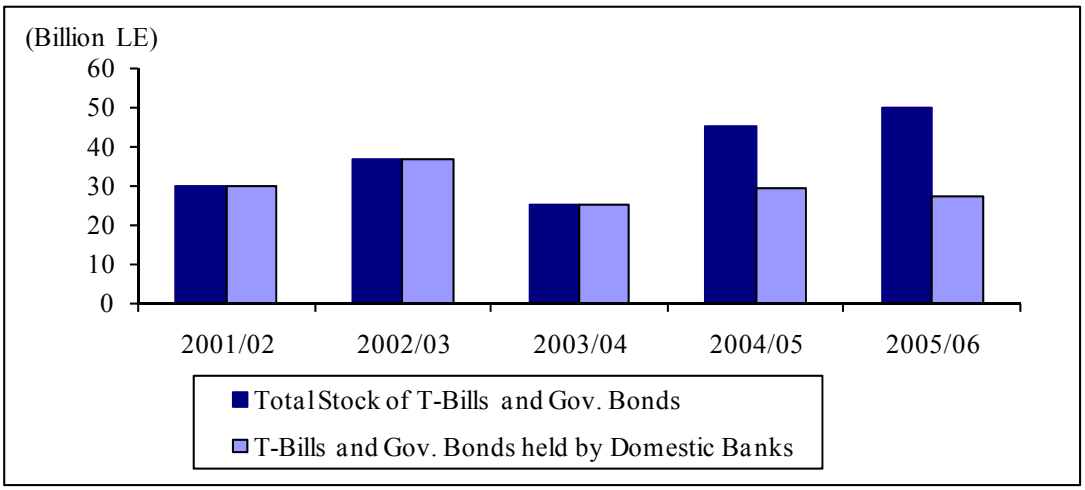
Figure 7. T-Bills and Government Bonds are the Main Sources of Domestic Financing for the Budget Deficit in Egypt (2001/02 and 2005/06)



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

T-bills and government bonds are mainly held by domestic banks, as shown in Figure 8. As of June 2002, nearly 95 percent of the total outstanding stock of T-bills was held by the domestic banking system. Of the rest, 3.3 percent was held by insurance companies and the remaining 1.7 percent was held by other entities. By end of June 2007, 18.8 percent of the total assets of the banking system (LE 176.3 billion out of LE 937.9 billion), was invested in T-bills and other government securities (Central Bank of Egypt 2008).

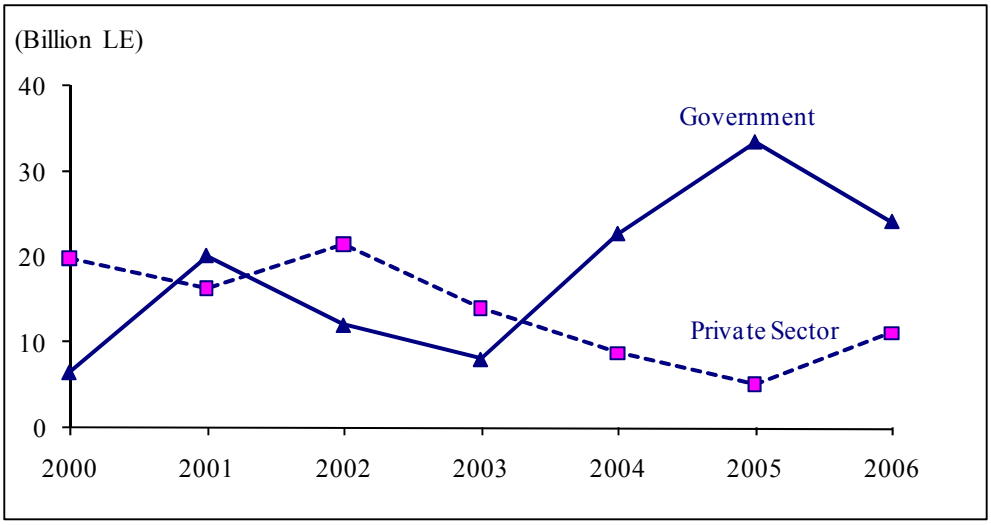
Figure 8. T-Bills and Government Bonds are Mainly Held by Domestic Banks (2001/02-2005/06)



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

As the large budget deficit is mainly financed from the domestic banking system, it could put further pressure on monetary aggregates and/or crowd out private credit. During 2001/02-2006/07, domestic bank holdings of government securities have increased from 14.8 percent to 16.2 percent of GDP, while their total lending to the private business sector has decreased from nearly 49.6 percent to 35 percent of GDP (author's calculations based on the Central Bank of Egypt 2008). Figure 9 shows that to meet the higher demand for government credit by purchasing debt, domestic banks have reduced their new credit to the private sector.[23] This implies that the large budget deficit absorbs available resources that could have been otherwise more efficiently invested by the private sector.

Figure 9. New Credit to the Government and the Private Sector (in Billions of LE)



Sources: Author's calculations based on the Plan and Budget Committee, People's Assembly 2007; and Ministry of Finance 2007 and 2008.

Summing up, financing the large and persistent budget deficit through net domestic credit of the Central Bank of Egypt to the government increases inflationary pressures, while increased issuing of government bonds and T-bills mainly held by domestic banks for their competitive yields in risk-adjusted terms crowds out credit to the private sector.

[23] As growth in private sector credit was sluggish, the Central Bank of Egypt lowered its policy rates (the overnight lending and deposit facility rates) successively until April 2006 (International Monetary Fund 2006). However, policy rates were raised in late 2006 in an attempt to rein in inflation (International Monetary Fund 2007c).

4. BUDGET DEFICIT AND INFLATION IN EGYPT: AN EMPIRICAL ANALYSIS

Based on theory and previously surveyed empirical research, this section investigates the short-run dynamics and long-run relationship between budget deficit, its sources of financing and inflation in Egypt using annual data from 1981/82 through 2005/06.

4.1. Choice of Variables

In order to empirically examine the inflationary response to budget deficit and its sources of financing, if any, our analysis includes six variables: The Consumer Price Index (CPI), government budget deficit (DEFICIT), net claims on the government (NCLG), broad money (M2), real gross domestic product (RGDP) and the nominal exchange rate (EXRATE, LE/$ exchange rate).[24] Data for Egypt were obtained from the International Monetary Fund's *International Financial Statistics (IFS)*, CD-ROM June and September, 2007, to ensure consistent data series.

4.2. Determination of the Stationarity of Data

The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to establish the stationarity status of all the time series variables. The results of the ADF and PP tests for stationarity, presented in Table 2, show that four variables (log CPI, DEFICIT, log NCLG and log RGDP) are integrated of order (1) and become stationary at first differences, while the other two variables (log M2 and log EXRATE) are integrated of order (2) and become stationary at second differences.

As shown by Charemza and Deadman (1992), it is possible for the variables in a long run relationship to be integrated of different orders and for the error term to be stationary as long as the order of integration of the dependent variable (log CPI) is not higher than the order of integration of any of the explanatory variables and there are at least two explanatory

[24] Empirical literature (Metwally and Al-Sowaidi 2004; El-Sakka and Ghali 2005) has found changes in real GDP and exchange rate to be significant in explaining changes in the price level in Egypt. The *former* study suggested that an increase in real output (RGDP) is likely to abate rather than increase inflation in Egypt. The authors attributed this to the fact that Egypt is not close to full employment. They also found that inflation in Egypt had a negative effect on the rate of growth of real output. The *latter* study showed a negative significant impact of real GDP on inflation and concluded that growth of real output is an important factor to fight inflation. It is worth mentioning that a study conducted by the International Monetary Fund in 2005 has examined the pass-through of exchange rate fluctuations to consumer prices in Egypt from 1995 to 2004 and its basic results were not altered when the estimations were conducted using alternative measures of the exchange rate [the nominal effective exchange rate instead of the bilateral LE/$ exchange rate] (IMF 2005).

variables (log M2 and log EXRATE) integrated to an identical order higher than the order of integration of the dependent variable.

Table 2. Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) Tests Statistics

Variables	ADF				PP			
	At level	At first difference	At second difference	Order of integration	At level	At first difference	At second difference	Order of integration
Log CPI	-2.127	-6.725*		I(1)	-2.129	-6.689*		I(1)
DEFICIT	2.643	-3.906**		I(1)	0.969	-3.886**		I(1)
Log NCLG	-2.673	-4.176**		I(1)	-1.811	-4.276**		I(1)
Log RGDP	-3.07	-3.33***		I(1)	-2.57	-3.32***		I(1)
Log M2	-1.44	-2.79	-6.85*	I(2)	-2.534	-2.68	-6.86*	I(2)
Log EXRATE	-2.68	-2.62	-4.997*	I(2)	-1.86	-2.62	-5.009*	I(2)

Source: Author's calculations.

* Indicates stationarity at 1 percent, ** indicates stationarity at 5 percent, *** indicates stationarity at 10 percent.

4.3. Cointegration Analysis

In order to determine the long-run relationship among non-stationary series, the Johansen Test for Cointegration was used. However, before implementing the Johansen procedure for cointegration analysis, the order of a vector autoregressive (VAR) model had to be correctly specified (Boswijk and Franses 1992; Johansen 1988, 1991, 1992 and 1994; Johansen and Juselius 1990).

Based on the Akaike's final prediction error (FPE) criterion and the Schwarz' Bayesian information criterion (BIC), the optimal lag length for the VAR system was found to be 2. This means that a variable in period (t) is affected by other variables of period (t-1) and (t-2) at maximum.

When testing to determine the nature of the cointegrating relation between the variables in the VAR system, a dummy was included as an exogenous variable to account for Egypt's

economic reform and structural adjustment program (ERSAP), initiated in 1990/91-cum-the successive devaluations of the Egyptian pound vis-à-vis the US dollar.[25]

As suggested by the Johansen likelihood ratio tests, based on the maximum eigenvalue and the trace of the stochastic matrix for a VAR (with a lag length = 2), the long-run cointegration relationship between the variables (at a 5 per cent level of significance) is presented in Table A1. of the Appendix. The estimated cointegrating vector, normalized on log CPI, is given below:

$$\text{Log CPI} = 2.2\text{ E-06 DEFICIT} + 1.1\text{ Log NCLG} + 2.4\text{ log M2} - 8.8\text{ log RGDP} - 1.3\text{ log EXRATE} \qquad (1)$$

Equation (1) transpires that in the long-run, an increase in government budget deficit, net credit to the government and money supply tends to hike the general price level, while an increase in real economic growth and an appreciation of the Egyptian pound vis-à-vis the US dollar, would decrease the inflation rate.[26]

4.4. Vector Error Correction Model (VECM)

Since log CPI series appeared to have a long-term relationship with the other series, a Vector Error Correction Model (VECM) provides the means by which the short-run observed behavior of variables is associated with their long-run equilibrium growth paths[27] (Enders

[25] On August 15, 1989, the buying rate in the central bank pool was changed from LE 0.7= $1 to LE 1.1= $1. Since February 27, 1991, the multiple exchange rate system was replaced by a temporary dual exchange rate system consisting of a primary market and a secondary "free" market. Effective October 8, 1991, the primary and secondary markets were unified and the exchange rate was used as a nominal anchor in support of the stabilization effort. In the 1990s, macroeconomic performance weakened and currency pressure started as a result of a combination of policy and external factors such as rapid credit growth; slow structural reform; inconsistency between fixing the exchange rate and financing the fiscal deficit by borrowing from the central bank, a temporary downturn in tourism; tightened global financing after the Asian Crisis and appreciation of the pound as a consequence of the strengthening of the US dollar to which it remained pegged. In 2001-2002, a crawling exchange rate within horizontal bands was adopted. In 2003, Egypt shifted to a flexible exchange rate regime.

[26] In the long run, an increase in real output (RGDP) is likely to reduce rather than increase inflation due to the fact that Egypt is not close to full employment. An increase in long-run aggregate supply (through an increase in the available labor supply, expansion of the stock of capital goods, sustained improvements in productivity, advances in technology and innovations), means that the economy can meet a higher level of aggregate demand without putting upward pressure on the general price level.

[27] VECM is a restricted vector autoregression (VAR) model designed for use with nonstationary series, which are known to be cointegrated. The VECM has cointegration relations built into the specification so that it restricts the long run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments (Eviews 6 users' guide: 377).

1995; Johansen 1988, 1992 and 1994). As there are six variables in the cointegrating system, the error correction model is given by the following equations.

$$\Delta \log CPI_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log RGDP_{t-i} + \Sigma\, \beta_i\, \Delta \log EXRATE_{t-i} + \varphi_1 \mu_{t-1} + \upsilon_{t1} \quad (2)$$

$$\Delta\, DEFICIT_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log RGDP_{t-i} + \Sigma\, \beta_i\, \Delta \log EXRATE_{t-i} + \varphi_2 \mu_{t-1} + \upsilon_{t2} \quad (3)$$

$$\Delta \log NCLG_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log RGDP_{t-i} + \Sigma\, \beta_i\, \Delta \log EXRATE_{t-i} + \varphi_3 \mu_{t-1} + \upsilon_{t3} \quad (4)$$

$$\Delta \log M2_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log RGDP_{t-i} + \Sigma\, \beta_i\, \Delta \log EXRATE_{t-i} + \varphi_4 \mu_{t-1} + \upsilon_{t4} \quad (5)$$

$$\Delta \log RGDP_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta \log RGDP_{t-i} + \Sigma\, \beta_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log EXRATE_{t-i} + \varphi_5 \mu_{t-1} + \upsilon_{t5} \quad (6)$$

$$\Delta \log EXRATE_t = \alpha_0 + \Sigma\, \alpha_i\, \Delta \log EXRATE_{t-i} + \Sigma\, \beta_i\, \Delta \log CPI_{t-i} + \Sigma\, \beta_i\, \Delta\, DEFICIT_{t-i} + \Sigma\, \beta_i\, \Delta \log NCLG_{t-i} + \Sigma\, \beta_i\, \Delta \log M2_{t-i} + \Sigma\, \beta_i\, \Delta \log RGDP_{t-i} + \varphi_6 \mu_{t-1} + \upsilon_{t6} \quad (7)$$

Such that $\varphi_k \neq 0$ for a valid error correction representation of the underlying variables as well as for cointegration to exist between the underlying variables. μ_{t-1} is the lagged value of the error correction term from the preceding period, measured as a residual from the cointegrating vector (Equation 1). $\upsilon_{tr\ (r = 1,\ldots, 6)}$, is the random error term in each equation.

In the VECM, the coefficient on the lagged value of the errors (representing the long-run relationship) determines the speed of the short-run dynamic adjustment process or size of correction in the short-run towards the long-run relationship between the variables. Short-run corrections in the equilibrium are presented in Table A2. in the Appendix.

The coefficient on the lagged value of the errors in the log CPI equation (2) is significant at the 10 percent level, which implicitly concludes that the inflation rate in Egypt is affected by government budget deficit, net claims on the government, broad money, real economic growth and the nominal LE/$ exchange rate.

The coefficients on the lagged value of the errors are significant at a 5 percent level in the DEFICIT, log NCLG and log EXRATE equations (3, 4 and 7), while insignificant in the log M2 and log RGDP equations (5 and 6). This implies that an increase in the inflation rate results in an increase in the budget deficit and net credit to the government as well as a depreciation of the Egyptian pound, with no feedback effect on money supply and real gross domestic product.

The two-way dynamic interaction between government budget deficit, net credit to the government, the nominal LE/$ exchange rate and the inflation rate drives the short-run adjustment process towards the long-run relationship.

To summarize, Johansen cointegration analysis suggests that in the long run inflation is not only related to the budget deficit but also to its sources of financing, real gross domestic

product and the nominal LE/$ exchange rate. Inflation has a feedback effect on the budget deficit, net credit to the government and exchange rate.

5. Conclusion and Policy Implications

The relationship between budget deficit and inflation is an important and controversial issue in the academic literature as well as in the economic policy field. The purpose of this paper was to empirically investigate the short-run dynamics and long-run relationship between the budget deficit and the inflationary process in Egypt's economy. After a review of theoretical and empirical literature of the relationship between budget deficit and the inflationary process, the most recent developments in the stance of fiscal policy and inflation dynamics in Egypt were analyzed. Johansen cointegration analysis and a vector error correction model (VECM) were utilized to empirically investigate the short-run dynamics and long-run relationship between the budget deficit, its sources of financing and inflation dynamics from 1981/82 through 2005/06.

The major finding of this study is that Egypt's budget deficit and its sources of financing remain important drivers of inflationary pressures, making targeting price stability problematic. A large net government debt coupled with high servicing thereof had a role in determining inflation and inflation expectations by further increasing budget expenditures, monetization expectations or convincing the markets that they eventually will be paid through an inflation tax. Besides generating inflationary pressures, budget deficit financing from the domestic banking system through extensive issuing of T-bills and government bonds was found to result in crowding out private credit. This implies that the budget deficit has absorbed available resources that could have been otherwise more efficiently used by the private sector.

Cointegration analysis suggested that a long-run relationship exists between the budget deficit, net credit to the government, broad money, real output growth, exchange rate and the price level in the Egyptian economy. An increase in net credit to the government and money supply leads to a rise in the general price level; while real economic growth and an appreciation of the Egyptian pound vis-à-vis the US dollar mitigate inflationary pressures. Results of the vector error correction model suggested that budget deficit, its sources of financing and inflation relationship in Egypt exhibits a two-way dynamic interaction. Not only did persistent budget deficit and sources of its financing produce inflationary pressures

through their impact on monetary aggregates and public expectations, but also high inflation then had a feedback effect pushing up budget deficit.

A key policy implication of this study is that strengthening the fiscal position by reducing the budget deficit, net government debt and credit to the government, is crucial for supporting monetary policy in curbing inflationary pressures in Egypt. In order to keep inflation at low levels, the government needs to spend in such a way that it also increases economic growth. Introducing greater exchange rate flexibility would make monetary policy an effective tool for liquidity management.

APPENDIX

Table A1. The Johansen Test for the Number of Cointegrating Relationships: Consumer Prices

Date: 05/04/08 Time: 12:45					
Sample (adjusted): 1984-2005					
Included observations: 22 after adjustments					
Trend assumption: Linear deterministic trend					
Series: LOGCPI DEFICIT LOGNCLG LOGM2 LOGREALGDP LOGEXCHRATE Exogenous series: DUMMY EXCHERSAP					
Lags interval (in first differences): 1 to 1					
Unrestricted Cointegration Rank Test (Trace)					
Hypothesized No. of Cointegrating Equation(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	
None *	0.994538	202.15756	95.75366	0.0000	
At most 1 *	0.810027	87.53893	69.81889	0.0010	
At most 2 *	0.682852	50.99974	47.85613	0.0246	
At most 3	0.580264	25.73526	29.79707	0.1368	
At most 4	0.163626	6.636398	15.49471	0.6203	
At most 5	0.115714	2.705443	3.841466	0.1000	
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level					
* Denotes rejection of the hypothesis at the 0.05 level					
** MacKinnon-Haug-Michelis (1999) p-values					
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**	
None *	0.99454	114.61863	40.07757	0.0000	
At most 1 *	0.81003	36.53919	33.87687	0.0235	
At most 2	0.68285	25.26447	27.58434	0.0963	
At most 3	0.58026	19.09886	21.13162	0.0940	
At most 4	0.16363	3.93096	14.26460	0.8665	
At most 5	0.11571	2.70544	3.84146	0.1000	
Max-eigenvalue test indicates 2 cointegrating eqn (s) at the 0.05 level					
* Denotes rejection of the hypothesis at the 0.05 level					
** MacKinnon-Haug-Michelis (1999) p-values					
1 Cointegrating Equation(s):		Log likelihood	11.328413		
Normalized cointegrating coefficients (standard error in parentheses)					
LOGCPI	DEFICIT	LOGNCLG	LOGM2	LOGREALGDP	LOGEXCHRATE
1	-2.2E-06	-1.1	-2.4	8.8	1.3
	(2.5E-06)	(0.05)	(0.08)	(0.18)	(0.02)

Source: Author's calculations.

Table A2. Vector Error Correction Model

Vector Error Correction Estimates						
Date: 05/04/08 Time: 12:58						
Sample (adjusted): 1984-2005						
Included observations: 22 after adjustments						
Standard errors in ( ) & t-statistics in [ ]						
Error Correction:	D (LOGCPI)	D (DEFICIT)	D (LOGNCLG)	D (LOGM2)	D (LOGREALGDP)	D (LOGEXCHRATE)
CointEq1	-1.106441	-12725.70	-0.334759	-0.004970	-0.020101	-0.334057
	(0.53743)	(4911.97)	(0.08527)	(0.02817)	(0.02280)	(0.13357)
	[-2.05875]	[-2.59075]	[-3.92609]	[-0.17642]	[-0.88173]	[-2.50092]
R-squared	0.606476	0.750371	0.814701	0.903283	0.482096	0.867614
Adj. R-squared	0.248726	0.523436	0.646248	0.815359	0.011274	0.747264
Sum sq. resides	1.647846	1.38E+08	0.041477	0.004528	0.002965	0.101790
S.E. equation	0.387045	3537.466	0.061406	0.020289	0.016418	0.096196
F-statistic	1.695252	3.306545	4.836367	10.27340	1.023945	7.209063
Log likelihood	-2.709341	-203.3577	37.79353	62.15723	66.81382	27.91807
Akaike AIC	1.246304	19.48706	-2.435776	-4.650657	-5.073984	-1.538007
Schwarz SC	1.791825	20.03258	-1.890255	-4.105136	-4.528463	-0.992485
Mean dependent	-0.054296	-1327.386	0.121208	0.144391	0.046625	0.095581
S.D. dependent	0.446543	5124.267	0.103243	0.047216	0.016512	0.191348
Determinant resid covariance (dof adj.)	5.55E-08					
Determinant resid covariance	8.67E-10					
Log likelihood	42.23025					
Akaike information criterion	3.797250					
Schwarz criterion	7.963049					

Source: Author's calculations.

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