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Macroeconomic Shocks and Banking Sector Developments in Egypt

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Abstract

From 2008 to 2011, Egypt was hit by significant shocks, both global and country-specific. This paper assesses the impact of the resulting macroeconomic instability on the banking sector, and examines its role as a shock absorber. The Central Bank of Egypt accommodated the shocks by supplying liquidity to the market. The paper verifies a change in the fiscal regime from one in which the primary fiscal balance was used an instrument to stabilize the public debt ratio to one in which the policy instrument stopped playing that role and affected investors' assessment of the risk of holding public debt. This pattern suggests that fiscal conditions influenced exchange rate and price expectations originating a fiscal dominance situation in which the Central Bank could not control inflation. Hence, the Central Bank

lacked functional independence in spite of its de jure independence, which underscores the importance of strengthening institutions that facilitate policy coordination and allow policy to be more predictable. The government also funds itself through non-market mechanisms, in a typical financial repression scheme. The paper estimates the revenue from financial repression at about 2.5 percent of gross domestic product in 2011, which together with the revenues from seignoriage add up to close to 50 percent of the budgeted tax revenues, indicating the need for an in-depth review of the governance of the public banks and the funding of public sector activities. Finally, the paper estimates the impact of shocks to macroeconomic variables on loan portfolio quality and bank capital.

Macroeconomic Shocks and Banking Sector Developments in Egypt[1]

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JEL No. E4, E58, E62, E63, E65,F3, G21,H63

Introduction and summary

From 2008 to 2011 Egypt was hit by significant shocks, both global and country-specific. First, in 2008 the country was shocked by the global crisis, which induced a capital outflow, a moderate growth slowdown, stagnation in employment growth, and high inflation due to rising food prices. As the country recovered from that shock and capital had started flowing back, the January 25 2011 Revolution sent the economy into a tailspin. The prolonged transition to a new political regime and the limited policy flexibility compounded uncertainty, grounded the economy to a halt, and drove it to the brink of a balance of payments crisis by December 2011.

This paper assesses the impact of the resulting macroeconomic instability on the banking sector and examines the role of the sector as a shock absorber. The paper identifies two capital inflow periods and two outflow episodes: capital flowed in from 2005 until June 2008, when the global financial crisis hit the country, and from September 2009 until September 2010. Capital flowed out from mid 2008 to mid 2009, and from December 2010 to December 2011. The Egyptian capital flow cycles are closely synchronized with those of other emerging economies, except in the last capital outflow cycle associated with the Revolution. A common adjustment pattern to both capital outflow episodes is the pre-eminence of domestic banks, especially the public ones, in funding the deficit as foreign investors exit the T-Bill market. At the same time, the Central Bank of Egypt (CBE) accommodated the shocks by supplying liquidity to the market. While in 2008 the CBE's credit to the government had a contractive impact on the money supply, in 2011 the CBE expanded credit to the government and provided ample liquidity to the system by reducing its level of open market operations, by establishing a repo facility for banks to access primary liquidity, and by reducing bank reserve requirements. Banks used the liquidity mostly to purchase government securities and increase deposits abroad.

The paper verifies a change in the fiscal regime from one in which the primary fiscal balance is used an instrument to stabilize the public debt ratio to one in which the policy instrument stopped playing that role and affected investors' assessment of the risk of holding public debt. Foreigners holding T-Bills exited the market and the central bank supported the price of government paper during the sell-off, creating an inadequate condition for stabilizing the economy. Higher inflation and the provision of liquidity by the central bank raised the revenue from the inflation tax to around 2 percent of GDP and from seignoriage to over 4 percent of GDP. This pattern suggests that fiscal conditions influenced exchange rate and price expectations originating a fiscal dominance situation in which the CBE cannot control inflation. Hence, the CBE lacks functional independence in spite of its de jure independence.

The government also funds itself through non-market mechanisms, in a typical financial repression scheme. This paper estimates the magnitude of financial repression based on the difference between the government's market borrowing and the effective interest rate on the government domestic debt. The revenue from financial repression reached 2.5% of GDP in 2011, which together with the revenues from seignoriage described above add up to close to fifty percent of the budgeted tax revenues, indicating the need of deep review the governance of the public banking sector and the funding of public sector activities.

The rise of commercial bank credit to the government during both capital outflow episodes was coupled by an accelerated decline in the fraction of credit to the private sector. This decline is explained using

both a "balance sheet approach" which examines the sources and uses of funds of the banking sector, and econometric techniques. The first approach reveals a close association of bank credit to the private sector with external capital flows mostly through the growth of bank deposits, which were the main determinant of the sources of funds. The banking sector's net external liabilities were countercyclical, i.e. they contracted during the capital inflow period and expanded during the capital outflow. In this sense, the sector played a stabilizing role in the first capital outflow episode. But in 2011 the banking sector's net foreign liabilities were procyclical: bank deposits abroad increased as capital flowed out. In the semester of the revolution, from December 2010 to June 2011, the net credit from the CBE to the banking sector increased by LE 70 billion, equivalent to 30% of the monetary base, coinciding with rising bank purchases of government securities by LE 30 billion and higher deposits abroad by LE 40 billion, suggesting a limited effectiveness of monetary policy, as would be expected in a small open economy with a fixed exchange rate.

The paper also examines the evolution of bank credit by means of econometric techniques. A system of private credit supply and demand equations showed that, until 2008 when the global crisis hit Egypt, deposit growth was the most important determinant within the credit supply elements, while from the demand side, vigorous industrial activity implied growing demand for bank credit, but alternative sources of financing were abundant and implied lower demand for bank credit. During the recent capital outflow episode, the economic slowdown accounts for between 15 and 20 percent of the predicted total fall in credit, while the expansion of the credit to the government accounts for the remaining fraction. The relative importance of these factors contrasts with that of the preceding capital inflow period during which credit to the government accounted for about 50 percent of the estimated fall, while demand factors accounted for a similar amount.

Finally, the paper estimates the impact of shocks to macroeconomic variables on loan portfolio quality and bank capital. Using international evidence and Egypt-specific econometric results, the paper estimates a significant expected impact of growth, capital outflows, and interest rate shocks on loan quality and profitability indicators. A negative growth shock of 4 percentage points, like the one experienced by Egypt in 2011, is expected to increase the ratio of nonperforming loans to total loans by about 3 percentage points. A USD 20 billion capital outflow shock could have an adverse impact on nonperforming loans between 5 and 7 percentage points of total loans, and a rise in interest rates of 5 percentage points could imply a deterioration of loan portfolio quality between 4 and 7 percentage points. The effect of these shocks is significant: with a loss-given-default (LGD) ratio of 50%, and a ratio of loans to bank capital of 3.5, the negative growth shock implies a capital requirement of 5 percentage points of the level prevailing in June 2011 to absorb the shock.

However, recent official bank performance indicators show little change in the loan portfolio quality or profitability indicators, almost two years after the shocks. This might be due to the forbearance regulation issued by the CBE. In this light, it is crucial to ensure that an adequate macro-prudential regulatory framework is in place. In particular, bank regulators may need to account for bank ownership structure in developing an early warning system that would alert them about potential problems in the banking industry.

I. Macroeconomic and financial sector developments

A. The macroeconomic context before the global financial crisis

In the early 2000s, the Egyptian economy grew slowly, averaging 3% a year. GDP growth started to accelerate in FY04, and a series of tangible advances have helped improving the business climate. The need to stimulate economic activity and generate new jobs had left no option for the country but to improve its overall economic performance in order to increase its growth potential. It is estimated that the labor market needs to absorb around 700,000 new entrants each year. High and increasing unemployment rates in the early 2000s had exceeded 10% in 2004.   Real Gross Domestic Product (GDP) growth increased from an average of 3.5% during FYs 2001-04 to around 7% between FY06 and FY08, a record over the previous twenty years. Since 2005 capital flowed back into Egypt, and that was a supporting element of the observed positive growth figures.

Starting FY04, important structural reforms were implemented, including trade liberalization, a complete overhaul of the tax system (with simplified tax procedures and lower income tax rates) and privatization of some State-owned Enterprises (SOEs) and banks. The banking sector also underwent major reforms that helped shield Egypt from severe consequences of the global financial crisis of 2008-09. These include, for example, the adoption in 2003 of a Unified Banking Law to raise the minimum capital requirements for banks, as well as a program to lower the ratio of non-performing loans (NPLs) on the Egyptian banks' balance sheets. Public sector entities were the major delinquent debtors, especially to state-owned banks: in 2004, SOE had delinquent debts of around LE 40 billion, equivalent to the same amount of outstanding claims of the banking sector on the public business sector, or to 18% of the claims of the banking sector on the private business sector; this amount was almost 50 percent of the total T-Bills outstanding in June 2004.

Egypt's banking sector is still influenced by a strong legacy of years of state intervention, and the extensive state-led activities are financed through non-market mechanisms that operate through the state-owned banks, the specialized banks, the post office, and the National Investment Bank. This is described in more detail below. Aware of the economic costs and resource misallocation that such system entails, the government started a gradual process of divesting from the financial sector.

The reform program led to significant reduction in public ownership and management of banks and increased competition in banking by privatizing one of the four state-owned commercial banks;[4] divesting state-owned banks' shares in joint-venture banks;[5] and consolidating the system through mergers and

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[4] The first generation reforms included the privatization of Bank of Alexandria through sale of 80 percent of the equity to Bank San Paolo (later merged with Intesa to form Intesa San Paolo). Although the privatization of Banque du Caire was not part of the reform program, the government decided in early 2007 to privatize the bank. The government's commitment was evident in completing all the necessary steps for a strategic sale. Specifically, in July 2007, the government had announced that 70 percent of the bank would be sold to a strategic investor, and in October 2007 the government selected JP Morgan as sales advisor. The government received three bids in May 2008. However, the sale transaction was not completed, mainly due to the fact that the price was much lower than that estimated by the evaluation committee headed by the Central Audit Agency (CAA), and the global financial crisis paralyzed the bank privatization world-wide.

[5] More than 94 percent of the state-owned banks shares in joint venture banks were divested.

acquisitions of small and weak banks, by enforcing stricter prudential regulations.[6] The remaining commercial state-owned banks underwent a financial, institutional and operational restructuring. This included the settlement of more than 60 percent of the SOEs' NPLs in state-owned commercial banks, reaching settlements of 90 percent of private sector NPLs, and recapitalization through retaining capital gains realized on the sale of non-core assets and investments. In parallel, there was an in-depth program of improvement in information technology, risk management, governance, and staff skills that allowed these banks to operate on a commercially viable basis in increasingly open and competitive markets, lowering future credit risk.

The management of public finance in Egypt was challenging though a gradual adjustment was put underway. In the early 2000s, the budget deficit was in the double digits (reaching 10.4% in FY03). Public debt was also very high, with the general government debt reaching 117% of GDP. By the middle of the decade, both the public deficit and debt started to slowly decline, reaching 6.8% and 78% in 2007-08, respectively. As will be shown in the section on fiscal dominance below, this period can be characterized as sustainable, given that the primary balance was used effectively as a tool to stabilize and reduce the public burden.

Table 1 – Selected macroeconomic indicators*

	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11
Real GDP annual growth rates (%)	3.2	3.2	4.1	4.5	6.8	7.1	7.2	4.7	5.1	1.8
Unemployment rate (%)	10.2	11.0	10.3	11.2	10.6	8.9	8.7	9.4	9.0	12.0
CPI inflation rate (%)	2.4	3.2	10.3	11.4	4.2	11.0	11.7	16.2	11.7	11.0
Nominal Exchange rate (period avarage LE/US$)	4.4	5.2	6.2	6.0	5.8	5.7	5.5	5.5	5.5	5.8
Budget deficit (% of GDP)	10.2	10.4	9.4	9.4	8.2	7.3	6.8	6.9	8.1	9.8

*June data. FY is fiscal year, that starts in July and ends in June.

B. Capital flows and economic growth 2005-2011

Like in other countries, the 2008 global crisis had an adverse impact on Egypt, with real GDP growth falling to 4.7% in June 2009 from 7.2 % a year earlier. Unemployment increased to 9.4% from 8.4%, and the country's current account balance shifted from a 0.5 percent of GDP surplus to a 2.4 percent of GDP deficit. A decline in capital inflows also led to an overall BoP deficit amounting to 1.3% of GDP compared to a surplus of 3.3% a year earlier. Table 2 and Figure 1 show the capital flows and international reserves in Egypt in the period 2005-2012.[7] There are two capital inflow periods with international reserves increasing: March 2005- June 2008, and September 2009 to September 2010; and there are two capital outflow episodes with decreasing levels of international reserves: July 2008-June 2009, and December 2010-December 2011. The sudden stop in capital flows in 2008 was accompanied by a moderate economic slowdown, while the second capital outflow was associated with a major output contraction (Figure 2).

In 2010 there were signs of recovery: GDP started growing above 5% and capital was flowing back into the country. But the January 25th 2011 revolution sent the economy into a tailspin. In the first quarter of 2011, output contracted by 4.3%, and growth in the following three quarters was close to zero, at 0.4%

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[6] Consolidation of the banking sector was through higher minimum capital requirements and stricter prudential rules resulted in the exit of small and weak banks through mergers, acquisitions, and closure of foreign bank branches, which reduced the overall number of banks from 57 in 2004 to 39 in 2008.

[7] International reserves in the figures and tables include foreign currency assets of the central bank of Egypt (CBE), hence will not coincide with the CBE definition of official reserves.
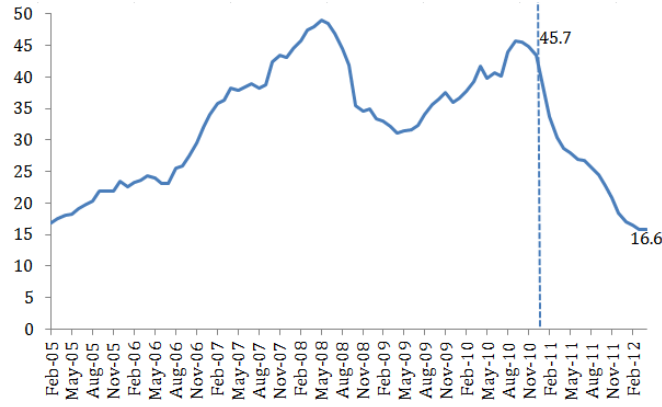
(June), 0.2% (September), and 0.4% (December) all y-o-y figures. Capital flowed out and output contracted in close synchronization. The correlation between the capital outflows and output slowdowns is clear both in 2011 and in 2008 (see figure 2); simple bi-variate Granger causality tests do not reject the causality from capital flows to growth. The output contraction associated with a typical capital outflow episode is much lower according to international evidence. A recent paper (Calderon and Kubota, 2012) shows that when the capital outflow is systemic or led by global investors, the output fall is of the order of 3 percentage points, while if the outflow is driven by local investors, the fall is of less than 1 percentage point.

Both episodes of capital outflows witnessed a fall in foreign currency assets of similar magnitudes. In the second semester of 2008 foreign currency assets of the CBE fell by US$14 billion, while in the first semester of 2011 they decreased by US17 billion; as a ratio of the stock prevailing before the shocks, the decline was equivalent to 28% while the second one was in the order of 38% (table 2). While the first capital outflow episode lasted three quarters, the second one has been more protracted, having started before the revolution and lasting until December 2011.[8] As a share of GDP, the first episode peaked at 13% of the quarter's GDP, while the second one reached 20% in the quarter ending in March 2011. By March 2012, the level of international reserves had reached US$ 15.2 billion, the equivalent of 2.5 months of imports and goods and services, placing the country at the brink of a balance of payments crisis.

The capital inflow/outflow cycles are also related to fiscal and monetary policy management, explored in the remaining sections of this paper. The links emanate from both structural and cyclical factors inherent to the policymaking framework in Egypt. The structural elements are: high public debt and deficit levels, incipient development of domestic capital markets, large presence of public banks and widespread financial repression, unregulated financial innovation through financial intermediaries such as mutual funds. The cyclical factors are related to the international capital markets and output contraction, and the expected impact on banking sector health.

These factors are analyzed in the remainder of this paper

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[8] At the time of writing the draft BoP data was available only until December 2011. Since then, March 2012 data shows capital outflow subsiding.

Figure 1: International Reserves (Billion US$)　　　**Figure 2: Growth (%) and capital flows (Million US$)**
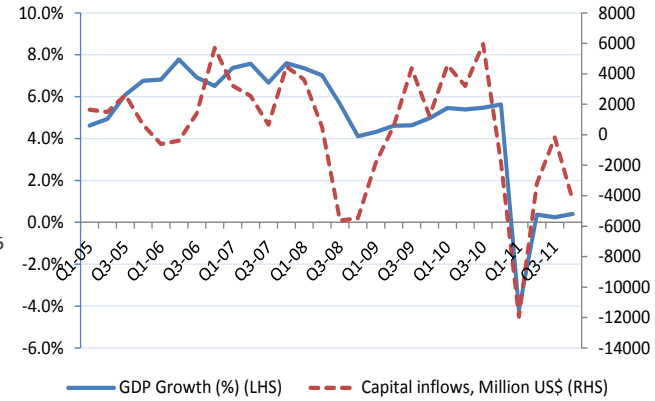
Source: CBE

Table 2 – International reserves, current account, and capital flows in Egypt 2005-2011 (US$ billion)

	2005				2006				2007				2008				2009				2010				2011			
	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec
International Reserves & foreign Assets	17.6	19.2	22.0	23.4	23.7	23.2	25.9	32.0	36.4	38.5	38.9	43.2	47.5	48.5	41.9	34.9	32.1	31.7	35.6	36.0	39.3	40.7	45.7	43.5	30.5	26.9	24.5	18.5
Change in CBE's International reserves & Foreign Assets	2.6	1.6	2.8	1.4	0.3	-0.5	2.7	6.1	4.3	2.1	0.4	4.3	4.3	1.0	-6.6	-7.0	-2.8	-0.4	3.9	0.4	3.3	1.5	5.0	-2.2	-13.0	-3.6	-2.4	-6.0
Current Account	1.0	0.1	0.2	0.8	0.9	-0.1	1.3	0.4	1.1	-0.6	-0.1	-0.2	0.7	0.5	-1.0	-1.5	-0.9	-1.0	-0.5	-0.8	-1.3	-1.7	-0.8	-0.6	-1.0	-0.4	-2.2	-1.8
Capital Account	1.6	1.5	2.6	0.6	-0.6	-0.4	1.4	5.7	3.2	2.5	0.7	4.5	3.6	0.5	-5.6	-5.5	-1.8	0.6	4.4	1.2	4.6	3.2	6.0	-1.8	-12.0	-3.2	-0.2	-4.3

Source: Authors' calculations based on CBE monthly reports.

C. Fiscal deficit and financing

From the mid-2000s Egypt started a gradual fiscal adjustment and as a result, the overall deficit declined from 10.4% of GDP in 2003 to a low of 6.8% in 2008. A central piece of the fiscal adjustment process was a gradual decline in the energy subsidies which allowed reducing the net transfers from the Ministry of Finance to the oil company (EGPG) to almost one half, in spite of the jump in oil prices by almost 50% between 2005 and 2008.[9] In the same period, public debt fell from 117% of GDP to 76%. In addition to the lower deficits, other factors such as high real GDP growth, moderate inflation and appreciation of the currency in real terms have also contributed to this fall. Following the global financial crisis in mid-2008 (FY09), the countercyclical fiscal policy consisted mainly of increasing public investment by 1% of GDP, and stopping the rationalization of energy prices. As a transitory management of the shock, it was considered a prudent fiscal policy (World Bank, 2009). With the beginning of the recovery in 2010, expansionary policies were not reversed due mostly to political uncertainty regarding the succession of Mubarak. Public investment remained high, and the energy price adjustment process was not renewed.

After the January 25th revolution and the slowdown of the economy, the fiscal deficit increased from the planned 7.9% of GDP to 9.8% in the fiscal year ending in June 2011. To placate protestors, the government increased public wages by 15% in February 2011 and in June it established a minimum wage for public sector workers of 700 EGP/month. Public spending increased, and is expected to continue the trend during the democratization process. In the fiscal year ending in June 2012, the wage bill has grown at 25 to 28 percent (y-o-y), and the fiscal deficit is expected to be around 9 percent of GDP.

The fiscal deficit is mainly being financed from domestic sources, through the issuance of public debt which is being absorbed by financial intermediaries. This pattern of adjustment also happened in 2008. Figure 3 shows how, in general, the evolution of the public banks' share of total T-Bill holdings is a mirror image of the foreigner's share. Further, private banks have increased their shares of T-Bill holdings, which suggests that it is the banking sector that has taken up the slack left by foreign investors as they leave and exit the market.

The role of public quasi-financial institutions, such as the National Investment Bank (NIB) has to be explored further. Though the holding of T-Bills by the NIB has remained stable through time, its holdings of bonds has increased substantially, from approximately LE 10 billion at the end of 2009 to around LE 15 billion by June 2011. Insurance companies of the

Figure 3- Evolution of T-Bill Holders in Egypt 2006-2011(percentage of total holdings)

Foreign Customers
Public Sec. & Spec. Banks
Private sector Banks+ Foreign Branches
Mutual funds

Source: Authors' calculations based on CBE data

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[9] The net transfer from MoF to the oil company is calculated as the energy subsidy paid from the budget minus the income tax and dividends paid by EGP to the MoF. This net transfer was 1% of GDP in 2005 and reached 0.6% of GDP in 2008. From that year on, it increases to reach 1.8% of GDP in 2012.

public sector increased their T-Bill holdings from LE 1 billion in July 2010 to around LE 10 billion by the end of 2011, while those of the private sector increased only by a factor of three.

The stable and growing importance of mutual funds is notable, as there is no information regarding the net flows of resources into these institutions and neither the CBE nor EFSA publish this information. In other countries, such as Brazil, the net flow of funds to these institutions have been good predictors of liquidity crises (World Bank, 2004)

Average T-Bill yields (273-day and one-year bills) during the second half of 2011 exceeded 14%, up from 10% before the revolution. During the period of political and macro instability, public debt is being accumulated mostly by commercial banks and, to a lesser extent, by money market mutual funds. More particularly, private and specialized banks[10] have substantially increased their share between June 2010 and November 2011 While having their share reduced, public banks still hold over a quarter of the outstanding debt.

Consequently, the balance sheets of the banking sector show a growing government size: the banks' total claims on the government increased their share within total bank claims from 30% in June 2008 to 49% in June 2011; the share of claims in local currency is even more significant, reaching 60% by June 2011. This increase is driven mostly by investment in government securities and T-bills growing by 28 percent between December 2010 and 2011. The private sector's share in total bank claims fell from 65% in June 2008 to 47% in June 2011.

The growing exposure of banks to credit risk from the government calls for closer scrutiny by bank regulators. In other countries, such as Brazil, Mexico and the UAE, the central bank has moved to limit the exposure to sub-national governments. In Brazil, that has been the practice since 2001, when the central bank limited bank exposure to sub-national public sector borrowers to 45% of equity, which proved particularly binding for the Caixa Economica Federal, the main source of funding for states and municipalities. In Mexico, in 2012, the Comision Nacional Bancaria y de Valores (CNBV) set limits on bank lending to states and municipalities based on bank capitalization: banks with capital ratios above 15% will have an exposure limit to single sub-sovereign entities of 40% of their Tier 1 capital, while less capitalized banks at the minimum regulatory level of 8% would have an exposure limit of 12% of Tier 1 capital. In Egypt the sub-national entities are not major sources of risk, but lending to the national SOE and the governments should have some cost in terms of the capital adequacy regulation of banks.

In addition to the credit from the banking sector, the government has also increased the use of credit from the CBE during the recent crisis period. Real CBE credit to the government increased by 59% since the Revolution, with faster acceleration registered after June 2011 (Figure 4). During the first capital outflow episode (July 2008-June 2009) claims on the government contracted. The CBE's intervention in the liquidity market through its open market operations shown in Figure 5, reveals its role during the crisis. By reducing its level of open market operations, the CBE facilitated the banking sector increasing its public debt holdings and hence supported the price of government bonds in the market. During the 2008-2009 capital outflow episode, the CBE's credit to the government fell by one quarter. But the injection of liquidity, as measured by the change in open market operations was of a similar order of magnitude, as in

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[10] Agriculture Bank (PBDAC), and Housing and Construction Bank

both episodes of capital outflows there was an expansion of about LE 70 billion in real terms (Figure 5). We discuss the interaction between monetary and fiscal policy in the section on fiscal dominance.

Figure 4- CBE Net Claims on the Government   **Figure 5 CBE Stock of Open Market Operations**

(in 2005 constant prices, LE bn)   **(in 2005 constant prices, LE bn)**
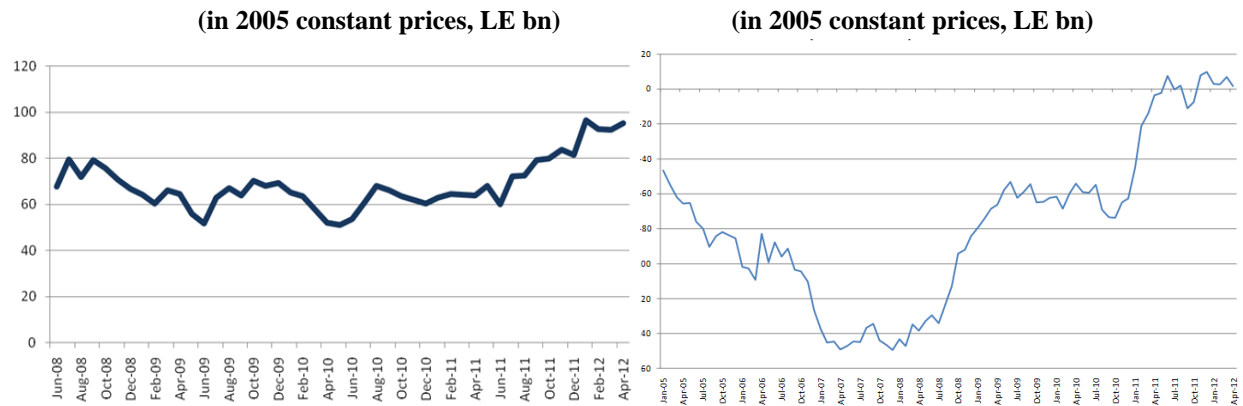
Here we only wish to highlight the CBE's role in providing liquidity to the economy. In March 2011 the CBE introduced 7-day REPO operations with commercial banks, with the commercial banks, with the objective of providing necessary liquidity. However, evidence from aggregate banking sector information does not support the hypothesis of a liquidity crunch. Table 3 shows the aggregate financial position of banks in the period December 2010 to June 2011, and it is clear that during the turmoil, the liquidity provided by the central bank was used to fuel capital outflow and lend to the government. The uses of funds shows a decrease in the net credit position of the banks with the CBE, of about LE 70 billion, and at the same time there is an increase in the credit to the government by about 30 billion and a reduction in net foreign liabilities by about LE 40 billion.

Table 3-Aggregate Financial Position of banks (Except CBE, LE million)

Aggregate Financial Position of Banks (Except CBE, LE million)	2010 December	2011 June
A- Assets	**1282910**	**1269690**
Cash	13353	14830
Securities and Investments in Tbs, of Which:	441179	474176
Balances with banks in Egypt	218120	117010
Balances with banks Abroad	67217	96080
Loan and discount balances	458081	474139
Other assets	84960	93455
B- Liabilities	**1282910**	**1269690**
Capital	51238	59049
Reserves	28822	22056
Provisions	54026	55106
Bonds and Long-term loans	25321	26180
Obligations to banks in Egypt	61224	28171
Obligations to banks abroad	24295	15168
Total Deposits	943972	957037
Other Liabilities	94012	106923
Sources of Funds	**1154469**	**1145439**
Deposits and other liabilities	1063305	1090140
Net Foreign Liabilities (obligations to banks abroad-deposits with banks abroad)-	-42922	-80912
Capital and other	134086	136211
Uses of Funds	**696388**	**671300**
Credit public sector	441179	474176
Net credit banks CBE	156896	88839
Other assets & cash	98313	108285
Credit to private sector	458081	474139

The difference in the CBE's position during the first capital outflow episode, which was systemic, and the second episode is reflected in the 90 day T-Bill rate. While in the 2008 episode rates almost tripled from 5% to around 14%, in the second episode the rise was less steep (Figure 6). The fiscal dominance section below further discusses the role of the CBE in the crisis episode.

Figure 6- Capital Flows and 90-day T-Bill rates
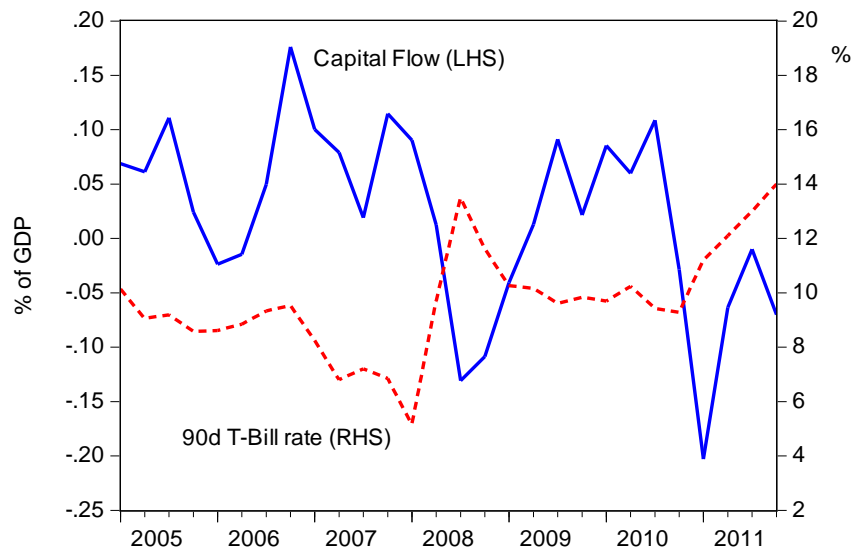
D. Explaining the 2011 capital outflow: Foreigners' stampede or domestic residents and the case of "missing deposits"

In the long run, financial development is associated with lower cash ratios, as low ratios imply higher bank intermediation, and ceteris paribus, should imply more credit availability. Figure 7 shows the cash/deposit ratio and the size of the credit to the private sector as a share to GDP in a cross- section of 97 countries; those with lower cash/deposits ratios have higher credit to the private sector. Higher cash ratios have been associated with lower trust and social capital which impede financial development (Guiso, Sapienza and Zingales, 2001). Higher cash holdings are also associated with inefficiency in the judicial system. In Egypt, the currency to deposits ratio is high by international standards. The declining trend in this ratio was reversed when the global financial crisis hit Egypt in 2008, and a significant increase also occurred after the January 2011 revolution (Figure 8). Both shocks exacerbated uncertainty, and hence increased the demand for cash. Below, we estimate an excess cash holding figure to link low deposit growth in the banking sector with the capital outflow.

Egypt's main external accounts between December 2010 and December 2011 (Table 2) allow gauging the capital outflow in the aftermath of the revolution at around US$ 20 billion. A significant share, US$ 9 billion, can be associated with foreigners' reduction of T-Bill holdings during the same period.

A fraction of the remaining outflow of US$ 11 billion can be explained by currency substitution by Egyptians. The substitution can take place either by leaving the deposits in the foreign currency in the financial system or converting the deposits into dollars and taking them out of the banking sector. The first type of substitution is approximated by the increased deposits in foreign currency in the banking sector of US$ 2.2 billion. The second possibility is more difficult to quantify but a back of the envelope estimation is based on the extremely low growth, of only 1% (y-o-y) of deposits in Egyptian-pounds by

December 2011. If deposits in local currency had increased with nominal GDP (by 10.6%), the expected deposit level in December 2011 would have been much higher. Hence there are "missing deposits" of about LE 70 billion. Where did they go? First, there was an increase in the demand for cash (Figure 8) and we estimate the excess cash holdings at about LE 32 billion[11]. The remaining LE 38 billion would be the "missing deposits" (equivalent to US$ 3.6 billion) resulting from a lower demand for demand deposits in local currency that very likely fueled the capital outflow.

Summing up, we estimate that the US$ 20 billion can be associated with the following flows: US$ 9 billion of foreigners exiting the T-Bill market; US$ 2.2 billion of increased deposits in foreign currency in the banking sector; and US$ 3.6 billion of substituting EGP denominated deposits for foreign currency out of the banking system.

Figure 7
Cash/deposits and private sector credit across the world
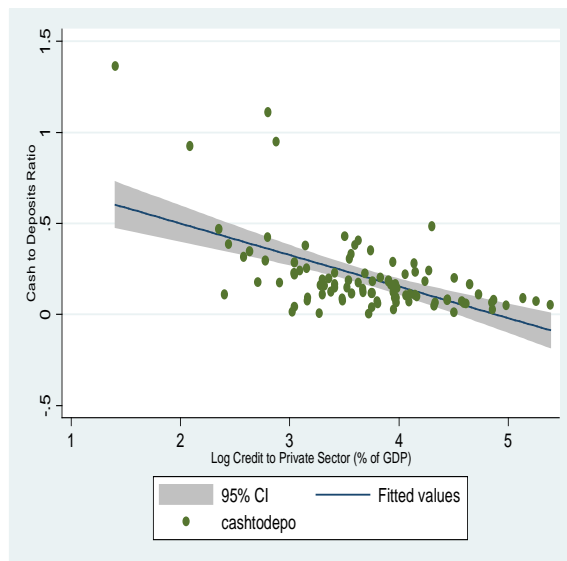
Figure 8

Cash/deposits ratio in Egypt
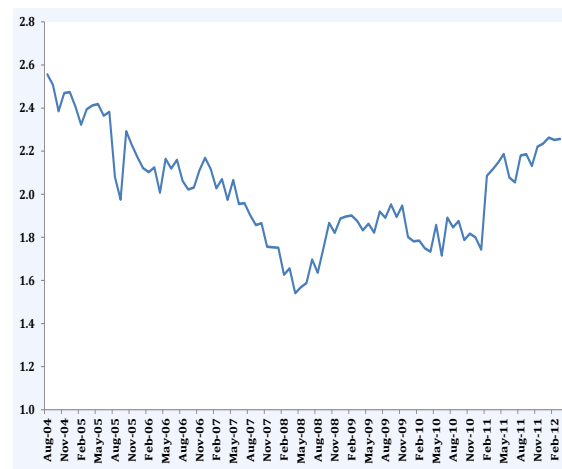
E. The role of financial repression and fiscal dominance in Egypt

Financial repression refers to the several mechanisms that a government can employ to channel to itself funds that, in a deregulated market, would go elsewhere. Hence, it provides a way for governments to circumvent going directly to the capital or financial markets to fund its operations. The major consequence of financial repression is the misallocation of resources that is also often associated with low or even negative real interest rates. The government's use of resources without using market mechanisms hinders the financial sector's role in directing resources to productive investments and induces distortions

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[11] The excess cash holdings is estimated as follows: in December 2010, cash holdings outside the banking system were 21% of total deposits. By December 2011, the ratio had increased to 25%. The excess 4% is equivalent to LE 32 billion.

because the price of capital does not accurately reflect supply and demand considerations. In this case, the government spends more than it can finance or it spends on inefficient activities.

This section examines the relevance of financial repression from a public-finance perspective, and estimates the revenue from financial repression based on the difference between the government's borrowing costs from the market on the one hand, and the effective interest rates on the government's domestic debt on the other. The analysis suggests that public finance requirements are the main driver for financial repression in Egypt. More specifically, it suggests that policies aimed at increasing revenues from implicit taxation may be considered as an alternative to (or at least an attempt to postpone) the structural change in the established fiscal policy. It will be shown that financial liberalization would further constrain the government budget and that it entails an exacerbation of fiscal problems in the context of structural deficit and rising debt.

1.   Institutional features of financial repression

Financial repression generally takes place in the form of restrictions on capital flows or limitations on interest rates. However, repression can also be identified by more subtle forms of government involvement/intervention in the financial markets, whether through direct ownership or extensive management of banks and other financial institutions. In those cases, administrative controls on financial markets are used to support the demand for government instruments. When public banks and financial institutions buy significant amounts of government securities, T-bills and bonds, interest rates remain at low levels. As such, captive buyers are forced to hold government debt at interest rates below market yields allowing the government to cut interest costs and reduce the recorded public deficit. At the same time, deposit rates on Egyptian households' savings accounts are reduced, in order for the banks to maintain their spreads.

One of those public financial institutions is the National Investment Bank (NIB), one of the biggest actors in the Egyptian capital markets, with assets equivalent to 18% of GDP; as a matter of reference, the largest private commercial bank, the Commercial International Bank (CIB) has assets equivalent to 6% of GDP, and the assets of the largest public bank, the National Bank of Egypt (NBE) are equivalent to 25% of GDP. The NIB is funded mainly through employees' contributions to social security through the Social Insurance Fund (SIF), investment certificates issued by the NBE and post office savings. These resources are mainly being used to fund state-owned enterprises, economic authorities and to satisfy the government's borrowing needs (Table 4). Consequently, the NIB which performs quasi-fiscal activities is funded through workers' savings, post office savings, and certificates of deposit issued by the NBE. The NIB has also been significantly increasing its holdings of government bills and bonds, with their share on its balance-sheet having almost doubled in a five year time span (from 3.7% to 6.4% in 2011). This suggests that controls over such big actors on the financial market are being used to support demand for government bonds. As is shown to be the case in the following section, such controls could be thought of as a form of 'implicit taxation'.

2. Government revenues from financial repression, inflation tax and seignoriage

Total revenues from financial repression can be seen as the difference between the government's borrowing costs from the market on the one hand, and the effective interest rates on the government domestic debt on the other. The difference represents the government's gains from access to low-cost funding for its domestic debt. The importance of quantifying the government revenues from financial repression is to provide a rough measure of the first-order implications on the public finances of easing the administrative control of the government on public banks and other financial institutions. This tax has to be included in the fiscal adjustment required in case of financial liberalization. The higher the revenue from implicit taxes, the harder it is for the government to change the established path of fiscal policy.

Table 4- National Investment Bank (NIB), Resources and Uses (% of GDP)

	2007	2008	2009	2010	2011
Liabilities	**23%**	**22%**	**20%**	**19%**	**18%**
Social Insurance Fund for Gov. Employees	3.7%	3.2%	2.8%	2.6%	2.4%
Social Insurance Fund for Pub. & Priv. Business Sectors	2.8%	2.5%	2.4%	2.3%	2.2%
Proceeds from investment certificates	9.2%	8.8%	7.8%	7.6%	6.9%
Accumulated interest on investment certificates (category A)	1.0%	0.8%	0.8%	0.7%	0.6%
Proceeds from US dollar development bonds	0.1%	0.0%	0.0%	0.0%	0.0%
Post office savings	5.8%	5.5%	5.2%	5.4%	5.2%
Others*	0.1%	0.6%	0.6%	0.3%	0.2%
Assets	**23%**	**22%**	**20%**	**19%**	**18%**
Loans to government	0.0%	0.0%	0.0%	0.0%	0.0%
Loans to economic authorities	6.9%	5.7%	4.8%	4.3%	3.8%
Investments in government securities (bills and bonds)	0.8%	1.0%	1.0%	1.1%	1.1%
Deposits of the NIB with the banking system	0.4%	0.4%	0.5%	0.5%	0.2%
Lending to holding companies and affiliate units, concession loans, and others (net NIB debt minus its intradebt)	14.5%	14.4%	13.5%	13.0%	12.4%

Source: CBE June data.

Table 5 shows that the amount of revenues the government extracts from financial repression differs widely from one year to the next. Figure 8 suggests that the amount is mostly triggered by the differential in interest rates rather than by the amount of outstanding debt (see Annex 1 for details on estimation method).

Table 5 – Financial repression tax rate & revenues

	Interest rate differential	FRR (% of GDP)
FY04	2.72%	2.1%
FY05	5.70%	4.5%
FY06	3.84%	2.3%
FY07	1.56%	0.8%
FY08	0.38%	0.2%
FY09	9.98%	3.5%
FY10	4.45%	1.5%
FY11	7.85%	2.5%

Figure 9- Revenue from financial repression
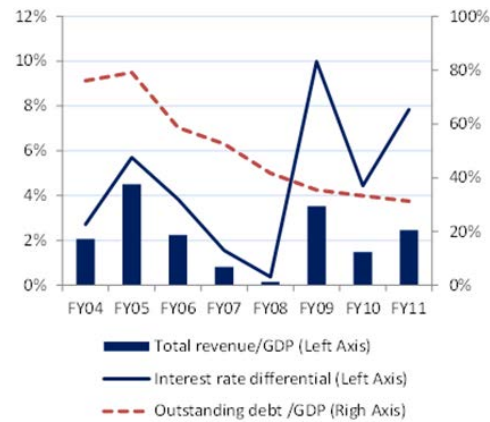
Channeling additional revenues to the government using a repressed financial system affects other sectors in the economy. For example, real negative interest rates usually induce households to shift their savings towards non-productive alternatives (such as residential housing) in order to preserve the value of money. In a way, this distortion is equivalent to an implicit tax imposed on households and corporates who could possibly have earned higher income in a non-repressed financial market.

In Egypt, financial repression and excessive government borrowing have been associated with higher inflation and lower saving ratios. The evolution of inflation in recent years has so far helped to limit the growth of the government debt, mainly because of the negative real interest rates and the large base of the inflation tax.

Table 6 presents an estimation of the inflation tax as the loss that is sustained by the holder of real money balances as well as from seignoriage. Seignoriage is the revenue that accrues to the government from the central bank's ability to issue liabilities (monetary base) without paying interest. Given the stability of the tax base (monetary base) and the tax rate (inflation rate), the revenue collected by the inflation tax is also stable, though it has risen to 14.3 percent of budget tax revenues. Seignoriage has increased dramatically in the past year, reaching 4.3% of GDP. The expansion of the monetary base has been due mostly to expanding government credit facilities at the CBE, and to the provision of liquidity of the CBE by reducing its open market operations.

Table 6- Inflation tax and seignoriage in Egypt

|	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11
1. Money supply (% of GDP)	19.4%	18.8%	18.8%	18.0%	19.0%	16.8%	16.8%	18.3%
2. GDP Inflation rate (π)	11.7%	6.2%	7.4%	12.6%	12.2%	11.2%	10.1%	11.0%
3. Inflation tax (% of GDP)	2.3%	1.2%	1.4%	2.3%	2.3%	1.9%	1.7%	2.0%
4. Budget tax revenue (LE million)	102,046	75,759	97,779	114,326	137,195	163,222	170,494	192072
5. Inflation tax (% of tax revenue)	10.8%	8.3%	8.7%	14.8%	15.1%	12.0%	12.0%	14.3%
6. Growth rate of money supply	13.7%	7.2%	14.8%	15.6%	26.7%	3.1%	16.0%	23.6%
7. Seignoriage (% of GDP)	2.7%	1.4%	2.8%	2.8%	5.1%	0.5%	2.7%	4.3%
Notes: 3= 1x2; 7= 1x6. Calculations based on CBE data								

Source: Authors' calculation, from CBE and MOF data

We assess the incidence of the inflation tax on different sectors of the economy by decomposing the economy-wide inflation tax into households, banks, business, government and other unidentified sectors (see Annex 1 for details). Banks are the biggest payer of the inflation tax, with a share of 40% of the total cost. This is mostly due to the large holdings of government securities by specialized banks, as well as from the holding of required reserves by the CBE. The inflation tax burden then falls on the household sector which bears around 26% of the total cost. This is due to the sector being the largest holder of demand and savings deposits (Figure 10).

Foreign currency deposits are an alternative to domestic assets, but represented less than 20% of total deposits before the Revolution. From 2005 to the Revolution theirs share within total deposits (Figure 11) declined, and after the Revolution they increased to 21%. Given the shock, and that interest rates were negative during most of the period 2005-2010, the low dollarization of the economy can only be understood with the expectations of currency appreciation. Another explanation could be that savers demand other assets to hedge against inflation, possibly land, real estate, and gold, which are tax-free but costly to liquidate and blurs the relationship between savings and growth, to the extent that these savings instruments are not necessarily associated with productive investment.
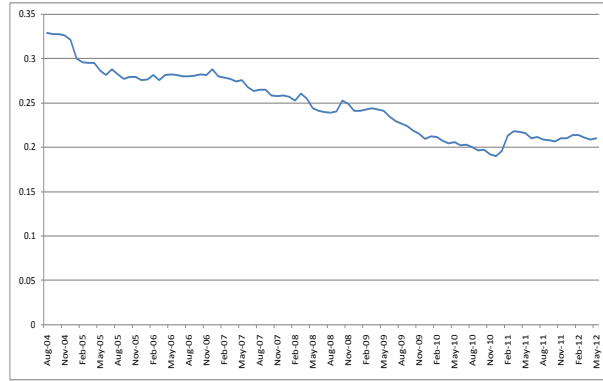
Figure 10- Inflation tax incidence, by sector
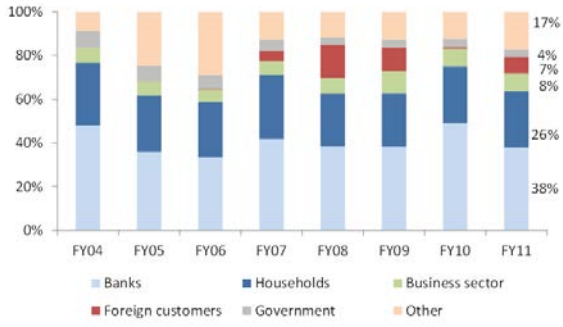
Figure 11- Dollarization rate

(Deposits in foreign currency/total deposits)

Source: Authors' calculation, from CBE and MOF data

3. Fiscal dominance and the lack of functional independence of the CBE

Monetary policy will be an effective stabilization tool only if the central bank can influence expectations of inflation or the price level. There may be circumstances when fiscal events, or their expectation, are determinant of price changes or of interest rates, and these expectations might not be consistent with the central bank's objectives. Functional independence of the central bank refers to the institution's ability to guarantee that its actions will influence inflation expectations and keep them within certain bounds consistent with its inflation target; this independence is a necessary complement of legislative independence which isolates monetary policy form political interference.

Hence, policy coordination is important to ensure consistency and credibility in the stabilization package. Sustainability of the policymaking framework hinges on its capacity to absorb shocks and the coordination of its different elements in changing environments. When one of the elements is constrained to react to a shock, the other has to be more responsive, and policymakers have to judge which restrictions are more binding. Policy rigidity is historically associated with crises in other countries (World Bank, 2003) and the 2011 balance of payments crisis in Egypt following the Revolution may have been due to the same policy inflexibility.

Making the public budget more flexible and responsive to shocks will constitute the main challenge of Egyptian fiscal policy in the future. The capacity to change government savings is a crucial element to guarantee sustainability as external conditions evolve. This ability is central for stabilization purposes. The present-value borrowing constraint[12] that the government faces will always be met. For instance, if public debt goes up, the expected primary surplus should also rise to ensure that the larger obligations will be repaid. If that is not feasible, the budgetary restriction equation will be adjusted either through an increase of the price level or a reduction of debt service. The precise form to be utilized to adjust to equilibrium depends on the flexibility of fiscal policy and on the composition of the public debt. If government expenditures and taxes are predetermined, some other variable such as prices or asset returns, has to adjust to attain the balance. How much or how fast prices react will depend on the maturity structure of public debt: short duration instruments are less sensitive to changes in interest rates and hence require larger swings in asset prices to change their real value.

Fiscal policy flexibility is also required to be used as an effective signaling mechanism. In a world of imperfect information, in which investors do not know the debt issuer's true commitment to meet its obligations, a committed sovereign must differentiate itself from other types of debtors to be able to issue new debt. The primary surplus is an exogenous policy tool available to a government to signal its commitment to pay its future obligations. As debt increases, the primary balance should go up to signal investors that the government is willing to adjust in order to maintain its intertemporal budget.[13]

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[12] This constraint sets the equality between the discounted expected government revenues and the future flow of government spending including servicing the debt.

[13] Bohn (1998) claims that this property of fiscal policy, namely the positive reaction of the primary surplus to changes in debt levels, is a necessary condition for long run solvency, and hence proposes it as a statistical test for verifying compliance of intertemporal budget restrictions.

Uncertainty regarding the government's commitment to fiscal adjustment during the transition generated concerns about the future value or liquidity of public debt. Given the concentration of public debt holdings in foreigner's hands, the sell-off of government securities is reflected in the capital outflow and loss of international reserves. The sell-off would have also caused a collapse in the price of government paper, but the CBE's decision to inject liquidity (described in previous pages) and hold its own interest rates constant, revealed its objective as supporting the price of government bonds, or holding interest rates within certain bounds.

The increased uncertainty generated a decline in the demand for government bonds, which forced the central bank to intervene in the market by: (1) printing money by extending direct credit to the government; (2) providing support for government securities' prices by providing additional liquidity to financial intermediaries through REPO operations and by reducing the level of open market operations.

The central bank's reaction can be rationalized given the fiscal considerations of a high and rising debt level and a high fiscal deficit prior to the Revolution. In these circumstances, it is very likely that sustainability concerns dominated investor sentiment.[14] With taxes and expenditures predetermined by political considerations, this implied that the adjustment of the government's real cash flow could come through several avenues: an increase in the price level, a higher seignoriage, or a default. The nature of the fiscal regime could have switched from one in which the primary surplus would be adjusted with certainty to ensure debt sustainability to one where there was uncertainty on how the adjustment would take place.

Hence, under the circumstances of rising debt levels with an unresponsive fiscal policy, raising interest rates could have been inflationary. The higher cost of debt service (with an unresponsive primary surplus) could have led to a higher probability of default, which in turn would have accelerated capital outflows, increasing pressure on the currency to depreciate and hence, on inflation. Since printing money and higher prices were part of the solution to the imbalance in the government's present-value borrowing constraint, fiscal expectations were inconsistent with a stable price level.[15]

Verification of the character of the fiscal regime focuses on testing the responsiveness of the primary balance to changes in different variables (Bohn, 1998). These tests regress the primary surplus on the public debt ratio and other control variables to verify the significance of primary balance coefficient. A positive (and significant) response of the primary surplus to changes in the debt ratio implies that this policy variable was the adjustment factor. Wyplosz (2005) and Favero and Giavazzi (2005) have used this methodology to examine the behavior of fiscal policy in emerging countries during crises episodes.

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[14] This is what Blanchard (2005) calls the "wrong" fiscal conditions. Woodford (2001) call this a non-Ricardian environment. A Ricardian environment is one in which expected future primary surpluses adjust to compensate variations in the present value of debt, while in non-Ricardian regimes this policy adjustment certainty is non-existent.

[15] Woodford (2001) shows how the price level may be determined by fiscal variables. The government's inability to balance its budget constraint via adjustments in the primary surplus, implies that the price level is the adjustment mechanism. Hence, the budget constraint acts as an equilibrium condition which determines a unique price level associated with the particular fiscal policy.

We follow Wyplosz (2005) in examining the fiscal policy reaction function, which describes the relationship between the primary surplus (s) and public debt (b) and other control variables, such as the output gap (g) and interest payments (ib). As the public debt level goes up, the government is expected to raise the primary surplus to signal its commitment to stabilizing debt. For the same reason, the government is also expected to raise the surplus as interest payments go up. The sign on the output gap can be positive or negative, depending on the procyclical or countercyclical use of fiscal policy during the period. Hence the implicit fiscal policy reaction function can be captured by running the regression:

$$s_t = \alpha + \beta b_{t-1} + \gamma ib_t + \theta g_t + \rho s_{t-1}$$

To examine whether this relationship changed after the 2011 Revolution, the regression was estimated using quarterly data for the period June 2005 - December 2010. As mentioned, the critical point that summarizes the fiscal policy stance is whether β is positive and large enough to act as a stabilizer. To test whether the reaction function changed after the revolution, and in particular if the parameter β changed, we construct an auxiliary variable by multiplying a dummy variable of one after December 2011, and the public debt level. The total effect of lagged debt on the primary surplus following the revolution is the sum of the auxiliary variable coefficient and that of lagged debt. Given the limited degrees of freedom, we ran the regression using the controls, namely the output gap and the interest payments, alternatively. Table 7 summarizes the results for both time periods, with and without the controls. The table also reports the values of parameter β for Argentina, Brazil and Turkey.

Table 7-Fiscal Policy Reaction Function in Egypt and other emerging economies

	Egypt Pre-Revolution		Egypt Post revolution		Argentina	Brazil	Turkey
	With controls	Without controls	With controls	Without controls			
β	0.11**	0.01	0.04	-0.02*	0.02*	0.19*	0.07*
θ	1.56*	--	0.59	--			

*** 0.05 significance   *0.01 significant.*
Standard errors are Newey-West heteroskedastic and autoroccrelated corrected
Source: Egypt: authors calculations for Egypt. Herrera-Salman (2008) for Brazil, Argentina and Turkey

These results suggest that the fiscal policy reaction function changed after the Revolution and moved in an undesirable direction: from a positive and significant β in the middle of the range of successful stabilizing experiences of Brazil and Turkey, and significantly higher than in failed stabilizers (Argentina), it moved to an insignificant coefficient. These results imply that fiscal conditions evolved from a Ricardian setting in which the primary surplus is managed to stabilize the debt to a "non-Ricardian" setting in which the primary balance moved in the opposite direction. In these circumstances, the literature has shown that monetary policy is ineffective in controlling the price level (Woodford, 2001) and raising interest rates can be destabilizing because it increase the risk of default (Blanchard, 2005).

Hence, the main challenge for policymakers in Egypt is to design a framework that ensures functional independence of the central bank. This independence implies that the central bank can influence inflation expectations and maintain them within specific limits to meet the inflation target. To achieve this, the policymaking framework must ensure that expectations of fiscal events, which are exogenous to the

central bank, are not incompatible with price stability. Hence, a mechanism that contains fiscal expectations within certain bounds is a necessary element of an economic policy framework.

Fiscal rules are useful mechanisms for this purpose and Brazil has successfully experimented with one of them, namely, the Fiscal Responsibility Law (FRL). Other countries in Latin America, such as Chile and Colombia have used some sort of fiscal commitment mechanisms with relative success, and may be worthwhile exploring in the case of Egypt.

II. The sources and uses of funds of the banking sector and the credit to the private sector

Total bank credit as a share of GDP has been falling since 2006, except in 2011, when credit to the government jumped by six percentage points of GDP (see Table 8). The banking sector's claims on the government and on the business sector show divergent trends, especially since 2009 (Figure 12)[16].

Figure 12 Real claims on the government and on the private sector
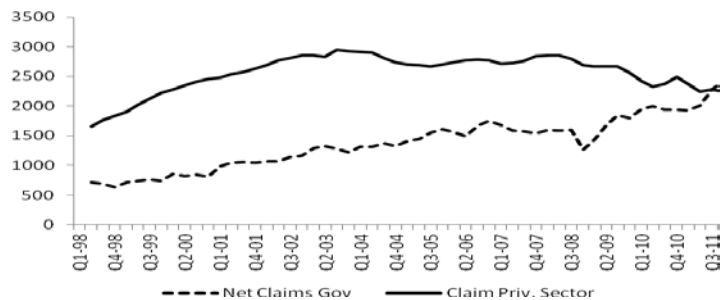
This **section** provides a brief evolution of the Egyptian banking sector and explains why credit to the private sector as a percent of GDP has fallen in the past five years. First, it describes the evolution of the banking sector's sources and uses of funds in the period 2005-2011. Second, it discusses the evolution of the supply and demand for credit to explain the observed contraction of credit to the private sector.

Table 8 - Credit as Share of GDP

	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Total credit	79%	66%	57%	62%	60%	63%
Government	39%	31%	25%	33%	32%	38%
Public business	4%	3%	2%	2%	2%	2%
Private business	28%	25%	22%	20%	18%	16%
Households	8%	7%	8%	8%	8%	7%

Source: Herera, Hurlin, Zaki (2012)

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[16] *Note: Real figures of claims on government and private sector were obtained by deflating nominal figures by the CPI index*

A.   Description of banking sector: Sources and uses of funds

This section examines the banks sources and uses of funds, using the methodology used by Barajas-Steiner (2002) in Latin America, and Barajas et. al in MENA, to facilitate comparison. The sources of funds for the banking sector are the deposits (D_t), the net foreign liabilities (NFL_t), and the bank capital (K_t), while the uses include, lending to the private sector (CPS_t), lending to the government (GOV_t), changing its net credit position with the CBE (CB_t), and cash holdings or other assets (OTH_t). Therefore, credit to private sector can be defined as follows:

$$CPS_t = D_t + NFL_t + K_t - GOV_t - CB_t - OTH_t$$

Consequently, the private sector credit growth (as well as its change) can be decomposed into changes in these other balance sheet items, which either contribute to the decline, or offset it:

$$\Delta CPS_t/CPS_{t-1} = \Delta D_t/CPS_{t-1} + \Delta NFL_t/CPS_{t-1} + \Delta K_t/CPS_{t-1} - \Delta GOV_t/CPS_{t-1} - \Delta CB_t/CPS_{t-1} - \Delta OTH_t/CPS_{t-1}$$

Table 8 shows the changes in sources and uses of funds for the period 2005 to 2011. Real deposits are the main force behind the changes, exhibiting high growth rates during the boom years of 2007 and 2008, a time when real net foreign liabilities were falling. The 2009 data reflects the impact of the global crisis (data corresponds to fiscal years, ending in June), when the banking sector's net foreign liabilities increased, compensating the decrease in the deposits as a source of funding. The general trend in the uses of funds shows that the real credit position with the CBE was the main alternative use of funds until 2009 when real credit to the government began taking over as the main use of banking sector funds.

In 2011, against a background of political unrest, real credit to the private sector decreased by 8.5 percent, as a result of a contraction of sources by 17 percent and of alternative uses by 8.5 percent. The banking sector's adjustment to capital outflow consisted of compensating the contraction of net foreign liabilities with a reduction in the net credit position with the CBE by a similar magnitude.

During the capital inflow period 2006 to 2008, the Egyptian banking sector did not fund credit operations expanding foreign liabilities. In fact, during the capital inflow years the external sector became instead a contractive factor. In 2009, when capital flowed out in response to the global crisis, banks used their external liabilities as a funding source, playing a counter-cyclical role. Only in 2011, during the capital outflow related to the January uprising, were the net foreign liabilities pro-cyclical.

Table 9- Change in sources and uses of funds of the banking sector as a ratio to real credit to the private sector (for fiscal years ending in June)

|	2005	2006	2007	2008	2009	2010	2011
Change in credit to the private sector	*-0.044*	*0.009*	*-0.015*	*0.017*	*-0.078*	*-0.029*	*-0.085*
Change in sources	0.062	0.035	-0.026	0.116	-0.038	0.024	-0.170
Change in deposits	0.066	0.086	0.115	0.047	-0.171	-0.031	-0.044
Local currency	0.055	0.098	0.023	0.083	-0.072	0.030	-0.048
Foreign currency	-0.002	-0.013	0.030	-0.028	-0.053	-0.054	-0.020
Other	0.013	0.000	0.061	-0.008	-0.045	-0.008	0.024
Change in foreign liabilities	-0.010	-0.072	-0.121	0.046	0.146	0.060	-0.077
Change in capital	0.006	0.022	-0.019	0.023	-0.014	-0.005	-0.049
Change in alternative uses	0.106	0.026	-0.010	0.100	0.040	0.052	-0.085
Change in credit to government	0.065	0.050	-0.108	0.013	0.210	0.072	0.044
Change in net credit to CBE	0.026	-0.020	0.066	0.074	-0.142	-0.025	-0.144
Change in other assets & cash	0.015	-0.004	0.033	0.013	-0.028	0.006	0.014

Source: Authors' calculations based on Central Bank of Egypt data

Note: Real figures of all aggregates were obtained by deflating nominal figures by the CPI index from CAPMAS.

The role of the CBE helps explain this puzzling behavior. During the capital inflow period, the CBE intervened to prevent the domestic currency's appreciation. CBE's foreign currency assets increased from USD 23 billion in June 2006 to USD 48 billion in June 2008. To compensate for this expansion, the banks had to increase their net credit position with the CBE, especially in 2007 and 2008. During the capital outflow periods 2009 and 2011, the banking sector reduced its net credit position with the CBE.

Table 9 also shows a significant expansion of credit to government in FY2009 (21%), accompanied by a change in the banking sector's net credit position with the CBE. This may reflect a countercyclical monetary policy by the CBE who provided liquidity to the banking system to accommodate the government's higher demand for credit. Figure 13 shows the evolution of bank deposits. Until 2008 they grew at a significantly higher rate than the uses of funds. As of mid-2008, they stagnated and growth rates show a close synchronicity with capital flows.

Figure 13- Real Deposits in Local and Foreign Currency

**(in constant EGP)**   **(growth rates in percent)**
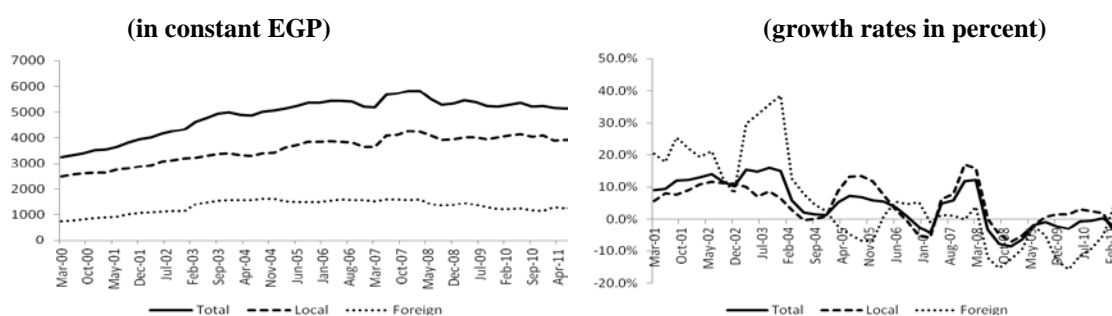
Source: Central Bank of Egypt

From the demand for credit side, two factors typically affect credit expansion and/or contraction, namely the level of economic activity and the availability of alternative funding sources. Egypt's economic activity measured by the real industrial production index was clearly expanding, especially in the period 2002-2008, but then it began to contract (see Figure 14).[17]

The availability of alternative funding sources for firms (captured by the evolution of the stock market index, EGX 30) expanded significantly in the boom period 2004 to 2008. During the 2008 global crisis it fell precipitously, recovering again during the renewed capital inflow, and falling again in the recent macroeconomic turmoil (Figure 15).
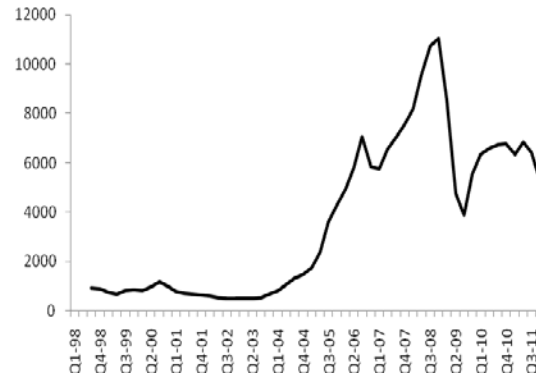
Figure 14- Real Industrial Production	**Figure 15- Stock Market Index - EGX30**
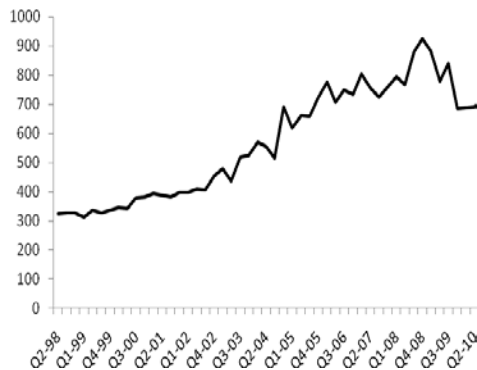
Source: CAPMAS   *Source: The Egyptian Stock Market*
Note: Real industrial production obtained by
deflating nominal figures by the CPI index.

B. Bank credit to the private sector: Why is it falling?

This section explains the observed decline in credit to the private sector described in Table 8 based on both credit supply and demand considerations, using a recent paper which estimates private credit supply and demand equations using quarterly data for the period 1998-2011 (Herera, Hurlin, Zaki, 2012). The system of equations is estimated both assuming continuous market clearing and allowing for transitory price rigidity entailing market disequilibrium.

B.1 Equilibrium Hypothesis

Following Barajas and Steiner (2002), the identification variables in the demand equation capture the macroeconomic environment that affects credit demand: real industrial production (RIP) and the stock market index (EGX30). The former reflects the business environment and has a positive effect on credit demand; the latter represents an alternative form of financing for Egyptian firms, and should therefore

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[17] Quarterly GDP data is only available starting in 2002, while the industrial production index is available since 1998. The larger degrees of freedom for the econometric estimation explains the choice of this variable.

have a negative impact on credit demand. Real lending rate (RLEN) is added to determine the impact of credit prices on credit demand.

The variables introduced in the supply function measure the banks' ability to supply loanable funds. We constructed an exogenous "lending capacity" (LEND.CAP.) variable which consists of real total deposits minus banks' real reserves. The higher the total deposits, the more the bank will supply credit. By contrast, the higher the reserves, the lower the available loanable funds. Therefore, we expect a positive effect of the lending capacity variable on credit to the private sector.

To capture the trade-off that banks face when lending to the government, we introduced the real T-bill rates (RTBILL) in the supply function. This variable is mostly exogenous to the banking system but affect banks' willingness to lend to the government. The higher the T-bill rates, the more funds banks provide to government and hence the less they can lend to private firms. Therefore, it has a negative impact on credit supply to the private sector. Finally, lending rates (RLEN) were introduced to determine the impact of credit prices on credit supply[18]. Our dependent variable is real credit to the private sector (RCRPV).

The system of equations is:

Supply function:

$$ln(RCRPV)_t = \beta_0 + \beta_1 (RLEN)_t + \beta_2 ln(RTBILL)_t + \beta_3 ln(LEND.CAP.)_t + \epsilon_t \quad (1)$$

Demand function:

$$ln(RCRPV)_t = \alpha_0 + \alpha_1 (RLEN)_t + \alpha_2 ln(RIP)_t + \alpha_3 ln(EGX30)_t + \varepsilon_t \quad (2)$$

with ϵ_t and ε_t the respective disturbance terms.

We ran the regression using different techniques. First, using a seemingly unrelated regression, we estimated the supply and demand system assuming that the disturbances across equations are contemporaneously correlated (Zellner, 1962). Next, we ran it using a multivariate regression. Finally, we used OLS and 2SLS regressions.

Table A1 (Annex 2) summarizes the results using different techniques, all of them yielding similar results. In the demand equation, real industrial production has the expected positive sign while the stock market index has a negative impact on the demand for credit, reflecting its role as a substitute for bank credit. The real lending rate turns out with an unexpected positive sign and statistically significant coefficient.

Concerning the supply function, we found lending capacity to be positively and statistically significant as it relates to the credit supply. The trade-off between the government and the private sector seems to be an important factor in explaining Egypt's credit contraction. The more loans the banks provide to the government, the less they can lend to private firms. Consequently, the coefficient associated with the real T-bill interest rate is negative and statistically significant. Finally, in a supply function we expect a

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[18] Real rates were computed using the Fisher's relation $(1+i) = (1+r)(1+\pi)$ where i is the nominal rate, r the real rate and π the inflation rate. Therefore, $r = (1+i)/(1+\pi) - 1$.

positive impact of credit prices on credit quantities. The real lending rate in fact has a positive and statistically significant impact on credit supply at 1 percent.

B.2 Disequilibrium Hypothesis

It is possible that the market for credit in Egypt does not clear continuosly and hence econometric estimation needs to be adapted accordingly. Since Fair and Jaffee (1972) a large body of literature has been devoted to the econometric problems associated with estimating demand and supply schedules in disequilibrium markets. The main approach consists of using a maximum likelihood (ML) method to estimate a model of the following form:

$$d_t = x'_{1,t}\beta_1 + \varepsilon_{1,t} \qquad (3)$$

$$s_t = x'_{2,t}\beta_2 + \varepsilon_{2,t} \qquad (4)$$

$$q_t = \min(d_t, s_t) \qquad (5)$$

where d_t denotes the unobservable quantity demanded during period t, s_t the unobservable quantity supplied during period t, $x'_{1,t} = \left(x_{1,t}^{(1)} x_{2,t}^{(1)} ... x_{K_1,t}^{(1)}\right)$ is a vector of K_1 explanatory variables that influence d_t, $x'_{2,t} = \left(x_{1,t}^{(2)} x_{2,t}^{(2)} ... x_{K_2,t}^{(2)}\right)$ is a vector of K_2 explanatory variables that influence s_t, β_1 and β_2 are respectively $(K_1,1)$ and $(K_2,1)$ vectors of parameters. The model assumes that d_t and s_t are unobservable at date t whereas $x_{1,t}$ and $x_{2,t}$ are observable. The variable q_t denotes the actual quantity observed at time t. The equation (5) is the crucial disequilibrium hypothesis, which allows for the possibility that the price of the exchanged good is not perfectly flexible and rationing occurs. More generally, equation (5) indicates that any disequilibrium which takes place, i.e. any divergence between the quantity supplied and demanded, results from lack of complete price adjustment. Therefore, on the basis of voluntary exchange the "short side" of the market prevails. Because of the equation (5), the model itself determines the probabilities with which each observation belongs to either supplied or demanded quantities.

Table A2 (Annex 2) summarizes the results using the disequilibrium model, using the same specification as in the previous section.

Decomposing the Predicted Changes in Credit

The estimated models (Tables A1 and A2) can be used to determine the relative importance of demand and supply factors explaining the evolution of bank credit to the private sector in five sub-periods, categorized according to the nature of capital flows: 3 capital inflow periods (July 2001-June 2004, July 2004-June 2008, July 2009-September 2010) and 2 capital outflow episodes (July 2008-June 2009, and December 2010-December 2011). The predicted change is obtained by multiplying the coefficients obtained in the previous section by the change in the explanatory variable throughout the given sub-period. For both supply and demand the change attributable to the lending rate is ignored, to capture shifts in the curves and not movements along them (Barajas and Steiner, 2002).

Table A3 (Annex 2) presents the results for different sub-periods using the equilibrium model.[19] Until July 2008, lending capacity growth is the single most important credit supply factor, whereas after 2009 it is credit to the government (captured by the real T-bill rate). From the demand perspective, both the level of activity and the alternative funding sources switch dominant roles.

During the period July 2004 to June 2008, from the demand side, the availability of substitute funding sources was partially dampened by the positive impact of economic expansion. From the bank credit supply side, moderate growth in credit to the government compensated the equally moderate lending capacity.

During the global crisis (July 2008 to June 2009) a significant capital outflow led to a negative impact of lending capacity, which in turn affected the credit supply. Additionally, the banking sector gave credit to the government. Both made the supply effect dominant during the period. From the demand side, the contraction of economic activity mitigated credit demand but the drying up of alternative funding sources led to higher demand for bank credit from the private sector.

After the June 2009 trough of the global crisis, capital flowed back into the country. Lending capacity continued being a drag on the supply side, but credit to the government (as captured by the effect of the real T-Bill lending rate) became the driver of credit supply. From the demand side, the contraction of economic activity and increased availability of alternative funding sources relieved pressure in the market. Now credit to the government was behind the fall in credit to the private sector.

From the last quarter of 2010 (October) capital started flowing out of Egypt, in tandem with global capital markets, and the January 2011 uprising added an Egypt-specific shock that accentuated the outflow. Lending capacity dragged supply, but credit to the government was again the dominating factor explaining the fate of credit to the private sector. The slowdown in economic activity relieved pressure from the demand side. During this period, expansion of credit to the government accounts for about 85 percent of the predicted total decline in credit, and the slowdown in economic activity accounts for about 15 percent of the predicted total fall in credit.

During the global financial crisis, a significant capital outflow led to a stall in bank deposit growth, which in turn affected the supply of credit to the private sector. Additionally, the banking sector increased credit to the government. Both of these factors contributed to the supply playing a central role during the period. After the trough of the global crisis, capital flowed back into the country and deposit growth stopped being a drag on the supply side, but bank credit to the government continued being the main driver of the fall in the credit to the private sector. Starting in the last quarter of 2010 capital flows reversed, in tandem with global capital markets, and in January the revolution added an Egypt-specific shock that accentuated the outflow. Deposit declines dragged again supply of credit and credit to the government continued to drain resources. During the recent period of macroeconomic turmoil, credit to the government accounted for about 80 percent of the estimated total decline in credit, and the fall in deposits accounted for 5% of the estimated fall in private credit, while the slowdown in economic activity accounted for about 15% of the predicted total fall in credit. The relative importance of these factors

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[19] Given the broadly similar results we report here only the equilibrium results. The disaggregation based on disequilibrium model can be seen in the original paper (Herrera, Hurlin, Zaki, 2012).

contrasts with that of the preceding capital inflow period in which credit to the government accounted for 47% of the estimated fall, while demand factors accounted for a similar fraction of the estimated fall.

III. Sensitivity of bank loan portfolio quality and profitability to aggregate macro shocks

Recent indicators of bank performance in Egypt (see Table 10) show little sign of change over the last three years. This section assesses the expected changes in some of these indicators, particularly in the loan quality, based both on international evidence and recent econometric estimations for Egypt (Love and Turk Ariss, 2012)

Table 10 Financial Soundness Indicators for Egypt's Banking Sector (%)

	FY08	FY09	FY10	FY11	Dec-11
Capital Base to Risk weighted assets	14.7	15.1	16.3	16	15.6
Nonperforming Loans to Total Loans	14.8	13.4	13.6	11	10.9
Loan Provisions to Nonperforming Loans	92.1	100.4	92.5	93.6	94.6
Loans to Private Sector to Loans to Customers	83.9	81	80.5	81	81.1
Return on Average Equity	14.1	13	14.3	14.3	14.3
Loans to Deposits	57.7	52.7	51.8	49.5	50

Source CBE

A.   International evidence: Back of the envelope calculations

So far the recorded NPLs have not increased, which is surprising given the output contraction and the growth stagnation registered after the revolution. Given the growth prospects and uncertainty over the political panorama, we use the following results from previous studies to examine what would be the expected results in Egypt, based on international evidence:

- A 2.7 percentage point adverse shock to GDP causes NPL to increase by 0.4 percentage points in the first year and 1.7 percentage points by the fourth year (Nkusu, 2011). This result is for the banking system of 26 developed economies.

- A temporary decrease of 3 percentage points in GDP would increase NPLs by 0.3 to 1.1, depending on the initial level of NPL (Espinoza and Prasad, 2011).

- A shock of 4 percentage points to growth increases NPL by 4.7 percentage points (World Bank, 2001a). These results are for a single case study (Mexico) rather than a panel of countries.

- A change of one percentage point in growth will change the NPL ratio by 1 percent[20] (Dashh and Kabra, 2010). This result is for India, a single case study.

- In Guatemala, a 4 percentage point shock to growth implied a change of 12 percent in bank capital to absorb the losses (World Bank, 2001b)

The above results indicate that the single country studies (Mexico, India, and Guatemala) seem to report larger sensitivity of the NPL ratio to growth, than the panel studies.

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[20] The dependent variable in this studs the natural logarithm of the ratio of NPL and the explanatory variable is the growth rate (multiplied by 100): the estimated coefficient is -.05.

Though the panel studies control for bank specific information, they do not allow for country heterogeneity. The results of the country case studies show almost a one-to one sensitivity. The panel studies show a sensitivity of about a third of that magnitude The long run developed economies sensitivity, is similar to that reported in the Mexico study, as well as the Indian case, of around 0.6 to 0.7 percentage points of the NPL ratio for each percentage point of growth.

In Egypt, growth fell from 5% (y-o-y) before the revolution to -4% immediately afterwards, and then to 0.4% by the end of 2011. It is expected to stabilize around 0% in the next few quarters, to reach a projected 2% growth in FY12. It would be safe to assume that the magnitude of the shock to growth was of the order of 3 to 4 percentage points.

Hence, based on international evidence, a 4 percentage point growth shock would imply an increase of between 2.5 and 3 percentage points in the NPL ratio in Egypt. Given the time lag shown in the above studies, this is expected to happen between 15 months (Guatemala, Mexico) to 36 months (GCC, developed economies). Given total loans of the banking system of about LE 470 billion, that would imply additional NPLs of about LE 14 billion. If a loss-given-default (LGD) ratio of 50% is assumed (following Basel II recommendations for a starting point), then LE 7 billion of additional bank capital would be required to accommodate the expected growth shock; this value is equivalent to 5% of bank capital, reserves and provisions as of June 2011.

B. Estimating the impact using Egyptian data

A recent paper (Love and Turk Ariss, 2012) analyzes the Egyptian bank's sensitivity to macroeconomic shocks using firm-level annual financial data on all banks operating in Egypt for the 18-year period between 1993 and 2010 from the Bankscope database. The study classifies financial institutions based on their ownership status: state, domestic private (non-state), and foreign.[21] The study's main variable of interest, loan portfolio quality, is usually proxied in the literature by the ratio of impaired or nonperforming loans to total loans. Given that this variable is missing for most Egyptian banks in the Bankscope database, the paper used instead the ratio of reserves for impaired loans to total loans.

The paper used two complementary methods to assess macro-financial linkages in Egypt. First, it checks for persistence in the deterioration of loan quality following an aggregate shock using both static and dynamic multivariate specifications that investigate the determinants of loan quality. Then it uses a Panel Vector Auto Regression (PVAR) to assess the extent to which macroeconomic shocks affect the banking sector, capturing feedback effects that may not be identified from the first methodology. Results are similar, and we focus on the second methodology given that allows examination of interactions across all the variables.

Using the GMM method, a negative growth shock of 4 percentage points is expected to deteriorate loan quality between 2 and 3 percent of total loans. A USD 20 billion capital outflow shock could have an impact equivalent between 5 and 8 percentage points of total loans. And a rise in interest rates of 5

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[21] There are three state commercial banks in Egypt (Banque du Caire SAE, Banque Misr SAE, and National Bank of Egypt) and three specialized state banks (Egyptian Arab Land Bank, Industrial Development & Workers Bank of Egypt, and Principal Bank for Development and Agricultural Credit). An additional commercial bank used to be state-owned (Bank of Alexandria), but it was privatized in 2006 through a sale to a foreign bank.

percentage points could imply a deterioration of loan portfolio quality of between 4 and 7 percentage points.

The baseline PVAR model includes 3 macro variables and 3 individual bank level variables: the macro variables are the capital flows of the balance of payments, GDP growth, and the interest rate (given by the aggregate lending rate); the micro bank-level variables are loan growth, reserves to total loans (a proxy for loan quality) and ROE (return on equity), a measure of bank profitability. The baseline PVAR ordering is: Capital Account, GDP growth, Interest rate, Loan Growth, Reserves, ROE.

The estimated impulse-response functions by Love and Turk-Ariss (2012) show that a one standard deviation shock to the capital flows (equal to 2.7 billion USD) is associated with a 1.3% decline in the reserve provisions over total loans. A one standard deviation positive shock to GDP growth (equal to 1.3%) will translate into about 1.1% decrease in reserves (improvement of loan quality) over total loans. Finally, a one standard deviation positive shock to interest rates (equal 1.7%) results in an increase in reserves (deterioration of loan quality) of about 0.4%.

With these results from the estimated impulse response functions, one can gauge the expected impact of the macro shocks on the Egyptian banking sector since the revolution. For instance, given a growth shock of 4 percentage points (equivalent to 3 standard deviations, according to the Love and Turk Ariss paper), the expected deterioration in loan quality would be of the order of 3 percentage points (of total loans). This impact is very similar to the one estimated using the GMM method and to the back-of-the-envelope calculations based on international evidence described in the previous section. To estimate the impact of such change on bank capital, we need a loss-given-default (LGD) ratio. Given data unavailability we adopt the 50% ratio recommended by Basel II, which would imply losses equivalent to 1.5 percentage points of loans. In June 2011, the ratio of loans to bank capital (including reserves and provisions) was 3.5, hence the expected losses of the banking sector would be equivalent to about 5 percentage points of the existing level on that date.

The magnitudes are similar for ROE. Thus, one standard deviation shock to the capital account results in 1.12% increase in ROE, a one standard deviation shock to GDP growth results in about 0.66% increase in ROE and a one standard deviation shock to interest rates results in 0.88% decline in ROE. The increase in interest rates that has taken place in Egypt is expected to have a negative impact on ROE, based on historical experience.

The variance decompositions for the baseline PVAR model shows that the macro variables account for about the same fraction of total explained variance in the loan quality indicator. Hence, these results reflect the importance of the macro environment on the bank profitability and loan quality variance, though individual bank characteristics account for a similar fraction of the explained variance.

IV. Conclusions and implications for policy

The main challenge for policymakers in Egypt is to design a framework that ensures functional independence of the central bank. This implies that better coordination between fiscal and monetary policy is needed to anchor expectations. This independence is needed to ensure the central bank's ability to influence inflation expectations and maintain them within the inflation target range. To achieve this,

the policymaking framework must ensure that expectations of fiscal events, which are exogenous to the CBE, are not incompatible with price stability. Hence, a mechanism that contains fiscal expectations within certain bounds is a necessary element of an economic policy framework.

There are different types of fiscal commitment mechanisms, and it would be worthwhile that Egypt explores this policy option. Fiscal rules are useful mechanisms, and developing countries have used them with varying degrees of success. Brazil, Chile, and Colombia have used them with relative success, in spite of the differences in the legal frameworks. To pave the way for this medium term objective, the fiscal reform agenda of the immediate future must take great strides in the areas of transparency in the fiscal reporting and ensuring comprehensiveness of the budget. Without these two, no fiscal commitment mechanism will work, and any fiscal adjustment will be sub-optimal because the full spending and revenue envelopes are not known to the decision makers.

This paper showed that despite the contracting demand for credit, credit to the government provides an alternative use of funds to the banking sector that accounts for the major part in the decline of credit to the private sector. Hence, fiscal adjustment will imply credit flowing back to the private sector.

To expedite the transition, the bank's exposure to the government risk, especially of public and specialized banks, could be limited to a specific level. For instance, in Brazil, the limit for credit operations of banks with sub national governments and state owned companies was set at 45% of equity. Currently in the US, law restricts the amount of exposure banks can have to a single counterparty to 25% of their regulatory capital. Recently the UAE central bank set new limits of 100% of the capital base for all lending by a bank to governments of the seven-member UAE federation and their non-commercial entities, and 25% to individual borrowers. In Mexico, similar regulation was adopted, but was conditional on the banks capitalization: banks with capital ratios above 15% will have an exposure limit to single sub-sovereign entities of 40% of their Tier 1 capital, while less capitalized banks at the minimum regulatory level of 8% would have an exposure limit of 12% of Tier 1 capital. In Egypt, the sub-national entities are not major sources of risk, but lending to the national government and SOE should have some cost in terms of the capital adequacy regulation of banks.

As part of the fiscal adjustment process, it is imperative that the government continues reducing the financial repression channels, initiated in 2004. The post office should be exempt from transferring the resources to the NIB, NIB should pay market rates for the funds it uses, and it should charge market rates for the loans and investments it funds. It would be useful to have periodic publications of the post office sources and uses of funds. Transparency in the reporting of NIB lending and investing activities, since it is funded with savings (collected through the post office) and deposits issued by the NBE. Enhance transparency would also lead to more efficient use of public resources, since part of the NIB funding comes from the social security contributions of Egyptian workers.

Mutual fund regulation needs to be improved to measure and quantify the flow of funds into the institutions. The information should be made available to the public. Given the stable and growing importance of these intermediaries in holding public debt, it would be desirable that they all have common valuation practices for their holdings of these instruments.

Banking performance indicators published by the central bank need to be revised. The lack of reaction of the aggregate system shows there might be a problem in the information. Or the effect of the forbearance regulation issues in the wake of the crisis was much larger than anticipated. The publication of the indicators would be more informative with a greater degree of disaggregation, and should at least make the differentiation between public sector and private banks, and the indicators for specialized banks should be made public as well.

Annex 1

Estimation of government's revenues from financial repression and inflation tax

1. *Financial repression*

To measure the amount of revenue that the government extracts from its control over the financial system, we compute the nominal effective interest rates of the government's domestic debt (EDIR). EDIR is calculated as the annual interest payments on central-government domestic debt (INT) as a percentage of the average government domestic debt (DD) outstanding. This is done after excluding the outstanding stock of T-bills and T-bonds from both the total amount of domestic debt (DD) and the interest payments on this debt (INT). The differential (DIFF) between EDIR and the market rate (measured by the average interest rates on one year T- Bills and T-Bonds, 1YRB) is then applied to the outstanding domestic debt (excluding government securities) to obtain the amount of revenues the government extracts from its access to artificially low-cost funds (FRR).

$$EDIR_t = INT_t / \left[(DD_t + DD_{t-1})/2\right]$$
$$DIFF_t = 1YRB_t - EDIR_t$$
$$FRR_t = DIFF_t * DD_t$$

The definition adopted is that of the budget sector, which covers the central administration as well as local governments, in addition to the Public Services Authorities such as the post service, railways and other state monopolies. It does not include the operations of the NIB and SIF.

Demand for Egyptian government debt can be driven by more than the search for high returns. Krishnamurthy and Vissing-Jorgensen (2007)[22] argue that financial-market participants may use T-bonds and T-bills as a mean of secure lending. Hence, beyond the Treasury securities' cash flows, there is a "convenience yield" that makes up for the differential with other market securities. This convenience yield may have both liquidity and security components.

2. *Inflation Tax*
The inflation tax (INFTAX) can be estimated as:

$$INFTAX_t = \pi_t (DD_{t-1} + CUR_{t-1} + RES_{t-1}) + (\pi_t - i_{t-1} SD_{t-1})SD_{t-1} + (\pi_t - i_{t-1} B_{t-1})B_{t-1}$$

Where π denotes the GDP inflation rate, DD is demand deposits, CUR denotes currency in circulation outside the banking system. RES denotes the reserves requirements held by commercial banks with the central bank (not remunerated in Egypt), SD is time and saving deposits, iSD is the average interest rate on time and savings deposits, B represent the government non-indexed securities and iB is the average interest rate on government bonds.

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[22] Krishnamurthy, A. and A. Vissing-Jorgensen (2007) "The Demand for Treasury Debt", NBER Working Paper No. w12881

Annex 2

Table A1 - Demand and Supply of Private Credit (Equilibrium Estimation)

	SURE		MVREG		OLS		2SLS	
	Ln(Claim. Priv.)		Ln(Claim. Priv.)		Ln(Claim. Priv.)		Ln(Claim. Priv.)	
	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand
Real Lending Rate	1.721***	0.892***	1.721***	0.892***	2.509***	0.788***	2.509***	0.788***
	(0.327)	(0.212)	(0.343)	(0.222)	(0.391)	(0.235)	(0.391)	(0.235)
Real T-bill Rate	-0.958***		-0.958***		-1.892***		-1.892***	
	(0.335)		(0.351)		(0.431)		(0.431)	
Ln(Lending Cap.)	0.198***		0.198***		0.241***		0.241***	
	(0.0584)		(0.0612)		(0.0658)		(0.0658)	
Ln(Industrial Prod.)		0.249***		0.249***		0.378***		0.378***
		(0.0523)		(0.0548)		(0.0622)		(0.0622)
Ln(EGX 30)		-0.0397***		-0.0397***		-0.0785***		-0.0785***
		(0.0121)		(0.0126)		(0.0155)		(0.0155)
Constant	6.165***	6.566***	6.165***	6.566***	5.776***	6.044***	5.776***	6.044***
	(0.497)	(0.285)	(0.521)	(0.299)	(0.560)	(0.328)	(0.560)	(0.328)
Observations	45	45	45	45	45	45	45	45
R-squared	0.458	0.491	0.458	0.491	0.517	0.560	0.517	0.560

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2- Demand and Supply of Private Credit (Disequilibrium estimation)

Equations	Estimates
Supply equation	
Constant	6.6444***
	(7.2737)
Real lending rate	2.7062***
	(4.5826)
Real T-bill rates	-2.1912***
	(-3.8632)
Ln(Lagged lending capacity)	0.1387*
	(1.2887)
Variance of residuals	0.0564***
	(48.308)
Demand equation	
Constant	4.7733***
	(9.5659)
Real lending rate	0.7455
	(1.1246)
Ln(Lagged real industrial production)	0.6378***
	(9.7747)
Ln(Lagged stock market index)	-0.1127***
	(-8.4481)
Variance of residuals	0.0066***
	(187.20)
Log-likelihood	-84.0863
Adjusted R²	0.4750
Frequency of supply regimes (FS)	22.22%
Frequency of demand regimes (FD)	77.78%
Akaïke Information criteria	-252.41
Schwarz Information Criteria	-234.34

Notes: Asymptotic t-statistics are in parentheses.

Table A3- Decomposition of Predicted Change in Real Credit (Equilibrium Hypothesis)

Supply

	Coeff	Growth					Multiplication				
		Jul 01- Jun 04	**Jul 04- Jun 08**	**Jul 08- Jun 09**	**Jul 09- Sep 10**	**Oct 10- Jun 11**	**Jul 01- Jun 04**	**Jul 04- Jun 08**	**Jul 08- Jun 09**	**Jul 09- Sep 10**	**Oct 10- Jun 11**
Real Lending rate	2.509	-1.5%	-1.1%	-4.1%	2.1%	0.6%	-3.76%	-2.66%	- 10.35%	5.18%	1.50%
Real Tbill rate	-1.892	-1.3%	-0.8%	-4.2%	2.9%	3.6%	2.40%	1.43%	7.99%	-5.56%	-6.78%
Ln(Lend. Cap.)	0.241	11.5%	5.3%	-5.9%	-1.6%	-2.6%	2.78%	1.27%	-1.42%	-0.39%	-0.63%
Shifts in the curve[1]							**5.18%**	**2.70%**	**6.56%**	- **5.95%**	**-7.41%**
Total changes in Supply[2]							**1.42%**	**0.04%**	**-3.79%**	- **0.78%**	**-5.91%**

Demand

	Coeff	Growth					Multiplication				
		Jul 01- Jun 04	**Jul 04- Jun 08**	**Jul 08- Jun 09**	**Jul 09- Sep 10**	**Oct 10- Jun 11**	**Jul 01- Jun 04**	**Jul 04- Jun 08**	**Jul 08- Jun 09**	**Jul 09- Sep 10**	**Oct 10- Jun 11**
Real Lending rate	0.788	-1.5%	-1.1%	-4.1%	2.1%	0.6%	-1.18%	-0.84%	-3.25%	1.63%	0.47%
Ln(Industrial Prod.)	0.378	12.9%	10.1%	-4.2%	-7.0%	-3.2%	4.86%	3.81%	-1.60%	-2.64%	-1.21%
Ln(EGX 30)	-0.079	21.5%	81.3%	-40%	21.7%	-7.5%	-1.69%	-6.38%	3.13%	-1.71%	0.59%
Shifts in the curve[3]							**3.18%**	**-2.57%**	**1.53%**	**-4.35%**	**-0.62%**
Total changes in Demand[4]							**1.99%**	**-3.41%**	**-1.72%**	**-2.72%**	**-0.15%**
Estimated Total shifts in Supply and Demand[5]							**8.35%**	**0.13%**	**8.10%**	- **10.30%**	**-8.03%**
Estimated Total changes Private credit[6]							**3.41%**	**-3.37%**	**-5.51%**	**-3.50%**	**-6.06%**
Observed Total changes Private credit[7]							**4.16%**	**-0.29%**	**-5.70%**	**-6.13%**	**-7.13%**

Source: Constructed by the authors using the regressions results.

Notes:

1= change in real T-bill rates + change in lending capacity.

2= 1 + change in lending rate

3= change in industrial production and stock market index

4= 3+ change in lending rate + change in T-bill rate

5=1+3

6= 2+4

7= observed change in claims on private sector.

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