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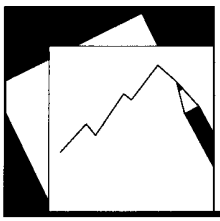

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Inflation Targeting in Georgia: Are We There Yet?

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Inflation Targeting in Georgia: Are We There Yet?

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Abstract

This paper evaluates whether Georgia is ready to adopt inflation targeting (IT), a monetary policy framework that several emerging markets have adopted recently. After reviewing selected prerequisites for successfully implementing IT, the paper focuses on whether one specific precondition is in place—an empirically stable monetary transmission mechanism. Building on a baseline VAR model, it presents several extensions to explore the various channels using causality tests, impulse responses, and variance decompositions. The paper finds that once the central bank overcomes some institutional and operational weaknesses and establishes a more reliable transmission mechanism, it could adopt IT over the medium term.

JEL Classification Numbers: O53, E4, E5

Keywords: Georgia, monetary transmission mechanism, inflation targeting, monetary policy

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I. INTRODUCTION

Since the early 1990s, inflation targeting (IT) has become a popular choice of monetary policy regime, with more than 20 countries—including at least 13 emerging markets—now adhering to this framework. IT has gained popularity since the successful introduction of this regime in developed countries, including New Zealand, Canada, United Kingdom, Sweden, and others. Countries have adopted IT under many different circumstances, ranging from a well-planned switch from a different policy regime (New Zealand, Canada) to the solution of a currency crisis (United Kingdom). The growing number of countries that target inflation and the perceived success of this monetary policy strategy encourage countries that engage in other regimes—such as monetary or exchange rate targeting—to shift to IT or to consider seriously such a shift in the near future. At the same time, it raises the question of how to evaluate whether a country is ready to join the group of inflation targeters.

The by now vast literature on IT has singled out several prerequisites that should be in place for a successful implementation of this framework. These prerequisites include but are not limited to: (at least instrument) independence of the central bank; no fiscal dominance; a single, well-defined target; a high degree of transparency and accountability of the central bank; a good inflation forecasting model; sufficiently deep financial markets combined with limited dollarization; and a stable feedback mechanism from the policy variable to inflation via the monetary transmission mechanism. Whereas most of these elements can be implemented rather quickly, the last three—and in particular the link between interest rates and inflation, the interest rate channel of monetary policy—are of an evolutionary nature, especially in emerging markets and transition economies.

In this paper, we analyze whether Georgia at its present level of economic development is ready for the adoption of IT. Without intending to be exhaustive, this paper reviews some of the prerequisites listed above in the Georgian context and investigates what measures can be taken in order to either move closer to IT—or improve monetary policymaking in general.[2] With regard to the monetary transmission mechanism, we explore whether the Georgian central bank has, via its existing monetary instruments, sufficient control over price developments to wholeheartedly commit to a binding target for inflation.

We find that Georgia is not yet ready to successfully implement IT. The NBG still suffers from some institutional weaknesses—e.g., a multiplicity of potentially conflicting goals—and de facto implementation sometimes falls short of the de jure institutional environment. Moreover, monetary policymaking is hampered by the lack of a reliable indicator of the monetary stance—a short-term interest rate. Finally, the empirical investigation of the monetary transmission mechanism highlights the importance of the exchange rate channel for real activity and the link between monetary aggregates and the price level in Georgia.

[2] Dabla-Norris and others (2007) provide a complimentary discussion of some of the issues that we sidestep in this paper.

The paper is organized as follows. In the next section, we give a brief review of Georgian monetary policy since the mid-1990s. In Section III, we discuss the extent to which certain elements and preconditions of IT are already in place and focus on understanding the monetary transmission channels as a prerequisite for successful inflation targeting. In Section IV, we evaluate empirically the relationship between monetary policy instruments, inflation, and output, extending a baseline model to account for various transmission channels. Section V offers some conclusions and policy recommendations for the successful conduct of monetary policy in Georgia.

II. BACKGROUND: MONETARY POLICYMAKING IN GEORGIA SINCE 1995

The National Bank of Georgia (NBG) was established in 1991, shortly after Georgia declared its independence from the Soviet Union. Georgia was still part of the Ruble zone, however, and the NBG had no authority to issue its own currency, relegating the central bank to an executing institution without policymaking responsibility. Moreover, the core functions of the NBG were not clearly stated—it had to conduct anti-inflation policy and promote the "equilibrium development of the economy" and economic activity. After the supply of rubles was suspended by the Russian central bank in April 1993, a temporary monetary unit—the coupon—was put into circulation.

In June 1995, a new *Organic Law of Georgia on the National Bank of Georgia* was adopted (henceforth, NBG law). Under this law, the NBG is independent in implementing monetary and exchange policies and bank supervision, as well as dealing with foreign reserves and acting as the fiscal agent for the government.[3] Its objectives are "to achieve and maintain the purchasing power of the national currency, and price stability, and to ensure the liquidity, solvency and market-based stable functioning of the financial and credit systems of Georgia." In other words, the NBG is committed to three objectives, of which two in particular could prove incompatible—price and exchange rate stability. In the context of maintaining price stability, the NBG intends to conduct monetary policy to provide a noninflationary supply of money and foster a gradual increase of monetization of the economy, consistent with economic growth and demand for money.

The NBG has, at least in principle, a satisfactory range of monetary instruments at its disposal. To manage liquidity in the banking system, the NBG can take advantage of several instruments: (i) foreign exchange interventions; (ii) open market operations, both intervening in interbank credit auctions and more rarely (inverse) repurchase operations with commercial banks; (iii) standing facilities such as attraction of deposits from commercial banks and issuance of overnight loans with a view to provide a daily interest rate; (iv) issuance of central bank securities; and (v) minimum reserve requirements on lari and foreign currency-denominated deposits at commercial banks.

[3] See the next section for a more thorough discussion.

However, the efficiency of the NBG's monetary instruments is hampered by high dollarization and shallow financial markets. Notwithstanding a recent decrease, dollarization of commercial bank deposits and lending is still around 70 percent and the amount of outstanding government securities is negligible. The gradual securitization of the government debt held by the NBG—approximately 6 percent of GDP—at maturities of 15 to 60 months will increase the NBG's portfolio of marketable securities and enable the NBG to significantly expand its use of open market operations.

In implementing its monetary policy, the NBG is gauging a variety of indicators of inflation, including monetary aggregates and the exchange rate. Traditionally, the NBG has monitored various monetary aggregates—such as reserve money (a target under the current arrangement with the IMF), cash in circulation, and broader definitions of money—with a view to gauge inflationary pressures. In addition to the NBG's statutory obligation to maintain the purchasing power of the lari, exchange rate developments also figure prominently in the NBG's considerations in light of the low stock of international reserves in the aftermath of the Russian crisis, the still-high degree of dollarization and the significant share of imported goods in the basket underlying the consumer price index, affecting both the price level directly and, inflation expectations indirectly. As a consequence, the NBG has geared its monetary policy implementation toward maintaining a high degree of exchange rate stability.

After the exchange rate movements experienced over the last decade or so, the NBG is now a good example of "fear of floating." Between early 1999—when the NBG was forced to float the lari in the aftermath of the Russian crisis—and late 2003, the lari continuously depreciated against the U.S. dollar. During this period, the NBG was allowed to intervene on the foreign exchange market exclusively on the purchase side to rebuild its stock of foreign exchange reserves, which was severely trimmed as the NBG defended the lari in the run-up to the 1999 floating. Strong inflows of capital after the Saakashvili administration took office in early 2004 eased the NBG's task, and it almost doubled its reserve holdings between December 2003 and September 2004 in an attempt to prevent the lari from appreciating against the U.S. dollar.[4] The NBG's interventions, however, were not enough to stabilize the exchange rate and the lari started to appreciate, gaining about 15 percent against the U.S. dollar between December 2003 and September 2004.

In September 2004, the NBG's practice of solely purchasing foreign exchange stopped after temporary pressures mounted on the lari to depreciate. Since then, the interventions of the NBG can, in principle, take place on both sides of the market to smooth short-term fluctuations. De facto, however, the NBG has continued to intervene almost exclusively on

[4] The rise in international reserves has been attributed to a variety of factors, including increasing confidence in the Georgian banking system, as well as higher demand for domestic currency due to stronger tax enforcement and legalization of the economy; see IMF (2005), NBG (2005), and Billmeier and Fedorov (2006). More recently, the continued capital inflows are related to the successful privatization program of the remaining state-owned enterprises and other foreign direct investment.

the purchasing side in an attempt to limit the continued appreciation of the lari as it hopes that a broadly stable nominal exchange rate will contribute to developing stronger relations with Georgia's trading partners and attracting foreign investment. At end-2006, the NBG's international reserves had increased almost fivefold compared to end-2003 and the lari had appreciated by another 5 percent against the U.S. dollar since December 2004 while remaining stable in nominal effective terms.

Stabilizing the exchange rate through interventions in the foreign exchange market resulted in high volatility of liquidity conditions. In 2004, the NBG did not sterilize its interventions in the foreign exchange market. Consequently, growth rates of reserve and broad money accelerated and peaked above 40 percent at the end of 2004. Since then, growth rates have subsided somewhat but continued to fluctuate, driven by sizeable capital inflows.

More recently, the increasingly large amount of capital inflows prompted the NBG to step up its attempts to sterilize its interventions in the foreign exchange market. As the last treasury bills originally issued by the Ministry of Finance had fallen due in June 2006, the NBG had to rely solely on credit and deposit auctions. Due to the inflexibility of these instruments—commercial banks are unable to sell their NBG deposits on the secondary market to manage liquidity—the NBG introduced a new tradable monetary instrument, certificates of deposit, in late 2006, to improve the short-term liquidity management. The certificate of deposit (CD) auctions replaced the deposit auctions and by the end of 2006 a total of 51 successful CD auctions had been implemented. Exerting limited upward pressure on interest rates, the NBG thus sterilized almost GEL 300 million, absorbing about three quarters of its interventions on the foreign exchange market over the same period. Moreover, the NBG also benefited from the securitization mentioned above to manage liquidity by selling its holdings of securitized treasury bonds to private investors in December 2006.

III. Selected Elements of IT in Georgia

This paper will not assess in detail the advantages and disadvantages of IT. These issues have been discussed at great length in the vast literature dedicated to inflation targeting.[5] We will instead briefly review some issues that are of particular practical relevance for Georgia—both in case the NBG decides to adopt a full-fledged IT framework over the medium term, but also more generally to enhance monetary policymaking and operations.[6]

Among the basic elements of this particular monetary policy regime, three are particularly relevant in the Georgian context. First, the legal status of the central bank and its interactions with the public need to be consistent with its monetary policy goals, for example the mandate

[5] See, for example, Debelle (1997), Masson, Savastano, and Sharma (1997), and Truman (2003) and references cited therein. Gottschalk and Moore (2001) provide an example of a similar study for Poland.

[6] For a comparative assessment of issues in the transition to a monetary framework focused on controlling inflation in Armenia and Georgia, see the complementary paper by Dabla-Norris and others (2007).

and commitment of a typical IT central bank to the unique target of price stability. Such a legal framework unambiguously communicates to the public that price stability is the priority aim for the central bank and can help anchoring public expectations about future inflation. The second basic element is the setting of the target for inflation in the form of a level or a range for annual inflation, and possibly the introduction of a de facto intermediate target of the monetary policy, in the form of an inflation forecast over a certain horizon.[7] This element also reflects what exactly the monetary authorities deem to be price stability, and represents a yardstick against which the central bank can be held accountable. The final element of an IT regime discussed below in the Georgian context are econometric models to gauge developments of the economy, prices or inflation, and the monetary transmission mechanism.

A. Central Bank Independence, Transparency, and Accountability

In Article 2.1, the NBG law requires the NBG to "achieve and maintain the purchasing power of the national currency, and price stability, and to ensure the liquidity, solvency, and market-based stable functioning of the financial and credit systems of Georgia." To do so, the NBG has reached a considerable degree of de jure independence as it "shall be independent in its operations" and "[n]o legislative or executive body shall have the right to interfere in its activities, except in cases specified by this law" (Article 3.1 NBG law). In its annual *Main Directions of Monetary and Exchange Rate Policies,* the NBG proposes a target (range) for reserve money growth and an inflation estimate (or forecast) for the year ahead which—together with other monetary policy parameters—are approved by parliament.[8,9] This makes the NBG, in principle, instrument, but not goal, independent—a characteristic of many central banks around the world, and a commonly-cited prerequisite for successful IT (Debelle and Fischer, 1994). While the NBG is therefore de jure independent, it served until end-2004 as a source of financing (direct lending) for the government.[10] Moreover, after the strong appreciation against the U.S. dollar and in real effective terms in 2004, the lari exchange rate has gained prominence in the political discussion in line with the statutory obligations of the NBG pointed out above, in addition to the ones laid out in the *Main Directions*. Clarifying unambiguously that the price target takes precedence over the exchange rate target—a prerequisite for successful IT—would necessitate a change in the NBG law. Moreover, the

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[7] See Svensson (1997).

[8] More precisely, the *Main Directions* address "the level of inflation, amount of foreign exchange reserves, the maximum amount of loans anticipated to be extended by the National Bank to the government, the mechanisms of monetary regulations to ensure these parameters, exchange rates and foreign currency regimes and proposed actions for improvements in the regulatory framework and the monetary system" (Article 69.2 NBG law).

[9] There exists, however, the possibility that the Georgian Parliament can ask the NBG to change its monetary strategy (Article 28.2 of the NBG law). This has not happened so far.

[10] In May 2006, Article 57 of the NBG law was modified to outlaw financial assistance to state institutions—contradicting the provision in Article 69.2 on the maximum amount of loans to the government to be spelled out in the NBG's *Main Directions*; see footnote 8.

NBG has been occasionally under political pressure to maintain an overly accommodative monetary stance.

The day-to-day activities of the NBG are quite transparent.[11] Information about the bank's activities is published on a daily basis on the bank's website. This includes the results of the daily Tbilisi Interbank Foreign Exchange trade sessions, interbank credit and deposit auctions (the last one held in August 2006), auctions of NBG certificates of deposit, and, until June 2005, the results of weekly treasury bill auctions. Besides, a wide range of monetary and financial data are published on a regular basis, including effective exchange rate indices (both nominal and real). Moreover, the site contains extensive statistical information, press releases, and a large number of legal documents describing the supervisory framework for monetary and banking activity in Georgia. At the moment, work is underway to develop a new NBG website, which will include a better organized and more extensive statistics section with built-in search possibilities, and an option to convert the output data to different formats.

The NBG has developed several reports, which are published on a regular basis. The first Inflation Report was published in the second half of 2003 and initially three semi-annual editions were prepared. In 2006, the NBG management decided to restart publishing the Inflation Report, and five quarterly editions have been prepared since. The Inflation Report in its new format covers all sectors of the economy, focusing on the inflationary pressures arising in each of them. The Report also includes the forecasts made on the basis of the NBG's inflation model (see Section III.C). At the same time, the NBG recently started to prepare a Financial Stability Report on an annual basis. This report reviews developments in the Georgian economy from the point of view of possible risks to the financial sector. The first Financial Stability Report was published in September 2006, covering the twelve months up to June 2006. Finally, the NBG also produces a Monthly Monetary and Fiscal Report, which is published on the NBG's web site.

In spring, the governor of the NBG presents the NBG's annual report for parliamentary approval, accounting for the activities of the NBG over the past year, inclusive of the goals set in the *Main Directions* issued in the previous year. The annual report consists of three parts—a report on the state of economy, a report on the NBG's operations and activities, and the financial statements of the NBG—and reviews progress toward achieving the targets set out in the *Main Directions* approved by parliament.

B. Definition of the Target

In the *Main Directions*, the NBG publishes also a "forecast" for inflation one year ahead. This estimate cannot be considered as a proper "target," since results from the NBG's shorter-horizon inflation forecast model are augmented by evidence from longer-term

[11] We understand transparency in this context as transparency ex post and not related to the concept of central bank "predictability," a discussion that has arisen in the context of Taylor rules.

structural models and judgmental considerations to form an inflation outlook at the 12-month horizon. During the past decade or so, the NBG's inflation estimate has served as input into parliamentary deliberations, other macroeconomic work done in the government, including in the Ministry of Finance, and to anchor public expectations. While the targets set in the *Main Directions* for reserve money growth have been over- and undershot substantially (except for 2005), the deviation of CPI inflation from its forecasted value contained in the *Main Directions*, was more limited, contributing to a slowly improving public profile of the NBG (Table 1). The document also provides escape clauses in case exogenous supply factors that are beyond the NBG's reach cause the NBG to miss the inflation target.

Table 1. Monetary Policy Targets and Outcomes, 2001–07
(End of period, in percent)

	2001	2002	2003	2004	2005	2006	2007
Targets and estimates							
Reserve money growth	14	8 – 10	8 – 10	16 – 17	18 – 20	25 – 27	20
CPI inflation	6	5	5	5 – 6	5	5 – 6	6
Outcomes							
Reserve money growth	9.9	18.4	13.9	44.3	19.7	19.2	…
CPI inflation	3.4	5.4	7.0	7.5	6.2	8.8	…
Memorandum items							
Real GDP growth	4.7	5.5	11.1	5.9	9.6	9.4	…
Monetization (period average M3/GDP)	10.2	10.7	11.2	13.1	14.7	16.6	…
Commercial bank credit to private sector (in percent of GDP)	7.4	8.3	8.9	9.5	15.0	19.1	…
Deposit dollarization	85.7	84.9	86.1	74.3	71.6	69.6	…

Sources: National Bank of Georgia (NBG), State Department for Statistics; and authors' calculations.

The choice of the price index is fairly straightforward as the most consistent, regularly published, and widely known price index in Georgia is the CPI. The staff of the NBG also calculates a variety of core inflation measures, but so far, they have not been used in policy formulation due to the lack of public awareness—in fact, decisions by the economic agents are usually made on the basis of headline CPI. The use of core inflation in the NBG's public communications could be justified by the fact that by excluding first-round effects of supply shocks that should not be accommodated by monetary policy, the NBG would find it easier to explain certain policy decisions. Therefore, a more active use of core inflation indices in policy formulation and communication would require a public awareness campaign to enhance understanding of the underlying rationale.

Choosing an appropriate target level or range for inflation appears a rather clear-cut task. A vast amount of research has pointed out the cost of intermediate and high inflation.[12] After several periods of high and hyperinflation in Georgia—most notably in the mid-1990s—the Georgian population has developed a distaste for inflation rates beyond the single-digit

[12] See, e.g., Khan and Senhadji (2001).

range. The public's inflation expectations have been also anchored by the fact that 12-month CPI inflation did not exceed 10 percent since the Russian crisis until 2006.

C. Modeling the Georgian Economy

The NBG has taken the lead in developing econometric models in Georgia. The modeling effort includes a macroeconomic model of the economy, a satisfactory model to forecast inflation, and an empirical description of the monetary transmission mechanism—the major challenge for the NBG at this stage and the focus of the empirical part of this paper. Table 2 reviews the status of some of these efforts.

A macroeconomic model of the economy

At present, work is underway in the NBG's research department to develop a general macroeconomic model of Georgia. This simple structural model consists of about ten equations and around 30 exogenous variables. This model is planned to be completed by the second half of 2007 and is expected to improve the forecasting of macroeconomic parameters and the integration of fiscal and monetary data. At the moment, the estimation of separate structural equations has been completed and the NBG research team is working with Dutch consultants on the calibration of the model.

The NBG's inflation forecasting model

The NBG has started to explore the economic linkages in the context of several inflation models and based on a growing number of empirical observations, the NBG research unit expanded an inflation forecasting model developed by Maliszewski (2003). The model represents a simple error-correction system, enabling to test both the long-run cointegrating relationship between prices and other variables of interest and the influence of short-term shocks on inflation. Compared to the original paper, there are some minor differences, such as using seasonally non-adjusted data which lead to more consistent results, and introducing the weighted CPI inflation rate of five major trading partners as an exogenous variable into the VAR.

However, difficulties arose recently in the application of the NBG's inflation model. For instance, due to the aforementioned high level of dollarization and significant dependence of the domestic economy on the U.S. dollar exchange rate, inflation was occasionally found to be borderline exogenous when using the M2 or reserve money in the model. For certain periods, these monetary aggregates were replaced with M3, such that prices were again endogenous to the model, diminishing, however, the clear link between inflation and a narrower definition of money more likely to reflect policy actions.

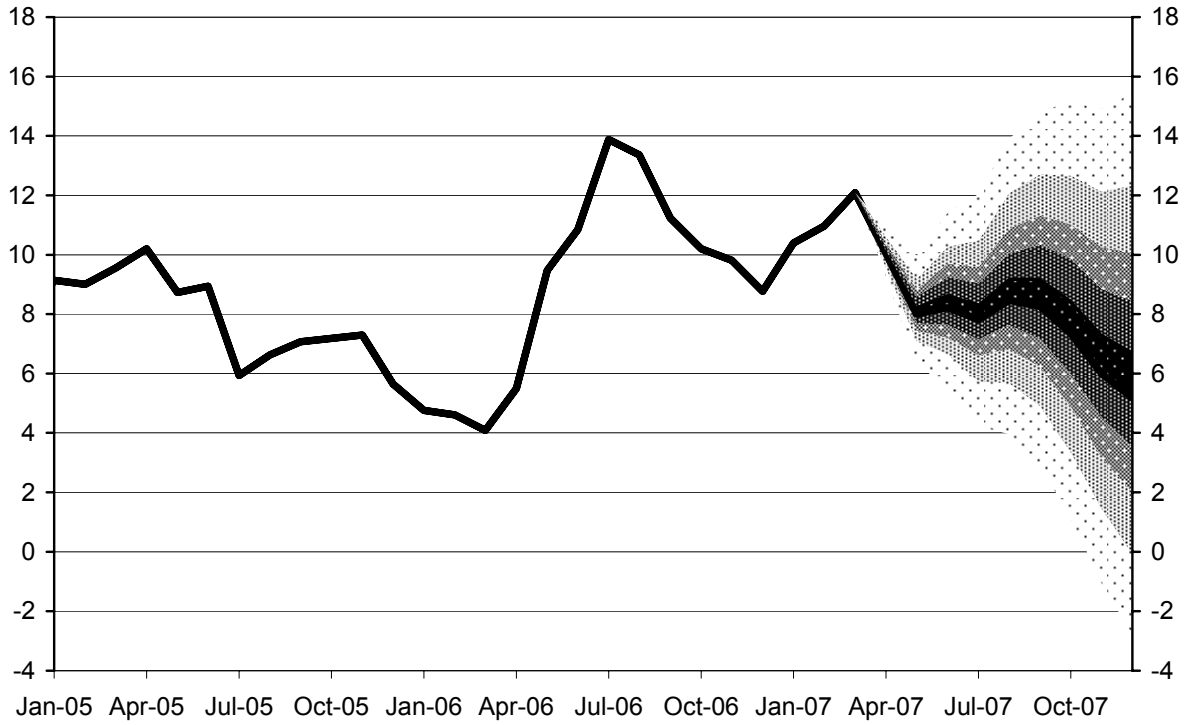
Table 2. NBG Efforts Regarding the Forecasting and Modeling of the Georgian Economy

Issue	Status	Comment
CPI and Core Inflation		
Construction of core CPI	Yes	A variety of different measures of core CPI has been used: median, weighted, and, more recently, certain trimmed measures (excluding price changes that deviate by more than one or two standard deviations from their mean)
Seasonally adjusted estimates of CPI	Yes	X12 ARIMA
Estimate sub-groups of CPI	Yes	Food products, alcohol & tobacco, cloth and footwear, housing, public health, transportation, communications, leisure and culture, education, hotels and restaurants, and miscellaneous goods
Estimate components of domestic CPI	No	
Estimate import component of various item or sub-groups of CPI	No	
Modeling		
Evaluation of monetary transmission mechanism	No	
Analysis of exchange-rate pass through (VAR analysis?)	Yes	Not VAR analysis - simple OLS
Effect of interest, credit and exchange rate channels	No	
Estimates of money demand in Georgia	Yes	A relatively complicated model, using stochastic cointegration. However, hasn't been updated for some time
Inflation forecasting	Yes	Simple error correction monthly model.
Quantitative	Yes	Model uses the following variables: GDP, M2 (M3), Oil prices, CPI, GEL/USD exchange rate, agriculture products prices, seasonal dummies and two dummies for December 1998 (financial crisis) and November 2003 (Rose revolution)
Graphic and numeric	Yes	Fan-chart
Stochastic	No	
How many quarters	2–3	Due to simplicity of the model and large spread of the fan-chart, NBG research unit considers 6–9 month horizon appropriate for inflation forecasting
Estimate of potential GDP	No	
Quarterly structural model (multi-equation)	Underway	
Other		
Business surveys with inflation indicators (wages, profitability, capacity constraints, input and output prices, and inflation	Yes	Banking sector survey regarding expectations on economic development, inflation and exchange rate movements
Household surveys of inflation expectations	No	

Source: NBG.

The forecast horizon is usually six to nine months, and the outcome of the model is given as a fan-chart (Figure 1). The central (darkest) band in the figure shows that at the last inflation forecasting exercise in March 2007, the NBG attached a 10 percent probability to an outcome range of 5.2 percent to 6.8 percent around the central point estimate (of 6 percent). With 30 percent probability, end-year inflation will lie in the three central bands, or between 3½ percent and 8½ percent. The predictive power of the model is hampered by the relatively short time series, a familiar phenomenon in transition countries. For a reasonably high probability, say 70 percent, the forecast band becomes rather wide: between 0 percent and 12.3 percent.

Figure 1. Inflation Forecast Fan Chart, 2005–07
(In percent)



Sources: NBG; and authors' calculations.

The monetary transmission mechanism in Georgia[13]

Traditionally, up to six monetary transmission mechanisms are generally distinguished in a developed small open economy: (i) the bank lending/credit channel; (ii) the exchange rate channel; (iii) the interest rate channel; (iv) the balance sheet channel; (v) the asset price

[13] This section draws on Dabla-Norris and Floerkemeier (2006), who present a more thorough discussion of the various channels in the Armenian context.

channel; and (vi) the expectations channel.[14] All these channels document very specific ways in which the monetary policy instrument (short-term interest rates) can affect the economy:

- The **bank lending (or credit) channel** postulates that a change in the monetary policy stance will have an impact on banks' reserves, and, by implication, on the amount of resources available for lending to the private sector, determining investment opportunities.

- The **exchange rate channel** in an open economy applies to both trade and capital flows. A rise in interest rates would likely be followed by an appreciation of the domestic currency due to higher capital inflows. This directly lowers the domestic price of imported goods, contributing to lower inflation. Indirectly, the reduction of the domestic price for tradable goods encourages the production of nontradables, and the ensuing reallocation of resources has dampening effects on aggregate demand and inflation.

- The direct **interest rate channel** assumes that changes in the *nominal* short-term policy interest rate feed through to banks' interest rates and cause changes in the *real* cost of borrowing, thereby affecting investment, consumption, aggregate demand, and inflation.

- Expansionary monetary policy will appreciate corporate assets via the **balance sheet channel**, leading to higher net worth, creditworthiness, and cash flow, thereby increasing consumption and household investment.

- Higher interest rates may also imply an adverse wealth effect via the **asset price channel**, which could lead to lower consumption, and, again, to lower aggregate demand and lower inflation.

- Moreover, monetary policy actions can drive the **expectations channel**, which—in turn—can have important implications for the behavior of economic agents. The higher the credibility of the central bank, the more effective this channel.

In emerging markets and transition economies, some channels are likely to be underdeveloped, whereas the exchange rate channel has often been found to be crucial in the transmission of monetary impulses.[15] For example, the credit channel is likely to be weak as banks hold excess reserves. An underdeveloped financial system could hamper the working of the balance sheet channel and the asset price channel. On the other hand, high dollarization could reinforce the exchange rate channel.

[14] See, for example, Mishkin (1995).

[15] See, e.g., Coricelli, Egert, and MacDonald (2006) and Juks (2004).

In Georgia, in fact, most of these channels are not yet fully developed, constraining the effectiveness of monetary policy. Credit and interest rate channels are weakened by low financial intermediation and limited interbank activity. At end-2006, monetization (average M3/GDP) amounted to 16.6 percent, whereas private sector credit corresponded to about 19 percent of GDP.[16] Moreover, high dollarization and shallow financial and debt markets also contribute to a feeble link between monetary policy and inflation. Domestic credit denominated in lari amounts to only 5 percent of GDP. Finally, the margin between lending and borrowing rates—although decreasing slowly—still amounts to about 10 percentage points, including due to high overhead costs/inefficient bank size, effective market segmentation, and weak governance. Commercial bank credit displays a low elasticity with respect to interest rates, including due to large holdings of excess reserves at the NBG, which corresponded to 33 percent of total reserves on average in 2006. In the next section, we will focus on the first three channels sketched above as we are constrained by the lack of data for corporate balance sheets, asset prices, and inflation expectations.

As a consequence of the frail monetary transmission mechanism, the connection from the policy stance to deposit rates is somewhat weak and the dampening impact on investment, consumption, and aggregate demand both through the direct interest rate channel and the credit channel are fragile. Interventions on the foreign exchange market continue to be an important tool for monetary policy purposes.

IV. Empirical Analysis

In this section, we examine one of the empirical prerequisites of the inflation targeting regime mentioned above—a solid understanding of the relationship between monetary policy instruments and macroeconomic outcomes via the monetary transmission mechanism. We first present a baseline model, tailored to the Georgian economy and conduct of monetary policy. We then investigate several alternative transmission channels as laid out above by applying causality tests, impulse response functions, and variance decompositions. Where applicable, we relate our empirical results to those in Dabla-Norris and others (2007).

A. The Baseline VAR Model

The baseline model consists of five variables: output (real GDP), the price level (CPI), a measure of liquidity (currency in circulation), the level of international reserves, and the nominal effective exchange rate.[17] The model spans from 1999Q1 to 2006Q4, hence excluding the turbulent years in the mid-1990s and the Russian crisis, for a total of 32

[16]This is inline with other countries in the Caucasus and the CIS more generally except Kazakhstan, but substantially lower than in more advanced transition economies, see Billmeier and Ding (2006).

[17] All variables are in logs.

observations.[18] Given the importance of Russia for the Georgian economy during much of the period under investigation (major trading partner, remittances, etc.) we include Russian real GDP as an exogenous variable in the estimation. Consistent with the NBG's research efforts, the series are not seasonally adjusted.[19] All data were provided by the NBG; the GDP and CPI data were originally compiled by Statistics Georgia.

The main challenge in assessing monetary transmission in Georgia is to find an appropriate measure of the monetary stance. While many countries have established a system that centers around a repo rate or an overnight facility as a monetary policy interest rate, the National Bank of Georgia has, so far, not developed a similar framework although it could, in principle, use standing facilities. Interest rates related to short-term interbank lending could provide an alternative as this market is managed by the NBG, but observations for both 7 and 30-day rates are somewhat patchy. In other words, there is no continuous interest rate that could be used in this context to reflect the monetary policy stance.[20] For this reason, we are considering both the level of international reserves and the currency (or cash) in circulation as indicators that capture both the NBG's activity on the foreign exchange market and the associated change in a tightly controlled monetary aggregate.[21] As detailed above, the NBG has had a long-standing tradition to intervene asymmetrically on the foreign exchange market, largely without sterilizing its interventions. Only recently, the NBG securities issued since September 2006 have served to control market liquidity (see above).[22] By including these two series, we intend to capture the two aspects of the NBG's policy stance—foreign exchange interventions and domestic liquidity management.

Some of the series used are prone to be non-stationary. In fact, augmented Dickey-Fuller tests suggest that the null hypothesis that variables are I(1) or have unit roots cannot be rejected (except for the nominal effective exchange rates at the 8-percent level).[23] We refrain

[18] We experimented with the inclusion of data from the earlier period (1996–98) to gain a few observations, but the volatility introduced by the weak data and economic turmoil did not improve our results, notwithstanding the potential gain in estimate precision.

[19] Results using seasonally adjusted series were broadly similar. Some impulse responses were somewhat smaller and less significant.

[20] Dabla-Norris and others (2007) resort to the lending rate.

[21] While broader monetary aggregates are usually more tightly related to price developments, they also incorporate effects that are not driven by policy decisions, for example changes in velocity. The choice of currency in circulation is also driven by the fact that certain components of broader monetary aggregates are highly volatile and not under the direct control of the NBG.

[22] In the next section, we provide some rudimentary evidence on the interest rate channel.

[23] Traditional unit root tests may have little power to distinguish between unit roots and stationary series in short samples, see the discussion in Dabla-Norris and Floerkemeier (2006).

from conducting a more thorough analysis of long-run cointegrating relationships in light of the short time span (eight years) covered by the data.

As preliminary evidence, Table 3 presents the results of the multivariate and bivariate block Granger causality tests for Georgia. Overall, the results suggest the joint significance of both policy variables and the exchange rate for output and prices. The bivariate tests suggest that the monetary aggregate has a significant Granger-effect on output but not on prices.[24] The NEER has some power in explaining output, consistent with the view that the nominal exchange rate is an important determinant of competitiveness and trade relations. The NBG's level of international reserves, in turn, has some predictive power for prices, which is consistent with the fact that sterilization of foreign exchange purchases was, until recently, rather limited, leading to an increase in liquidity and, in the longer run, to an increase in the price level.[25] Compared to Table 2 in Dabla-Norris and others (2007), we find a similar significant role for currency (or cash) in circulation and the NEER in explaining output. Regarding prices, however, we cannot confirm their result that dropping cash in circulation as an explanatory variable is rejected by the data. This is most likely due to the fact that we include international reserves as an explanatory variable, which, in fact, appears to have strong explanatory power.

Table 3. Granger Causality Tests: Baseline VAR, 1999–2006 1/

Effect on Output	p-value	
Cash in circulation	0.0010	***
International reserves	0.9015	
Nominal effective exchange rate	0.0002	***
Jointly	0.0000	***
Effect on Prices		
Cash in circulation	0.45389	
International reserves	0.01403	**
Nominal effective exchange rate	0.29044	
Jointly	0.0000	***

Source: Authors' calculations.

1/ The block Granger causality test for exclusion of a variable is based on a Wald test and follows a χ^2 distribution; *, **, and *** denote rejection of the exclusion at the 10, 5, and 1 percent level.

[24] Currency in circulation Granger-causes the price level if the real effective exchange rate is included instead of the nominal.

[25] The liquidity effect is clearly visible if other monetary aggregates (e.g., reserve money) are used instead of currency in circulation.

We estimate a reduced-form VAR and identify monetary policy shocks through assumptions about variable ordering (using a lower diagonal, or Choleski decomposition). The VAR representation is given by

$$X_t = A(L)X_{t-1} + B(L)Z_t + \varepsilon_t \tag{3}$$

where X_t is a vector of endogenous variables and Z_t a vector of exogenous variables. In the baseline model, the vector of endogenous variables consists of the real GDP (y_t), the consumer price index (p_t), currency in circulation (cic_t), international reserves (res_t), and the nominal effective exchange rate (er_t).

$$X_t = \left(y_t, p_t, cic_t, res_t, er_t\right)' \tag{4}$$

The variable ordering reflects the degree of endogeneity to current economic conditions and is broadly consistent with other causality tests not reported here. Output is ordered first, as it does not adjust to the other variables within the same quarter, especially not to the variables reflecting the monetary policy stance and the exchange rate. By the same token, prices are ordered second. Next, we order the variables that reflect the monetary policy stance as they could adjust, within the quarter, to output and price developments. In this specification, we take the reserve level to be more endogenous than cash in circulation, implying that the NBG would react on the foreign exchange market to domestic liquidity developments. The exchange rate is ordered last as it adjusts very fast to all sorts of shocks. The results are robust to changing the order of the exchange rate and reserves and currency in circulation and the price level. The vector of exogenous variables, in the baseline VAR, contains Russian GDP as discussed above.

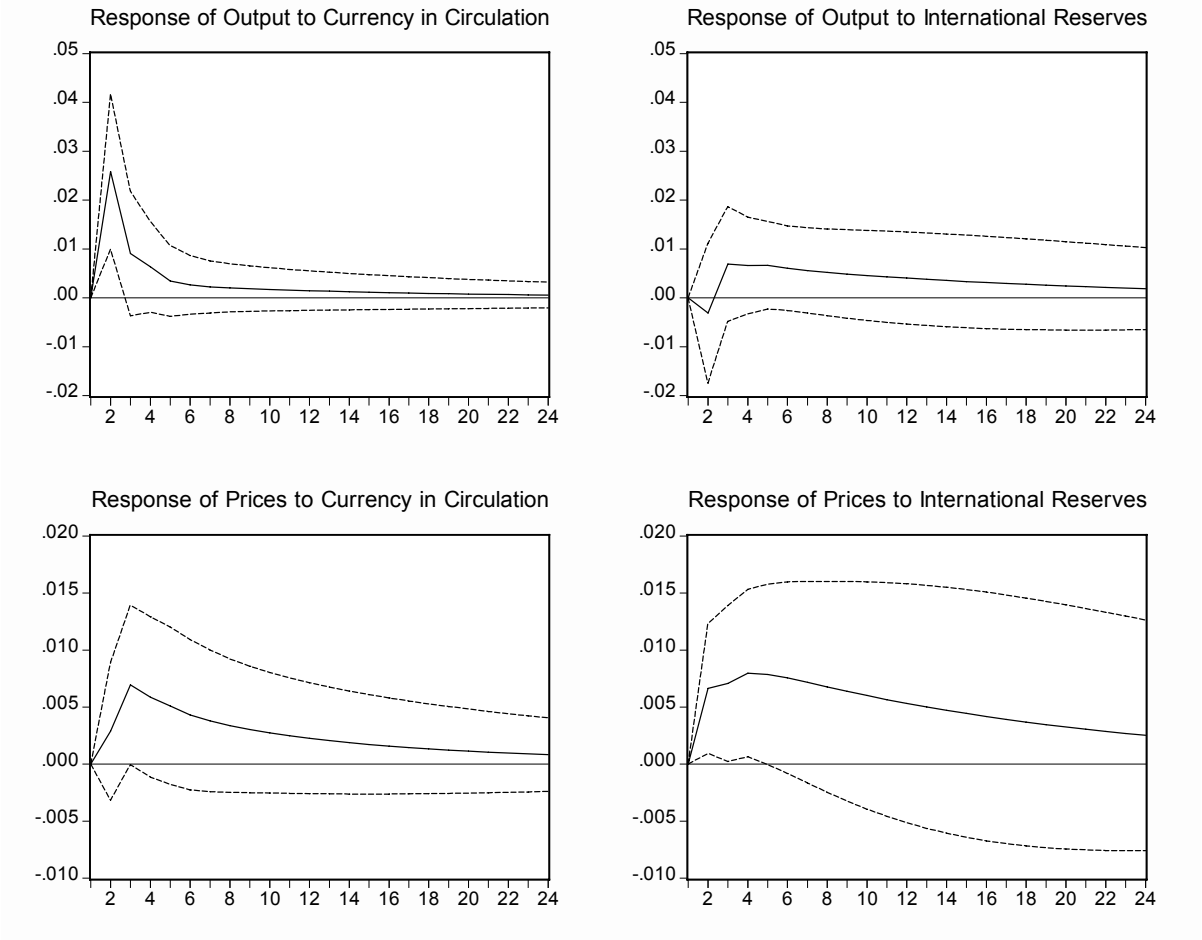
Given the short time series available and the rather large VAR system, a low lag length in the VAR estimation is crucial. We selected one lag for most specifications by testing down the models and deleting lags if they did not result in significant autocorrelations using the Lagrange multiplier test. For some extensions we had to use two lags.

Figure 2 presents quarterly impulse response functions indicating how the policy-related variables affect output and prices as specified in (4), with the dotted lines representing 95 percent confidence intervals.[26] A one-standard deviation shock to currency in circulation (3.2 percent) results in a fast increase of output of about 2½ percent in the quarter following the shock and remains significant for another period. A shock to reserves—reflecting additional liquidity given the NBG's incomplete sterilization—leads to a significant increase in the price level for five quarters. Consistent with the reaction to currency in circulation, the response of output to the shock in reserves is positive except for the initial undershooting.

[26] See the Appendix for a full set of impulse responses.

Prices respond as expected to a shock to currency in circulation, but the response is not significant, consistent with the results in Table 3.

Figure 2. Impulse Responses: Baseline VAR
(Response to Cholesky one standard deviation innovations ± two standard errors)



Variance decompositions for the baseline VAR (Table 4) indicate that although the variance of currency in circulation consistently explains about one quarter of output variability almost right away, output is still chiefly driven by its own variance. The important role of international reserves in our model is clearly visible from the fact that in the medium run, the variance in this variable explains a large share of the variance in prices and currency in circulation. The variance in international reserves and the exchange rate, instead, is best explained by the variables themselves. Compared to Table 3 in Dabla-Norris and others (2007), we are able to confirm the weak role of the exchange rate in explaining the variation of prices. We find, however, that at the two-year horizon, price variation is explained to a similar degree but own shocks as it is by shocks to international reserves, a variable omitted from the analysis in Dabla-Norris and others (2007).

Table 4. Variance Decomposition: Baseline VAR, 1999–2006
(In percent of total variance)

Variance decomposition of Output

Quarters	Standard error	Output	Prices	Currency in circulation	International reserves	Exchange rate
1	0.0403	100.0	0.0	0.0	0.0	0.0
2	0.0510	63.8	0.9	25.7	0.4	9.2
4	0.0536	58.2	1.2	27.5	3.5	9.6
8	0.0561	53.8	2.5	26.0	7.7	9.9
12	0.0576	51.4	3.3	25.0	9.7	10.5
24	0.0595	48.6	4.3	23.8	11.8	11.5

Variance decomposition of prices

Quarters	Standard error	Output	Prices	Currency in circulation	International reserves	Exchange rate
1	0.0165	5.0	95.0	0.0	0.0	0.0
2	0.0215	20.6	67.4	1.8	9.5	0.7
4	0.0274	17.9	48.4	12.1	21.0	0.6
8	0.0342	15.3	37.2	13.8	32.0	1.6
12	0.0379	14.1	33.8	13.2	35.6	3.4
24	0.0424	12.7	30.8	11.9	37.7	6.9

Variance decomposition of currency in circulation

Quarters	Standard error	Output	Prices	Currency in circulation	International reserves	Exchange rate
1	0.0372	9.5	14.3	76.2	0.0	0.0
2	0.0482	11.3	10.5	69.8	7.2	1.1
4	0.0601	11.0	9.5	59.4	18.5	1.6
8	0.0717	11.4	11.0	47.9	28.4	1.3
12	0.0781	11.2	12.1	42.5	32.2	1.9
24	0.0860	10.6	13.3	36.5	35.0	4.6

Variance decomposition of international reserves

Quarters	Standard error	Output	Prices	Currency in circulation	International reserves	Exchange rate
1	0.1332	0.2	0.0	6.5	93.4	0.0
2	0.1633	1.4	3.9	4.6	89.4	0.6
4	0.1991	4.0	9.6	4.0	79.2	3.3
8	0.2420	5.2	12.9	4.9	69.0	8.0
12	0.2659	5.4	13.9	5.0	64.9	10.6
24	0.2931	5.5	14.8	5.0	61.1	13.7

Variance decomposition of exchange rate

Quarters	Standard error	Output	Prices	Currency in circulation	International reserves	Exchange rate
1	0.0430	0.4	26.8	7.6	3.8	61.3
2	0.0496	2.8	23.5	6.5	5.3	61.9
4	0.0580	2.4	20.5	6.1	9.5	61.5
8	0.0662	2.4	19.3	5.0	14.6	58.7
12	0.0701	2.5	19.1	4.6	16.7	57.2
24	0.0739	2.6	18.9	4.3	18.7	55.4

Source: Authors' calculations.

B. The Interest Rate Channel

The argument made above against including interest rates as a monetary policy variable was mainly based on data weaknesses and gaps, with observations for 7- and 30-day interbank lending rates missing occasionally in 2001 and 2002. This implies also that the interest rate channel cannot be assessed in the baseline VAR, as there is no short-term interest rate. To provide further insights into the interest rate channel, we have reconstructed both short-term interest rate series by using directional information from the other series. In other words, we assume that the slope of the yield curve does not change over time.[27] This strategy, together with the fact that the analysis is based on quarterly observations, enables us to fully reconstruct both series. While inclusion of these series in the baseline VAR did not yield meaningful results, we are able to employ these two rates to test for Granger causality in the determination of other interest rates in the Georgian economy—bank lending and deposit rates—to obtain some indirect evidence on the interest rate channel.

Table 5. Granger Causality Tests: Interest Rates, 1999–2006 1/

Effect on Lending Rate	p-value
Deposit rate	0.0172 **
30-day interbank rate	0.0881 *
7-day interbank rate	0.0738 *
Jointly	0.0118 **
Effect on Deposit Rate	
Lending rate	0.0358 **
30-day interbank rate	0.2877
7-day interbank rate	0.4478
Jointly	0.1684

Source: Authors' calculations.

1/ The block Granger causality test for exclusion of a variable is based on a Wald test and follows a χ^2 distribution; *, **, and *** denote rejection of the exclusion at the 10, 5, and 1 percent level.

The evidence presented in Table 5 suggests that the constructed series have some predictive value for the lending rate but none for the deposit rate. More important, the lending and deposit rates are tightly linked by a bi-directional causal relationship, evidence of banks' intent to preserve a stable spread. We interpret this as further evidence of an ineffective interest rate channel, consistent with Georgia's underdeveloped financial markets and the fact that the monetary policy framework is not centered around an interest rate that would signal

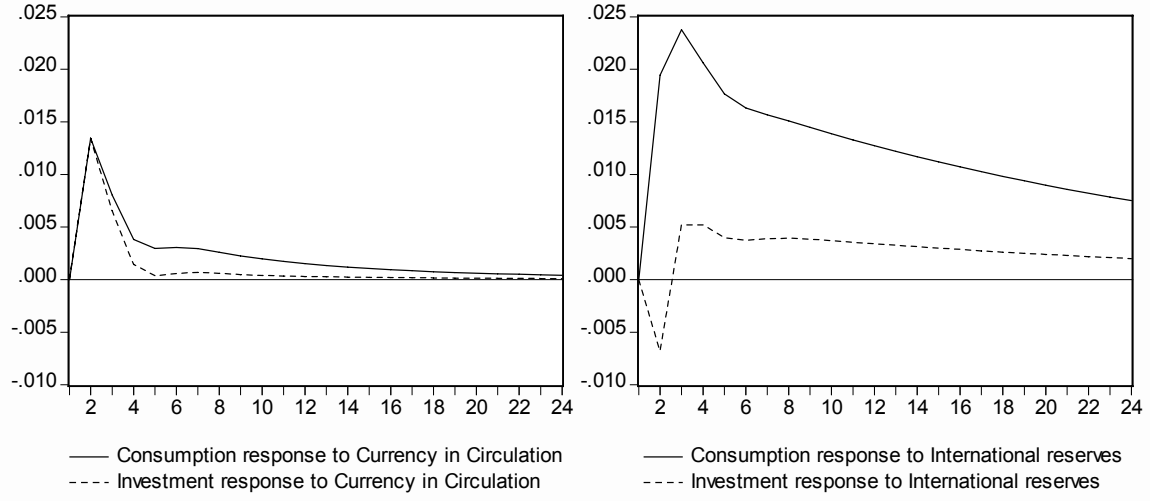
[27] That is, if a monthly observation for the 7-day rate is missing, we assume that it changed in the same direction and by the same amount as the 30-day rate and vice versa.

the monetary stance. Including the reserves level and currency in circulation instead of the constructed short-term interest rates does not yield any significant results.

C. The Real Impact of Monetary Shocks

To distinguish better the real impact of monetary policy shocks, we have replaced output in the baseline VAR with domestic consumption and investment. Consistent with our expectations, expansionary monetary policy (shocks to liquidity via either international reserves or currency in circulation) lead to a positive response of both consumption and investment except for the immediate undershooting effect for the latter. Consumption appears to play a stronger role in the transmission of shocks than investment, especially in response to shocks to international reserves, in line with a high marginal propensity to consume and the weak link between liquidity conditions and bank lending rates highlighted above.

Figure 3. Impulse Responses: Consumption and Investment to Monetary Shocks
(Response to Cholesky one standard deviation innovations)

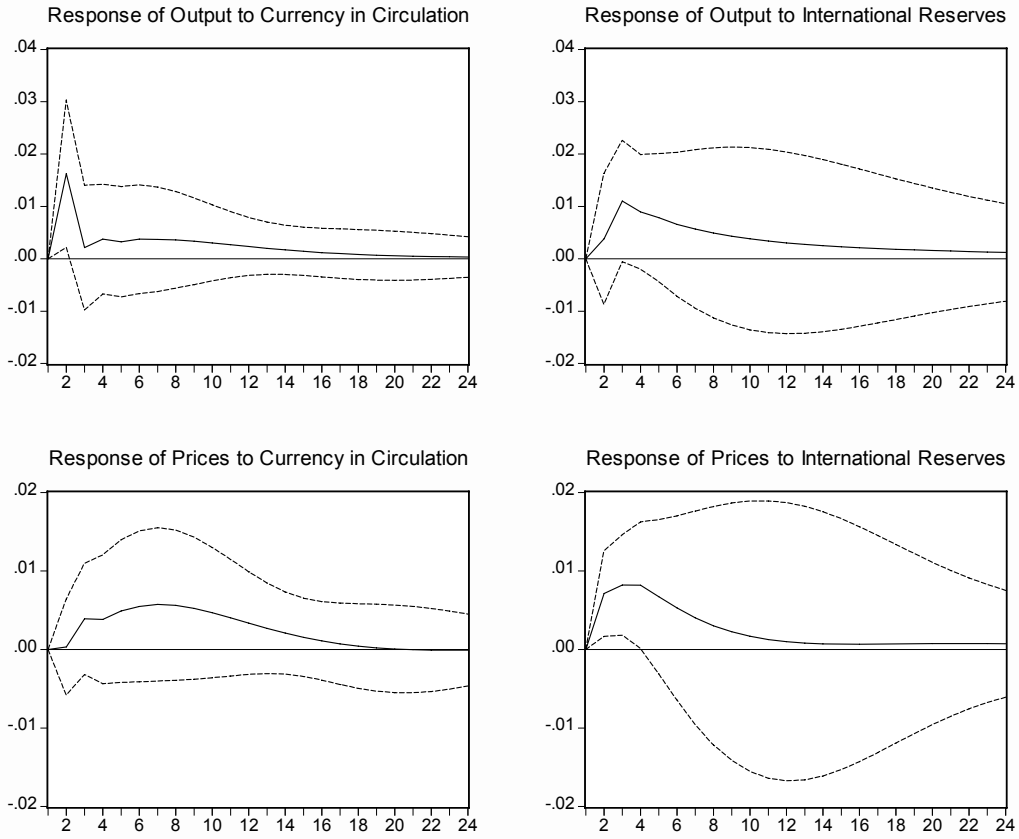


D. The Bank Lending Channel

In light of the recent credit boom in Georgia, understanding the bank lending channel is of particular importance when assessing whether the central bank's activities have an impact on prices and output. To that end, we first tried to include banks' reserves in the baseline VAR (before currency in circulation). The responses of prices and output to changes in currency in circulation and reserves are similar in shape but somewhat less pronounced and largely insignificant (results not reported).

Moreover, we experimented with several real credit aggregates, total private sector credit, credit to households, and corporate credit, ordered before the monetary stance variables.[28] In this specification, we have to exclude 2006 from the sample as the impulse responses diverge due to the enormous growth rates of all credit aggregates in that year. Including total private sector credit eliminates the initial undershooting in the response of output to a shock in reserves (Figure 4). The response of prices to the same shock is more front-loaded with much of the effect dissipated after 12 quarters. Surprisingly, the response of output to currency in circulation is somewhat smaller than in the baseline VAR, and the peak occurs much later (after seven periods instead of three periods in the baseline specification). As in the baseline, however, the responses are not significant.

Figure 4. Impulse Responses: Baseline VAR And Private Credit
(Response to Cholesky one standard deviation innovations ± two standard errors)



A simple way to discern the importance of the bank lending channel is to shut the transmission down by including the variable in Z_t, the vector of exogenous variables, as

[28] Credit aggregates were deflated with the GDP deflator. The results are qualitatively robust to ordering the credit aggregate after currency in circulation.

opposed to X_t.[29] Figure 5 presents the results for output responses with active and inactive credit channels. In each chart, we have included responses of output to a change in international reserves and in currency in circulation with and without the channel at work. Figure 6 presents the results for the price level in the same manner.

Figure 5 (right panels) documents that an active credit channel dampens the response to output to currency in circulation, but enlarges the response to a shock to international reserves, in both cases by about one third. Other than the difference in peak magnitude, the responses to currency in circulation are rather similar whether the credit channel is active or not, whereas the responses to reserves shocks are clearly distinct over the entire horizon, and dissipate much earlier. When decomposing the credit channel into household and corporate lending, it appears that an active corporate lending channel (left panels) dampens output response to both liquidity shocks. We explain this somewhat counterintuitive result with the fact that corporate lending in Georgia before 2006 (which we dropped from the sample) was anemic and may, in fact, have had a spurious negative reaction to such a shock. When active, both sub-channels work in the same direction (dampening effect) with regard to shocks to currency in circulation, whereas they have opposite impact in the case of the responses to international reserves.

Price responses (Figure 6) convey a somewhat different picture. An active credit channel enhances price responses to reserve shocks on impact, but dampens the response after about two years and dissipates largely after three years. In response to a shock to currency in circulation, however, an active credit channel limits the effect on prices.

[29] See Baqir (2002).

Figure 5. Impulse Responses: Ouput With Credit Channels Active/Inactive
(Response to Cholesky one standard deviation innovations)

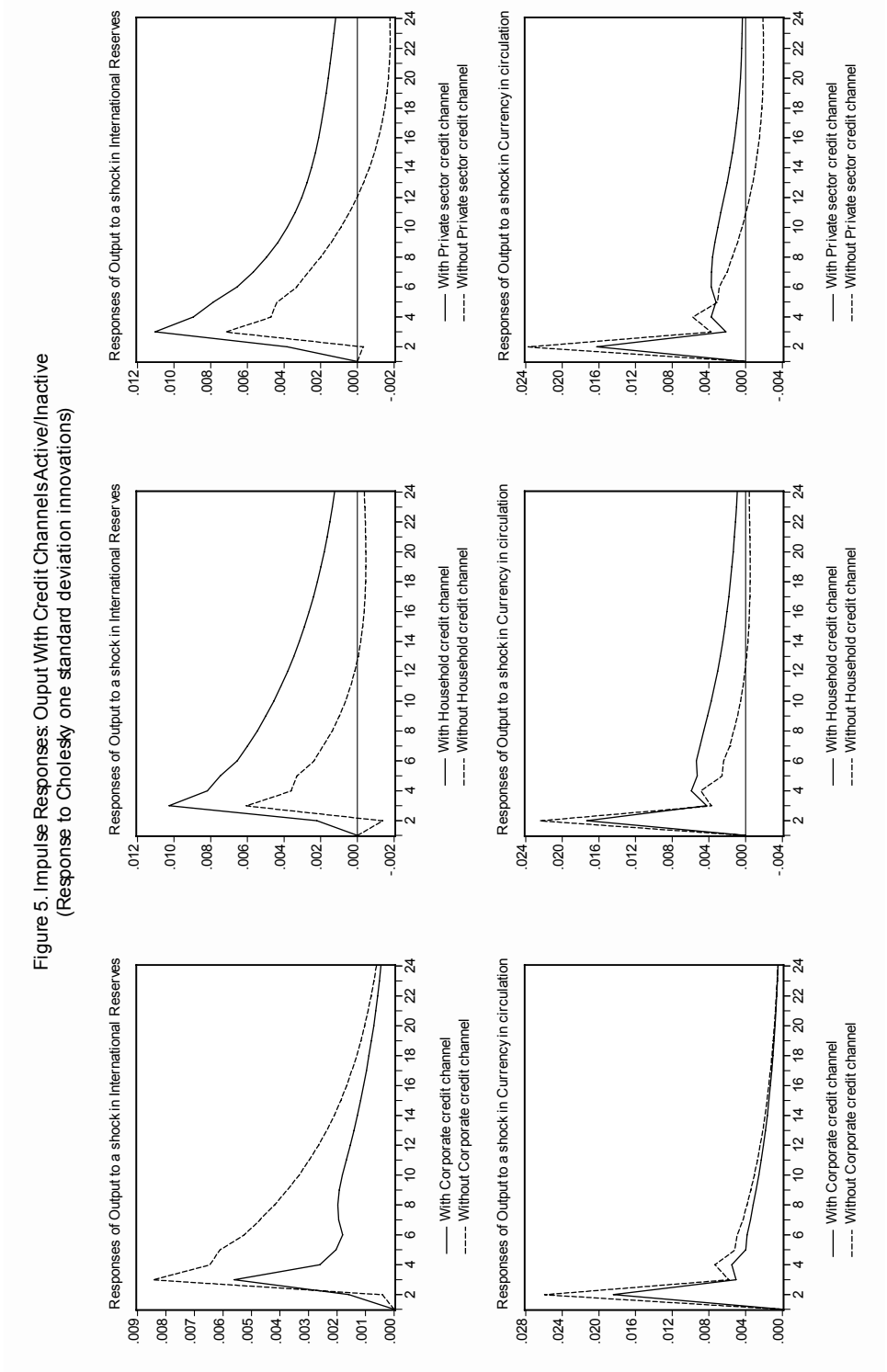
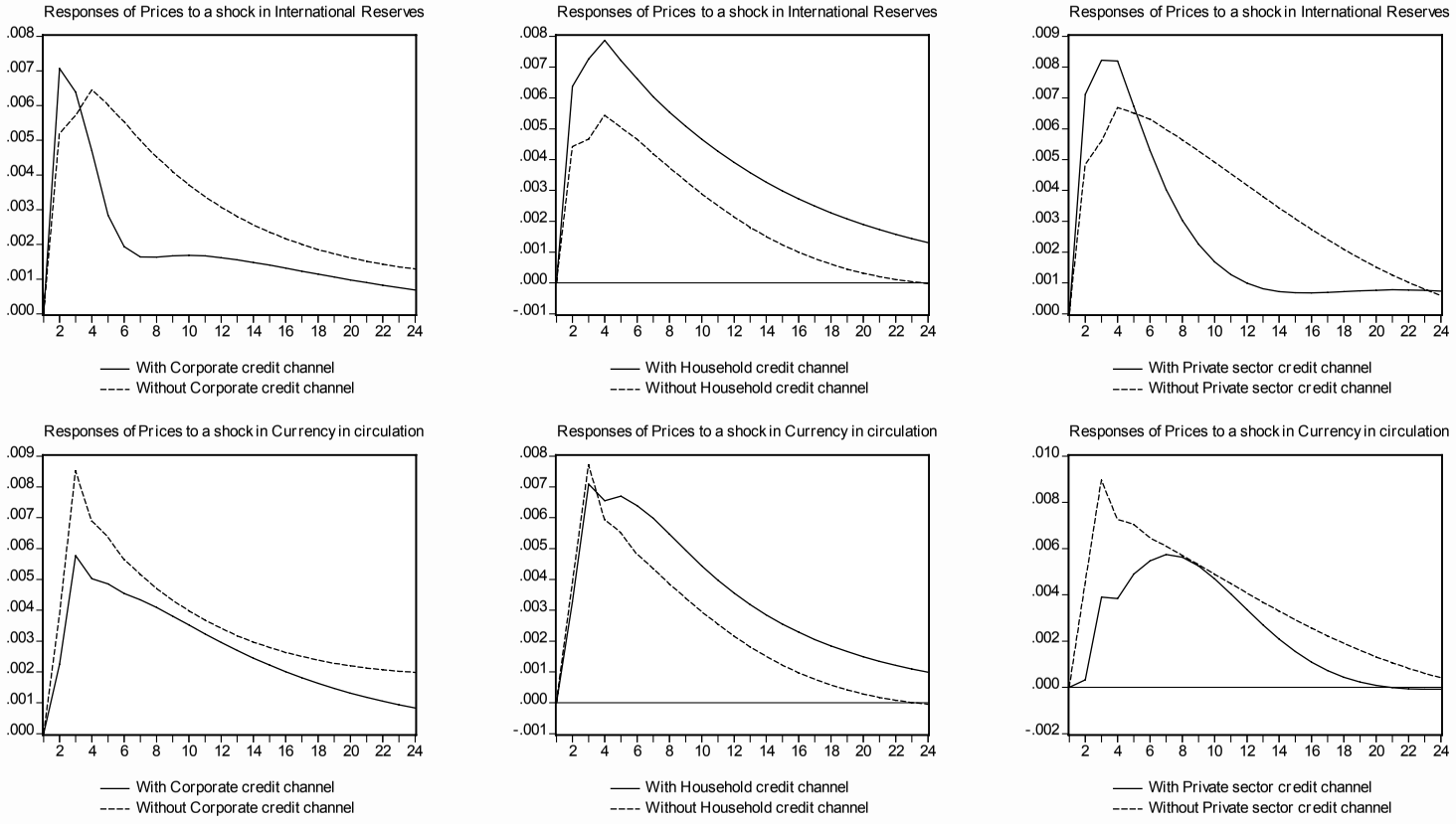


Figure 6. Impulse Responses: Prices with Credit Channel Active/Inactive
(Response to Cholesky one standard deviation innovations)



E. The Exchange Rate Channel

Similar to the previous section, we tried to assess the importance of the exchange rate channel by comparing the output and price responses with active and inactive exchange rate channels, using both the nominal (contained in the baseline VAR) and the real effective exchange rates. The results are presented in Figures 7 (for output) and 8 (for prices). While most output responses are larger when the exchange rate channel is active—whether in nominal or real terms—only the nominal effective exchange rate channel in response to an international reserves shock introduces a marked difference (top left chart). In fact, the exchange rate channel is responsible for the initial negative reaction found in the baseline scenario (see Figure 2, top right panel). Similarly, the response of prices to a shock in the NBG's stock of international reserves (Figure 8, top left panel) is enhanced by the NEER channel (and becomes borderline significant for about 5 quarters, see Figure 2, bottom right panel).

Figure 7. Impulse Responses: Output with Exchange Rate Channels Active/Inactive
(Response to Cholesky one standard deviation innovations)

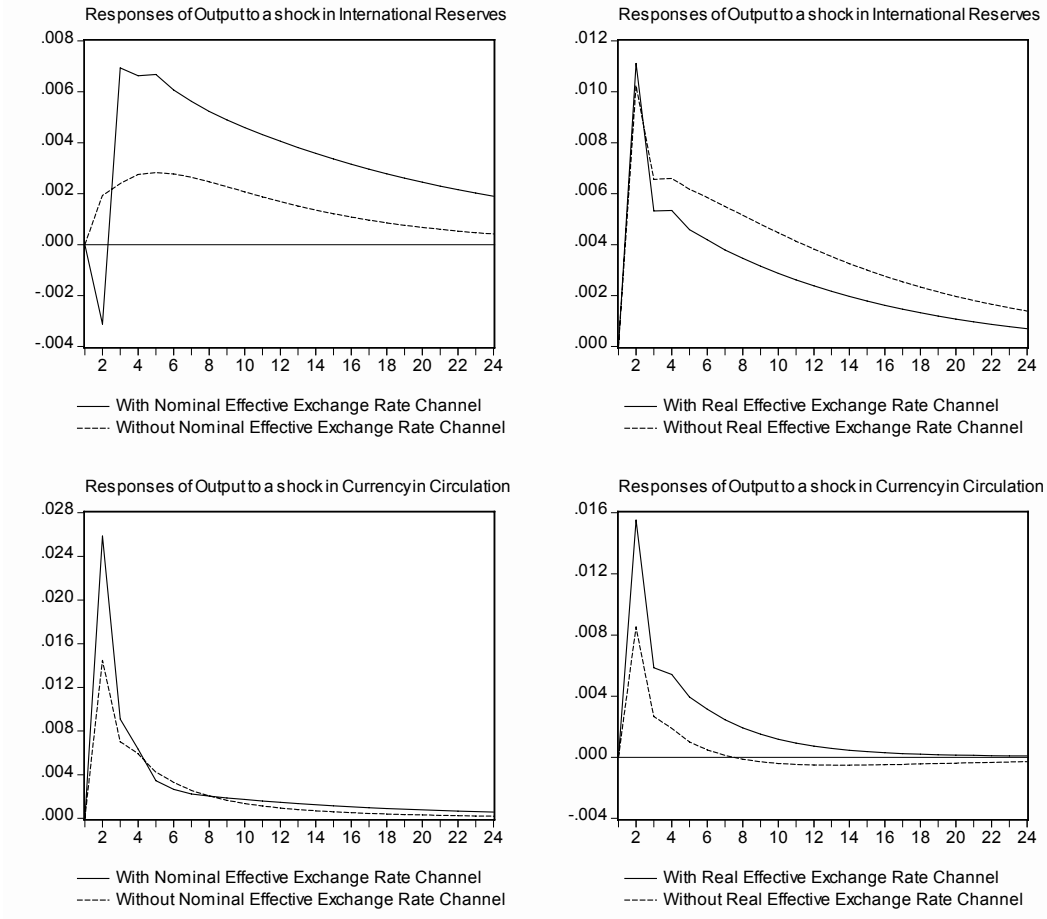
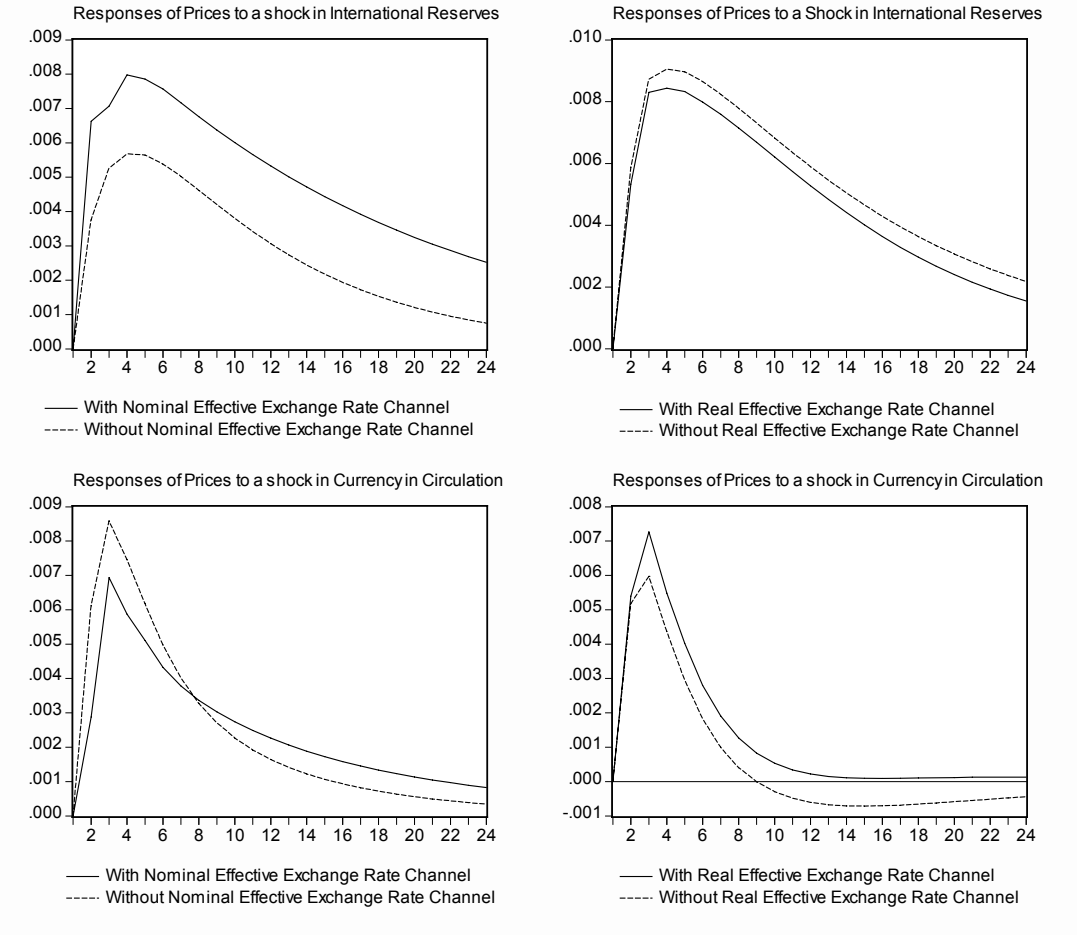


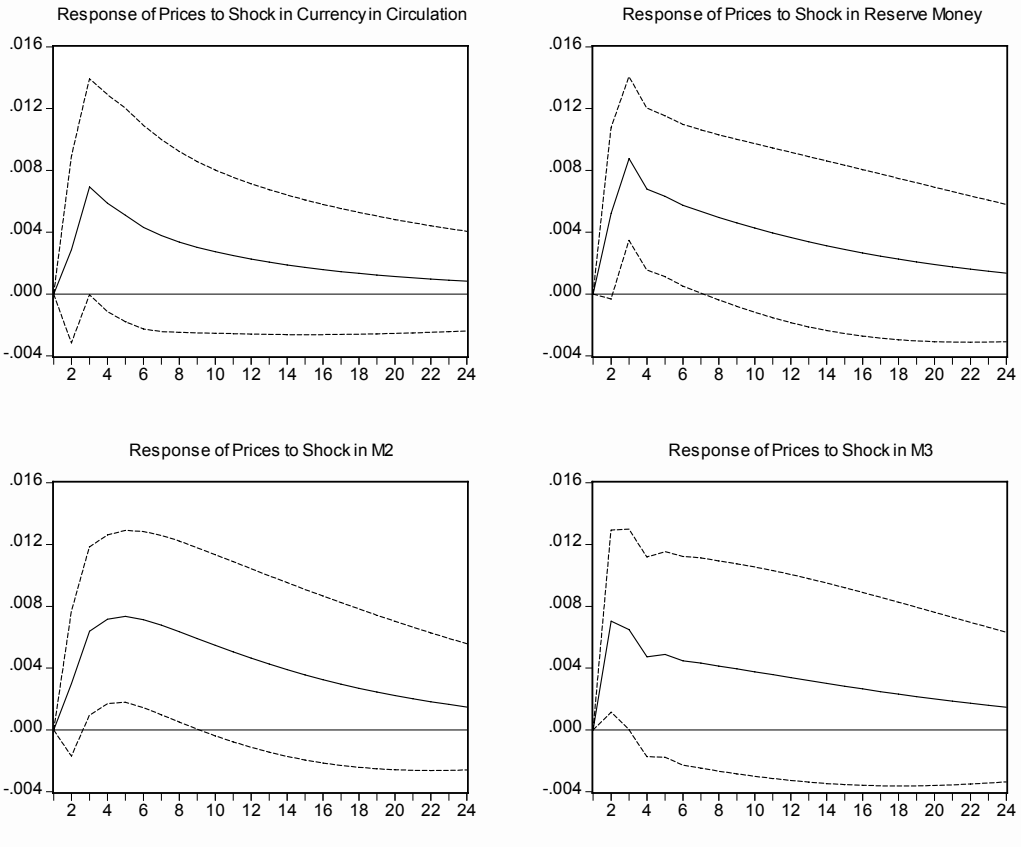
Figure 8. Impulse Responses: Prices with Exchange Rate Channels Active/Inactive
(Response to Cholesky one standard deviation innovations)



F. The Link Between Prices and Monetary Aggregates

As a final extension, we reviewed the relationship between prices and various monetary aggregates, substituting for currency in circulation in the baseline VAR. The top left panel in Figure 9 is consistent with the bottom left chart in Figure 2, the baseline specification. The other charts in Figure 9 detail the response of prices to shocks to reserve money, M2, and M3. Both M2 and especially reserve money have significant predictive power for up to two years. The response of prices to shocks to M3 is initially still significant, but dissipates more quickly than for less broad aggregates. This evidence confirms the NBG's practice to model the link between monetary developments and prices based on reserve money, even though the direct link appears to have weakened (see Table 1, where in 2006, reserve money undershot its target while inflation overshot the target estimate). The results are qualitatively similar to those in Figure 5 of Dabla-Norris and others (2007), but less significant.

Figure 9. Impulse Responses: Prices and Shocks in Different Monetary Aggregates
(Response to Cholesky one standard deviation innovations)



V. SUMMARY AND CONCLUSIONS

In this paper, we have assessed whether Georgia is ready to adopt inflation targeting. Based on the evidence presented, the answer to this question must be: Not yet. De jure, much of the institutional setup—e.g., the central bank's communication strategy—appears to be broadly in line with structures in peer countries that have adopted inflation targeting in a similar environment.[30] De facto, however, some of these institutional features—e.g., the central bank's (instrument) independence—are not fully implemented, and the transmission mechanism of monetary policy is not yet pronounced enough for the central bank to rely on stable empirical relationships that help to steer the economy. Improving these institutional and operational weaknesses will contribute to successful monetary policymaking more generally—not only in the context of a transition toward inflation targeting.

[30] One major exception in this context is the multiplicity of goals that the NBG is by law required to strive for.

From a regulatory perspective, the NBG should strive to maintain and enhance its de facto independence by more clearly defining its responsibility and making the legal framework consistent with the primacy of price stability. An exchange rate objective, as contained in the NBG's statutes ("maintain purchasing power of the nation currency"), will sooner or later conflict with the main monetary policy objective under IT. Moreover, the central bank must be immune to political influence, including with regard to the level of interest rates.

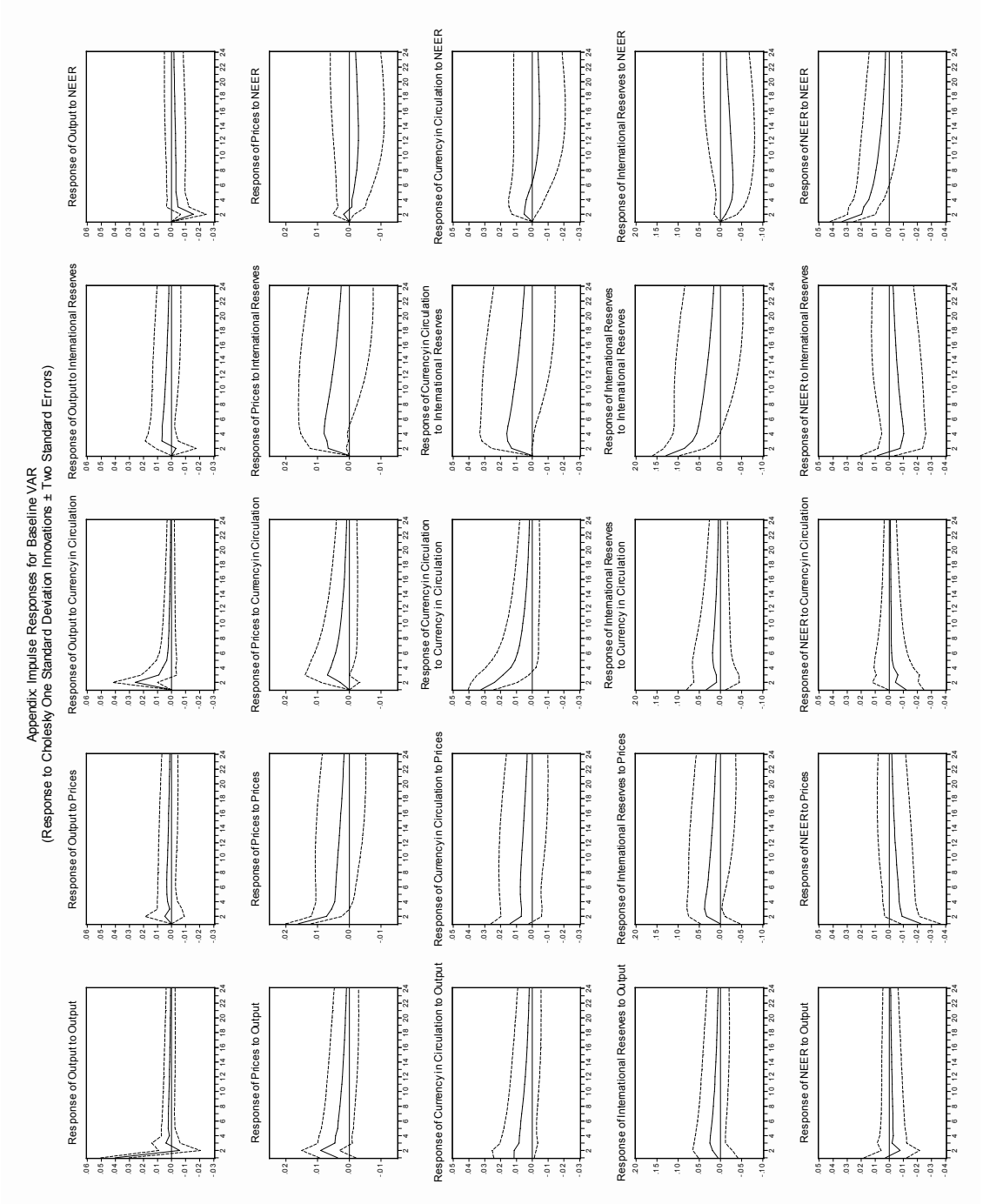
From an operational perspective, one major weakness of the present framework is the lack of a reliable interest rate that reflects the monetary stance. We have empirically circumvented this problem by assuming that the NBG's main instruments of monetary policy are its interventions on the foreign exchange market and a narrow monetary aggregate (currency in circulation) that excludes banks' voluntary and mandatory reserves. As long as the NBG does not build up benchmark interest rates—especially at the short end—that vary freely in light of market conditions, the conduct of monetary policy will have to be based on indirect evidence of the monetary stance. One possible setup would be a corridor for interbank interest rates, bound by standing overnight facilities.

The empirical evidence presented in this paper shows in the baseline setup: (i) a significant real effect of "monetary" shocks (taken to be shocks to currency in circulation) over three quarters; (ii) a more extended significant effect of a shock to the NBG's stock of reserves on the CPI; and (iii) an initially negative response of output to a reserves shock—a somewhat counterintuitive result. Investigating the various transmission channels in our extensions, we are able to clarify in this context that (i) the exchange rate channel enhances—and the credit channel reduces—the output response to shocks currency in circulation; (ii) the bank lending channel (and especially household credit) is responsible for the price reaction; and (iii) that feedback from the exchange rate channel is responsible for both the negative initial reaction but also for the size of the longer-run positive effect of a shock to international reserves on output. Moreover, we confirm the prior that shocks to monetary aggregates have a significant effect on the price level, with reserve money and M2 aggregates yielding the most favorable results. These results bode well for future empirical research on the transmission mechanism in Georgia, although the explosive growth of credit starting in late 2005 may create further challenges in examining the lending channel. The successful introduction of a short-term benchmark interest rate would be a major step toward future assessments of the monetary policy impact in Georgia. Only then will it be possible to gain insight in the "true" interest rate channel from policy rates to long-term interest rates, real activity, and inflation. In this context, the Georgian authorities are also encouraged to develop a reliable monthly measure of economic activity—e.g., industrial production—to enable higher-frequency analysis of these and related issues.

Summing up, the NBG should consider (i) correcting some of the institutional weaknesses; (ii) making de facto practices consistent with the institutional provisions; and (iii) developing its monetary operations framework and instruments, which will, over time, lead to a more stable monetary transmission mechanism. To convey publicly a commitment to upgrade its monetary policymaking and enhance its accountability on the path to a strengthened

monetary framework, the NBG could develop and communicate a medium-term implementation strategy that would include milestones derived from the goals outlined above. This strategy could be in parallel with the NBG's Banking System Development Strategy intended to deepen financial markets—another cornerstone of a functioning liquidity management. The NBG should also encourage the fiscal policy maker to provide a sufficiently liquid primary and secondary market for government securities, which would be crucial for successful liquidity management. By following through with this strategy over the next five to seven years, the NBG will gain credibility and be in a good position to successfully implement an inflation targeting regime—a framework for monetary policy that has proven beneficial for a wide range of modern, small open economies.

Appendix: Impulse Responses for Baseline VAR
(Response to Cholesky One Standard Deviation Innovations ± Two Standard Errors)



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