Macroeconomic Dynamics, **16** (Supplement 2), 2012, 190–212. Printed in the United States of America.
doi:10.1017/S1365100511000319

REAL EFFECTS OF MONETARY POLICY IN LARGE EMERGING ECONOMIES

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This paper provides evidence on monetary policy transmission for five key emerging market economies: Brazil, Russia, India, China, and South Africa. Monetary policy (interest rate) shocks are identified using modern Bayesian methods along with the more recent sign restrictions approach. We find that contractionary monetary policy has a strong and negative effect on output. We also show that such contractionary monetary policy shocks do tend to stabilize inflation in these countries in the short term, while producing a strongly persistent negative effect on real equity prices. Overall, the impulse responses are robust to the alternative identification procedures.

Keywords: Monetary Policy, Emerging Markets, BVAR, Sign Restrictions

> *"Over the next 50 years,. . . the BRICs economies . . . could become a much larger force in the world economy."* (Goldman Sachs, 2003)
>
> *". . . the aim of monetary policies shall be to maintain the stability of the currency and thereby promote economic growth*." (Law on the People's Bank of China)

1. INTRODUCTION

Many emerging market economies are grappling with a massive surge in net capital inflows, in particular increased portfolio investment, and trying to manage these via central bank intervention in the foreign exchange market. The associated macroeconomic problems in emerging markets raise questions about the desired policy options, namely, the use of capital controls and regular interventions in the

We gratefully acknowledge the constructive comments made by two anonymous referees of this journal on an earlier version of this paper, which was presented at the first International Symposium in Computational Economics and Finance (ISCEF2010: www.iscef.com), February 25–27, 2010, Sousse, Tunisia. We also thank Fredj Jawadi for his helpful comments in improving the paper. The usual caveat applies. Address correspondence to: Ricardo M. Sousa Department of Economics and Economic Policies Research Unit (NIPE), University of Minho, Campus of Gualtar, 4710-057 Braga, Portugal; e-mail: rjsousa@eeg.uminho.pt, rjsousa@alumni.lse.ac.uk.

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currency market. These instruments, in turn, undermine the exchange rate channel as an adjustment mechanism. In this context, it is important to know whether monetary policy can exert a powerful influence as a macroeconomic stabilization mechanism in emerging market economies. Is there a scope for monetary authority in controlling inflation? How effective is it in reviving output? Can it be part of the cause of currency or financial crises in these countries?

Historically double-digit inflation has been a major threat to economic growth in many developing countries, but the monetary authorities in these countries continue to maintain a pro-growth monetary policy stance, as these economies have a large excess productive capacity. Given that these economies are growing at less than their potential level of output, monetary policy may help stimulate private investment via monetary easing, rather than playing a stabilizing role. So any discretionary adjustment of monetary policy to maintain balance between supply capacity of the economy and demand growth can create large shocks. As a result, understanding the real effect of monetary policy shocks in the five key emerging countries—Brazil, Russia, India, China, and South Africa, the so-called BRICS—is crucial. So we have set up a VAR model aimed at identifying the macroeconomic effects of unexpected variation in monetary policy.

The broad concerns of monetary policy in these countries have been to monitor money growth to maintain price stability and to ensure adequate credit expansion to promote economic growth [Mallick (2006)]. This justifies the inclusion of both money growth and the interest rates in the model. The need to consider commodity prices in the VAR is explained by the fact that whereas India and China are net commodity importers, Russia and, to a lesser extent, Brazil and South Africa depend on commodity exports. In addition, one can eradicate the price puzzle by the inclusion of such a forward-looking variable [Leeper et al., (1996)].

The effectiveness of monetary policy and its transmission also depends on the exchange rate regime, and this explains why we account for the exchange rate. Whereas China follows a fixed peg, India monitors multiple indicators as its monetary policy framework with a managed floating–exchange rate regime. On the other hand, Russia manages its exchange rate indicator in the absence of any preannounced monetary and exchange rate regime, whereas Brazil and South Africa currently rely on an inflation targeting framework with a floating–exchange rate regime.

Previous empirical work on macroeconomic fluctuations has mainly been confined to the advanced economies. This paper contributes to studying the sources of economic fluctuations and providing evidence on the monetary policy transmission for the major emerging market countries. The focus on this set of countries has four main reasons. First, they are the biggest and fastest-growing emerging markets, as they represent about 40% of the world's population, encompass over 25% of the world's land, and have a combined GDP (PPP) of more than 15 trillion dollars. Second, many of them have adopted inflation targeting as the institutional setting for monetary policy making. Third, the downward trend of inflation associated with greater confidence in macroeconomic policies has enhanced the

scope for monetary policy as an effective tool for managing demand. Fourth, fiscal consolidation has reduced pressure for monetizing public sector deficits.

In this paper, we aim at understanding the effects of monetary policy shocks in emerging market economies while improving and extending the existing literature in several directions. First, we look not only at the impact of monetary policy in terms of output and inflation, but also at the monetary growth rate, the exchange rate, and the stock price. This allows one to understand the role of monetary policy in terms of provision of liquidity, explaining the current account imbalances, and its effects on financial markets stability. Second, we identify the monetary policy shock using modern estimation techniques, namely, the Bayesian structural vector autoregression (B-SVAR) and the sign-restrictions VAR, and thereby account for the uncertainty about the impulse-response functions. Third, we use data at high frequency—that is, quarterly data—and for a longer time period (namely, 1990:1–2008:4), and therefore are able to obtain more precise estimates. We show that a monetary policy contraction (i) has a negative effect on output; (ii) leads to inflation stabilization with persistence in the aggregate price level, although it coincides with the fall in commodity price; (iii) produces a small liquidity effect; (iv) has a strong and negative impact on equity markets; and (v) generates an appreciation of domestic currency.

The rest of the paper is organized as follows. Section 2 reviews the existing literature on the role of monetary policy in explaining macroeconomic fluctuations in emerging markets. Section 3 presents the estimation methodologies and Section 4 describes the data. Section 5 discusses the empirical results. Finally, Section 6 concludes with the main findings of the paper and their policy implications.

2. A BRIEF REVIEW OF THE LITERATURE

The past monetary policy experience of many emerging market countries has seen extreme episodes of monetary instability, swinging from very high inflation to financial instability. In China and Russia, the main banks are largely state-controlled, despite some moves toward partial privatization. In addition, interest rates are still largely controlled, markets for fixed-income assets are underdeveloped, and monetary policy is closely linked to the exchange rate regime: even if there are some capital controls, when foreign currency reserves reach record levels, sterilization becomes less efficient. When economies move from fixed– to floating–exchange rate regimes, they are more likely to experience dramatic rises in the variability of the real exchange rate. The degree of exchange rate passthrough becomes critical in determining the extent to which the external shocks can get transmitted to the real sector. Nevertheless, the use of the real effective exchange rate is likely to capture temporal variation in external relative prices across different exchange rate regimes for the five countries considered in this study.

Table 1 provides a review of the monetary policy instruments, the exchange rate regimes, and the transmission channels of monetary policy. It highlights

TABLE 1. A brief review of the monetary policy framework in large emerging market economies

Country	Period	Monetary policy instrument	Exchange rate regime	Expected transmission channels of monetary policy
Brazil	July 1994: Real Plan	Deposit interest rates over 50%	Sharp appreciation of the nominal exchange rate	Pressure on domestic producers of tradable goods to accelerate the fall of inflation rate and discourage speculative movements
Brazil	Early 1995–December 1998: soft peg	Volatile interest rates	Stable real exchange rates	
Brazil	July 1999 onward: Inflation targeting	Low and stable interest rates	Great exchange rate volatility	Enhance transparency, guide medium to long-term expectations, therefore, prevent transitory inflation surges
Russia	End 1991–mid 1993: dissolution of the Soviet Union	No truly independent and effective Russian authority		
Russia	1993–1995	Independent and effective Russian authority		Finance the huge budget deficit
Russia	1995: Some degree of legal independence	Tight monetary policy	Pegged exchange rate regime with a crawling band against the U.S. dollar	Stabilization of the Russian economy
Russia	2000	Pressure on monetary policy	Reluctance to permit real appreciation	Reduce inflation to 18%, achieve annual growth rate of 1.5%

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TABLE 1. Continued.

Russia	Recently: "sterilization policy"	Part of budget revenues from oil and gas production has been "frozen" in Central Bank accounts in order to sterilize petrodollar expansion of the money supply	More weight on exchange rate stability	Inflationary consequences, underfunding of investment in infrastructure, high technology, and manufacturing
India	Mid-eighties	Broad money, M_3, emerged as the nominal anchor	Maintain orderly conditions in the foreign exchange market	Reasonable price stability and adequate expansion of credit
India	Nineties–April 1998	Multiple indicator approach whereby interest rates or rates of return in different financial markets along with data on capital flows, currency, credit, exchange rate, fiscal position, inflation, output, trade are used for policy purposes	As before	As before

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TABLE 1. Continued.

Country	Period	Monetary policy instrument	Exchange rate regime	Expected transmission channels of monetary policy
India	2003 and from April 2006: Fiscal Responsibility and Budget Management Act and later amendments	The Reserve Bank has almost withdrawn from participating in the primary issues of central government securities	As before	As before
China		Quantity and price measures		Maintain price stability *and* promote economic growth, maximize employment, achieve balance of payments equilibrium and stability of the financial system
China	Since the nineties	Segmentation of credit markets		
South Africa	Until early eighties	Liquid asset ratio–based system with quantitative controls on interest rates and credit		
South Africa	Nineties	Cash reserves–based system and preannounced monetary target ranges for broad money, M_3		Financial liberalisation process and openness of capital accounts, a diverse set of indicators

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TABLE 1. Continued.

South Africa	Since 2000	Inflation targeting regime: interest rate policy is determined by a monetary policy committee	After consultation with the South Africa Reserve Bank, the target range for inflation (of between 3 and 6% per year) is set by the National Treasury

the differences in financial development (equity markets, fixed-income markets, and the liberalization of the banking system) and the potentially simultaneous interactions between the interest rate, the monetary aggregate's growth rate, and the exchange rate. Recently, the favorable macroeconomic environment in emerging economies has given rise to the need to design appropriate long-run strategies for the conduct of economic policy. Nevertheless, the real effects of monetary policy remain an important question to be investigated.

Although monetary aggregates have traditionally been used in these countries as a framework for monetary policy, Nelson (2003) comments that models where the only effect of monetary policy is via a short-term interest rate can be consistent with the quantity theory of money. The extension of the conventional VAR approach to emerging markets, however, poses, important conceptual and methodological challenges. First, uncertainty about access to international capital markets may lead to a large weight of balance-of-payments equilibrium in the central bank's reaction function. Second, public finances may influence the behavior of the monetary authority. Third, monetary policy may direct credit to strategic sectors when financial markets are underdeveloped.

From an empirical perspective, there is very limited research on identifying monetary shocks in emerging markets in the literature. Hoffmaister and Roldôs (2001) use a structural VAR approach for Brazil and Korea, and show that domestic shocks are the main source of GDP fluctuations. For Brazil, Minella et al. (2003) find that the consideration of the monetary aggregate and the exchange rate as endogenous variables typically understates the responsiveness of economic activity to monetary shocks and often displays a price puzzle. Burdekin and Siklos (2008) show that the People's Bank of China's monetary policy appears responsive to the output gap as well as to external pressures. Even in a key emerging market economy such as South Africa, there is supporting evidence for the thesis that monetary policy has been used more consistently to dampen the cycle of economic activity since the early nineties [du Plessis (2006)].

3. ESTIMATION METHODOLOGY

3.1. The B-SVAR Framework

We estimate the following structural VAR (SVAR):

$$\underbrace{\Gamma(\boldsymbol{L})}_{n\times n}\underbrace{\boldsymbol{X}_t}_{n\times 1} = \Gamma_0\boldsymbol{X}_t + \Gamma_1\boldsymbol{X}_{t-1} + \cdots = \boldsymbol{c} + \varepsilon_t, \tag{1}$$

$$v_t = \Gamma_0^{-1}\varepsilon_t, \tag{2}$$

where $\varepsilon_t|X_s, s < t \sim \mathrm{N}(\underline{0}, \Lambda)$, $\Gamma(L)$ is a matrix-valued polynomial in positive powers of the lag operator L, n is the number of variables in the system, ε_t are the fundamental economic shocks that span the space of innovations to X_t, and v_t is the VAR innovation.

We consider a recursive identification scheme and assume that the variables in X_t can be separated into three groups: (i) a subset of n_1 variables, X_{1t}, which do not respond contemporaneously to the monetary policy shock; (ii) a subset of n_2 variables, X_{2t}, that respond contemporaneously to it; and (iii) the policy instrument in the form of the central bank rate, i_t. These assumptions can be summarized by $\boldsymbol{X}_t = [\boldsymbol{X}_{1t}, \boldsymbol{i}_t, \boldsymbol{X}_{2t}]'$ and

$$\Gamma_0 = \begin{bmatrix} \underbrace{\gamma_{11}}_{n_1\times n_1} & \underbrace{0}_{n_1\times 1} & \underbrace{0}_{n_1\times n_2} \\ \underbrace{\gamma_{21}}_{1\times n_1} & \underbrace{\gamma_{22}}_{1\times 1} & \underbrace{0}_{1\times n_2} \\ \underbrace{\gamma_{31}}_{n_2\times n_1} & \underbrace{\gamma_{32}}_{n_2\times 1} & \underbrace{\gamma_{33}}_{n_2\times n_2} \end{bmatrix}. \tag{3}$$

We use a Monte Carlo Markov chain (MCMC) algorithm to assess uncertainty about the distribution of the impulse-response functions [Sims and Zha (1999)]. We construct probability intervals by drawing from the normal-inverse-Wishart posterior distribution of $B(L)$ and Σ, i.e., $\beta|_\Sigma \sim \mathrm{N}[\hat{\beta}, \Sigma \otimes (X'X)^{-1}]$ and $\Sigma^{-1} \sim$ Wishart $[(T\hat{\Sigma})^{-1}, T - m]$, where $B(L)$ is a matrix-valued polynomial in positive powers of the lag operator L associated with the regression coefficients, β is the vector of regression coefficients in the VAR system, Σ is the covariance matrix of the residuals, the variables with a circum flat are the corresponding maximum-likelihood estimates, X is the matrix of regressors, T is the sample size, and m is the number of estimated parameters per equation. The selected optimal lag length is 1 (India, Russia) and 2 (Brazil, China, and South Africa), in accordance with the standard likelihood ratio tests.

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3.2. The Sign Restrictions Approach

We use the reduced form of a VAR model of order p with the standard representation

$$Y_t = B(L)Y_{t-1} + u_t, \tag{4}$$

where the vector Y includes the endogenous variables, $B(L)$ is a lag polynomial of order p, and the covariance matrix of the vector of reduced-form residuals u is denoted as Σ.

After having estimated the reduced-form VAR model, in the first step, we randomly draw from the posterior distributions of the matrix of reduced form VAR coefficients, the variance–covariance matrix of the error term, Σ. The usual structural VAR approach assumes that the error terms, u_t, are related to structural macroeconomic shocks, ε_t, via a matrix A; hence $u_t = A\varepsilon_t$. The Uhlig (2005) identification method searches over the space of possible impulse vectors, $A_i\varepsilon^i$, to find those impulse responses that agree with standard theory. The aim is to identify an impulse vector, a, where $a \in \Re^n$, if there is some matrix A such that $AA' = \Sigma$, where $A = [a_1, \ldots, a_n]$, so that a is a column vector of A. As a result, a, is an impulse vector if and only if there is an n-dimensional vector α of unit length such that $a = A'\alpha$ and, hence, $\Sigma = AA' = \sum_{i=1}^{n} a_i a_i'$. Once the impulse vector a has been appropriated, the impulse response is calculated as $\varepsilon_a(k) = \sum_{i=1}^{n} \alpha_i \varepsilon_i(k)$, where $\varepsilon_i(k) \in \Re^n$ is the vector response at horizon k to the ith shock of Σ.

4. DATA AND SUMMARY STATISTICS

We use data for the BRICS. The sample covers the period 1990:1–2008:4, for which data are available at quarterly frequency. The main sources of the data are as follows:

- Raw materials: Real Commodity Price Index ($\text{COMMODITY}_{i,t}$). Used as a proxy for changes in the global demand and to control for the price puzzle and provided by Haver Analytics.
- Real GDP: GDP ($\text{GDP}_{i,t}$). Used as a proxy for economic activity and business cycle and provided by Haver Analytics.
- Inflation rate: Inflation Rate ($\text{INFLATION}_{i,t}$). Computed from the GDP deflator and provided by Haver Analytics.
- Interest rate: Nominal Central Bank Rate ($\text{CBRATE}_{i,t}$). Used as the monetary policy instrument and obtained from Haver Analytics.
- M_2: Real Growth Rate of M_2 ($\text{M2\_GR}_{i,t}$). Obtained from Haver Analytics.
- Exchange Rate: Real Exchange Rate versus the U.S. Dollar ($\text{EXCRATE}_{i,t}$). Obtained from Haver Analytics.
- Equity Price: Real Stock Price Index ($\text{EQUITY}_{i,t}$). Obtained from Haver Analytics (Brazil, China, India) and the Global Financial Database (Russia and South Africa).

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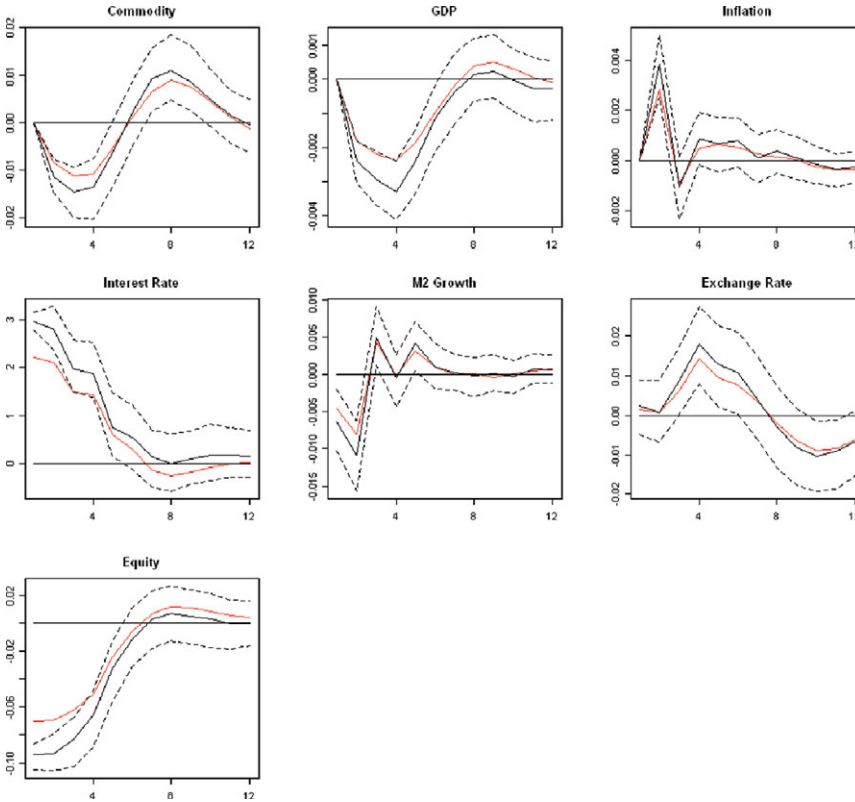

FIGURE 1. IRFs using Christiano et al. (2005) identification: Brazil.

All variables are expressed in logs and deflated using the GDP deflator, with the obvious exception of the policy instrument. Data on real GDP and the GDP deflator for China are annual and therefore are interpolated to quarterly frequency.

5. EMPIRICAL RESULTS

5.1. The B-SVAR Framework

We include the growth rate of M_2, the exchange rate, and the equity price in the set of variables that react contemporaneously to the monetary policy shock (X_{2t}). Similarly, the GDP, the inflation rate, and the commodity price are allowed to react to monetary policy only with a lag (being therefore included in X_{1t}).

Figure 1 plots the impulse-response functions (IRFs) to a positive shock in the interest rate for Brazil. The solid line corresponds to the point estimate, the red line represents the median response, and the dashed lines are the 68% posterior probability intervals estimated using the MCMC algorithm based on 10,000 draws.

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The results suggest that after a contractionary monetary policy, GDP falls, the trough (of −0.2%) is reached after four quarters, and the negative effect persists for about eight quarters. These findings are in line with those of Hoffmaister and Roldôs (2001), who show that domestic shocks are important. The price of raw materials also decreases substantially and the reaction is quick. In addition, the price level is roughly unaffected, despite a very small price puzzle in the first quarters, similar to results in Minella et al. (2003).

The response of the growth rate of M_2 also quickly falls, but the liquidity effect disappears after two quarters, which therefore suggests that tracking monetary aggregates may be useful. Finally, the exchange rate appreciates for about eight quarters, whereas the stock price index immediately falls (by around −6%) after the shock.

For Russia, Figure 2 is split into two cases: Figure 2a plots a monetary contraction, thereby assuming that the interest rate is the policy instrument; Figure 2b plots a monetary expansion, where we consider the monetary aggregate as the policy instrument. The results displayed in Figure 2a show that a positive interest rate shock leads to (i) a strong and persistent contractionary effect on GDP; (ii) a fall in the price of raw materials; (iii) an appreciation of the exchange rate; and (iv) a negative and persistent effect on the equity markets, which reach a trough of −10% after two quarters.

Esanov, Merkl, and Vinhas de Souza (2005) show that, during the period 1993–2002, the Bank of Russia used monetary aggregates as a main policy instrument in conducting monetary policy.[1] The impulse-response functions of Figure 2b roughly "mirror" the ones in Figure 2a. This suggests that the restrictions considered in the B-SVAR approach are consistent with both monetary frameworks.

Figure 3 displays the impulse-response functions for a monetary policy contraction using data for India. In accordance with the findings for Brazil and Russia, the interest rate shock has a significantly negative effect on GDP, with a trough of −0.15% after two quarters. Similarly, the stock markets react in a substantially negative manner to the shock: the stock price index falls by about 4% over the first four quarters and the effect remains negative even twelve quarters ahead. In contrast with Brazil and Russia, the price of raw materials (and inflation) does not seem to be affected by monetary policy, probably reflecting the stronger reliance and dependence of those countries on revenues from the trade in commodities. Finally, the interest rate shock leads to an appreciation of the domestic currency for about four quarters, but as the central bank regularly intervenes in the Foreign exchange market, this appreciation does not persist for long.

For China, the results displayed in Figure 4 show that a monetary policy contraction produces (i) a negative effect on GDP; (ii) a persistent fall in both the price of raw materials and the aggregate price level; and (iii) a negative impact of −4% on the equity markets. The dynamics exhibited by the price level is consistent with the work of Zhang (2009), who stresses the effectiveness of the interest rate as a policy instrument.

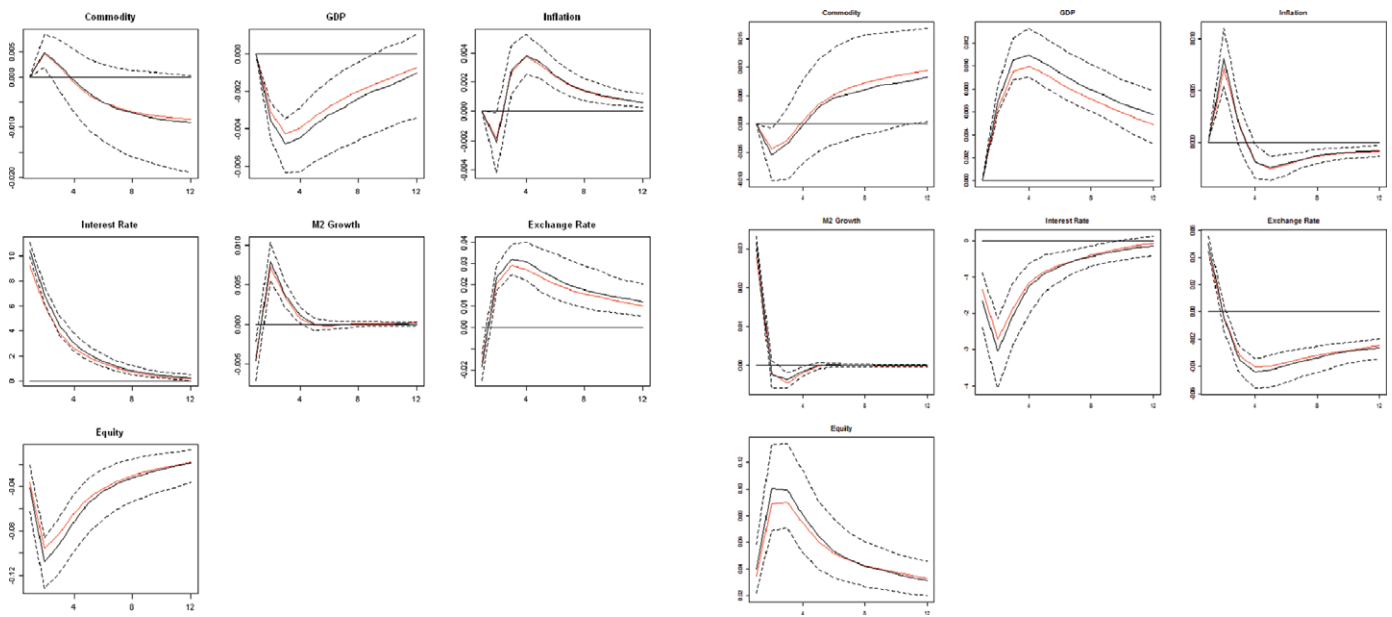

FIGURE 2. IRFs using Christiano et al. (2005) identification: Russia. (a) Monetary contraction (increase in the interest rate). (b) Monetary expansion (increase in the monetary aggregate).

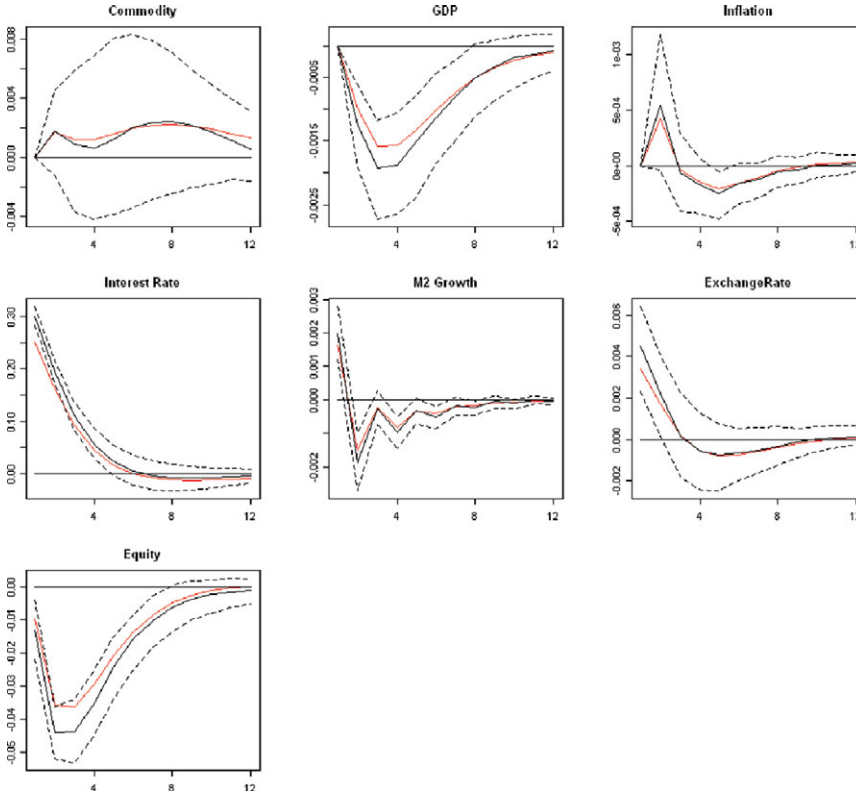

FIGURE 3. IRFs using Christiano et al. (2005) identification: India.

Finally, Figure 5 displays the results for South Africa, which suggest that monetary policy has a contractionary effect on GDP, which reaches a trough (of −0.6%) after eight quarters, and remains at a lower than initial level for about twelve quarters. The price of raw materials also falls substantially, helping to explain the negative impact on inflation. This piece of evidence reveals the role of a monetary regime based on inflation targeting [Aaron and Muellbauer (2007)]. The response of the growth rate of the monetary aggregate is negative and gradual, and the liquidity effect seems to be very persistent. The exchange rate appreciates for about twelve quarters, which gives rise to the idea that monetary policy is interested not only in optimal monetary conditions but also in external stability [Knedlick (2006)]. As for the stock price index, it immediately falls (by around −4%) after the shock and remains below its initial level.

5.2. The Sign Restrictions Approach

To further validate our BVAR results, we carry out the "pure sign restriction" identification strategy of Uhlig (2005) using the sign restrictions, not only upon

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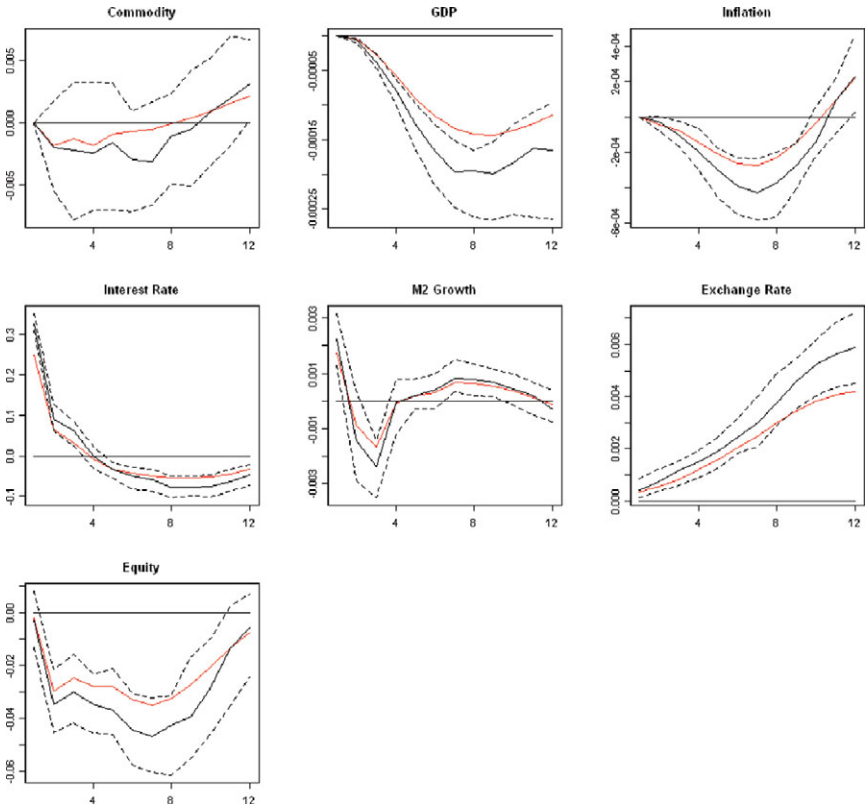

FIGURE 4. IRFs using Christiano et al. (2005) identification: China.

impact, but for a few periods after the shock's impact, that are shown in the impulse responses in Figures 6 to 10. The sign restrictions imposed are the same as the signs observed earlier in the BVAR exercise. Three restrictions are imposed to identify a monetary shock—an increase in interest rate, a reduction in inflation, and a reduction in money growth. In addition, we also identify an exchange rate shock, as a massive surge in capital flows can affect a central bank's balance sheet, forcing the monetary authority to intervene in the foreign exchange market. Such intervention usually takes the form of preventing currency appreciation and thus generating inflationary pressure because of a depreciated currency. So we identify an exchange rate shock first and then the monetary shock, as defined in Table 2.

The responses in Figures 6–10 satisfy the sign restrictions for $k = 1, \ldots, K$ quarters. The responses of these three variables have been restricted for the first two quarters, following the shock. The error bands are illustrated as the dotted lines above and below the response line (the thick line), which are composed of the 16th, 84th, and median percentiles of the impulse responses for each shock, and are based on 10,000 draws. The results are as follows:

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TABLE 2. Identifying sign restrictions

	GDP	INFLATION	CBRATE	M2_GR	EXCRATE	EQ
Contractionary monetary policy shock (increase in interest rate)	?	–	+	–	?	?
Exchange rate shock (depreciation)	?	+	?	?	–	?

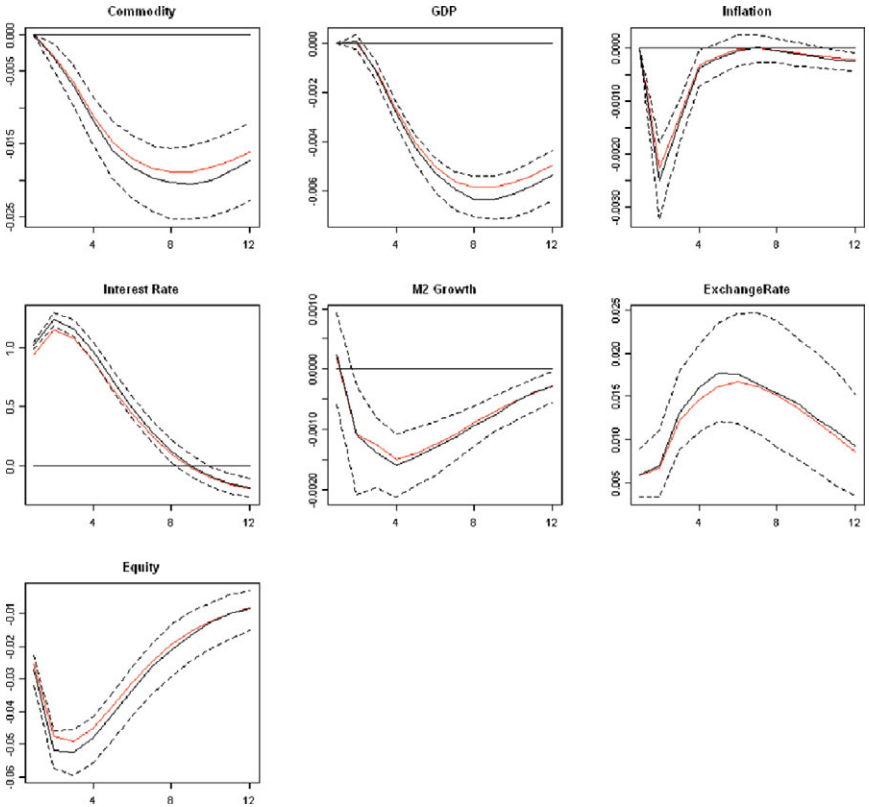

FIGURE 5. IRFs using Christiano et al. (2005) identification: South Africa.

(1) Russia seems to have experienced the largest fall in real output following a contractionary monetary policy shock, followed by Brazil, India, China, and then South Africa. All countries seem to demonstrate monetary nonneutrality, but to a lesser extent in Brazil, China, and South Africa, where the 84th percentile retreats back to zero. Overall it is found that a monetary policy shock leads to a fall in output.

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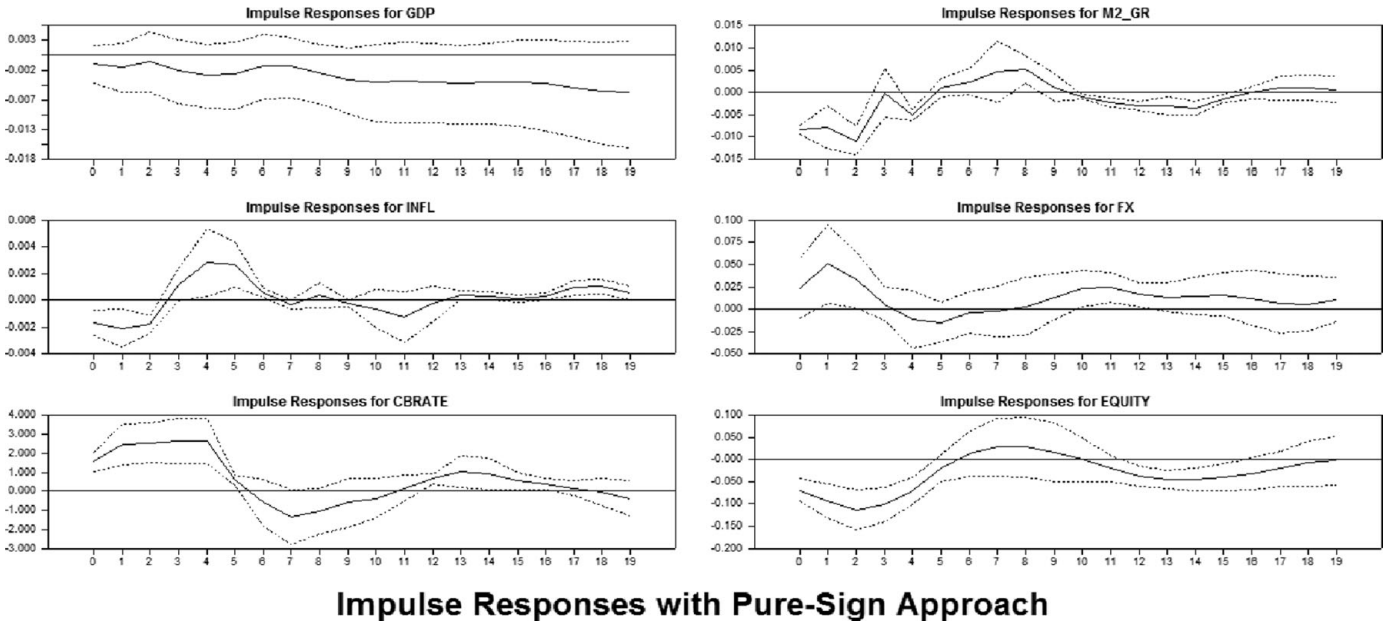

FIGURE 6. IRFs using a sign restriction approach: Brazil.

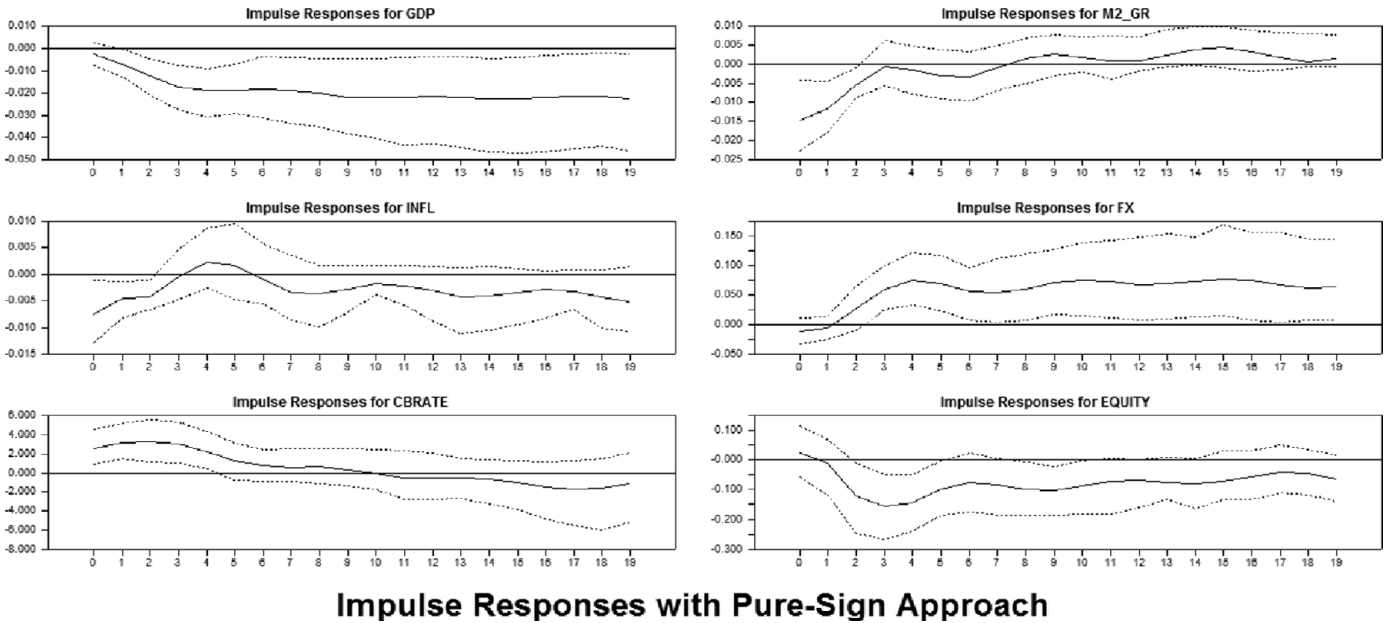

FIGURE 7. IRFs using a sign restriction approach: Russia.

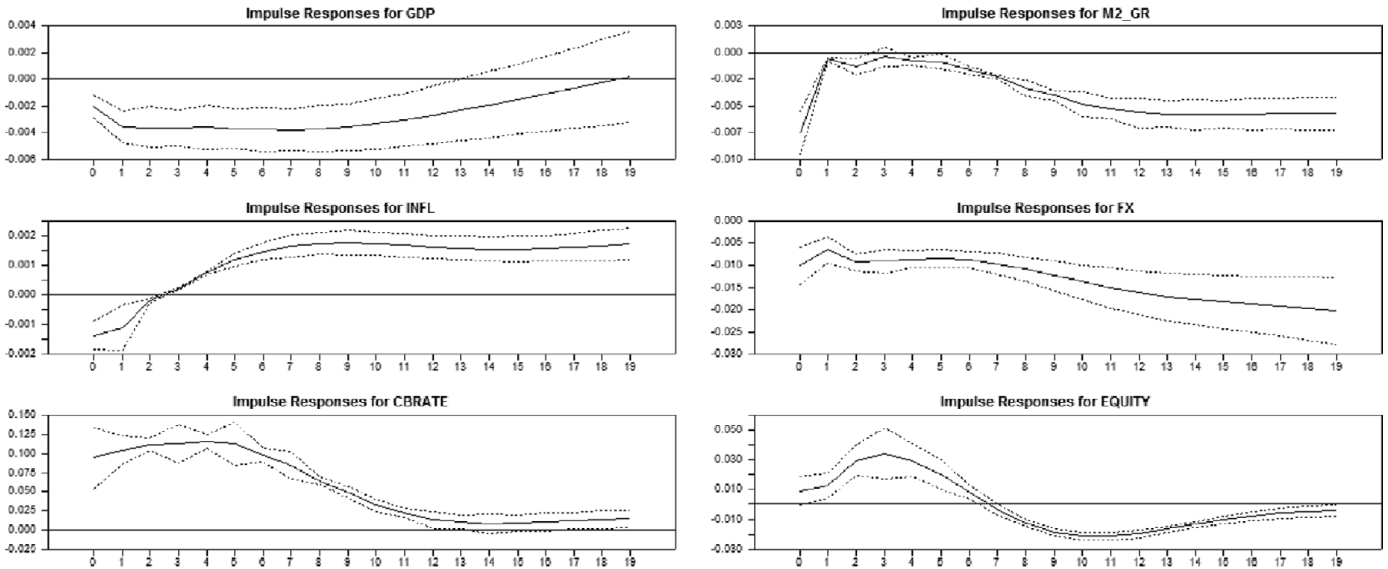

FIGURE 8. IRFs using a sign restriction approach: India.

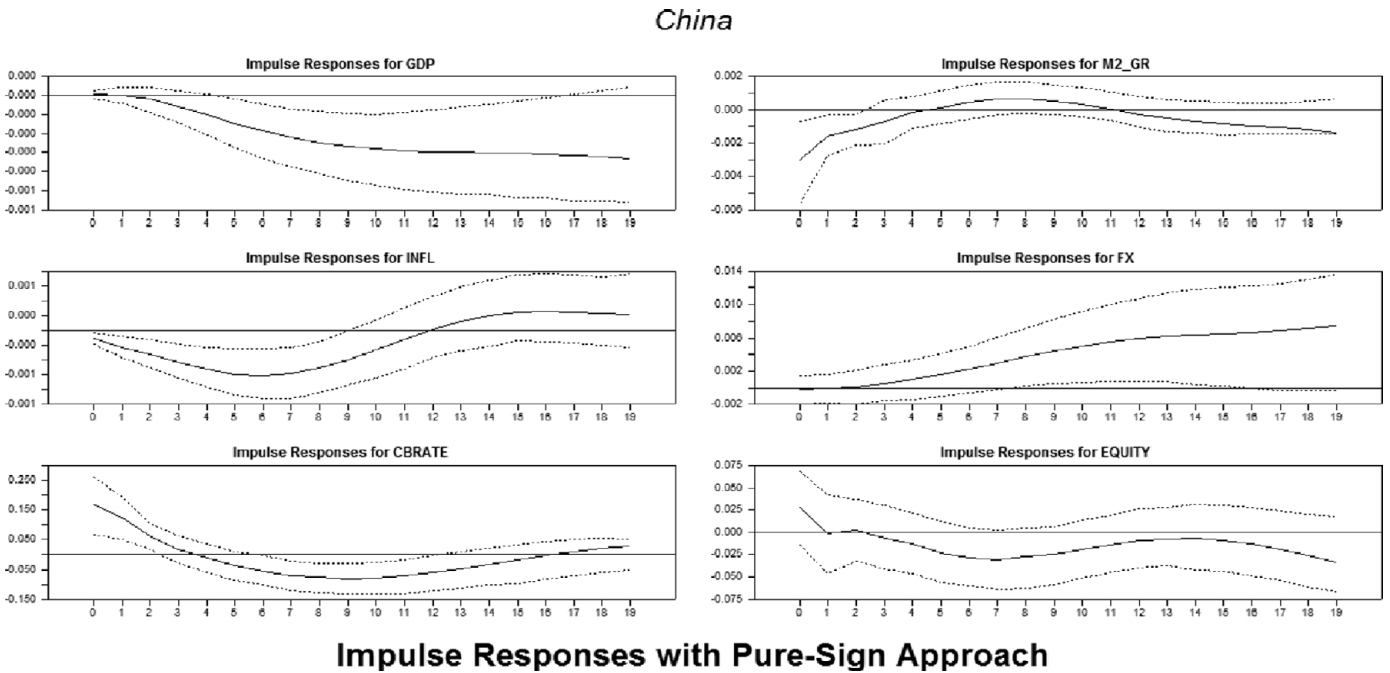

FIGURE 9. IRFs using a sign restriction approach: China.

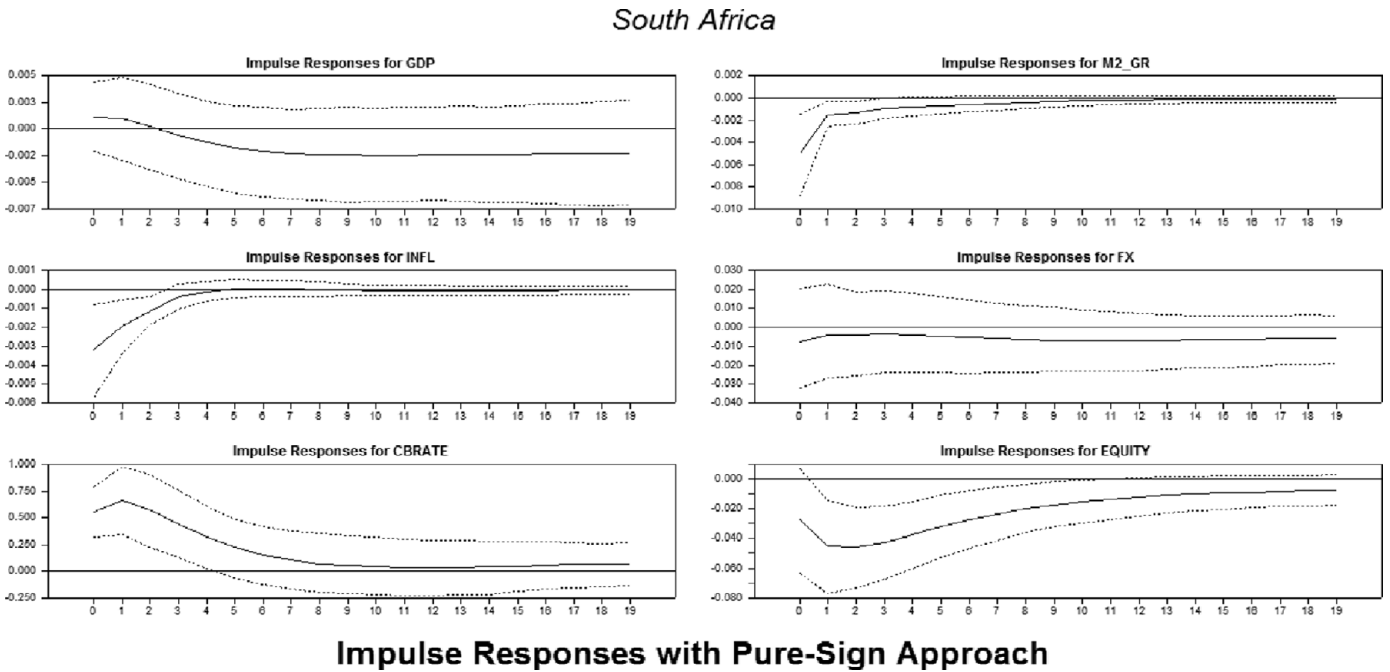

FIGURE 10. IRFs using a sign restriction approach: South Africa.

(2) Inflation declines in all five countries, reacting almost immediately to a monetary policy shock, but the effect seems small and mostly short-lived, as it quickly goes back to its initial level.
(3) Money growth falls in all five countries in response to a contractionary monetary shock, illustrating the "liquidity effect," but the impact dies out quickly given the high rate of money growth in these emerging markets, except in India, where there has been a higher degree of macroeconomic stability in recent years than in other countries.
(4) Interest rates rise in all countries, slowly recede back to zero in all five cases. Inflation gets reduced, but at the cost of reduction in output.
(5) Also, we find that a contractionary shock to monetary policy leads to persistent appreciation in the real exchange rates in all countries except South Africa, where Uncovered Interest Rate Parity (UIRP) appears to hold.
(6) The contractionary monetary shock has a negative effect on the equity markets.

In sum, our results show that monetary policy can be used to stabilize inflation, but its major effects decrease output. In addition, it seems to lead to a strong and persistent appreciation in the real exchange rate. In this context, one should note that the potential inclusion of the exchange rate in the central bank's reaction function would not contradict the objectives of central banks, in particular if exchange rate stabilization is a precondition for both output stabilization and bringing down inflation to a targeted level [Taylor (2001)].

Similarly, the main findings suggest that an exogenous increase in the short-term interest rate tends to be followed by an immediate decline in prices and an appreciation in the exchange rate, and has a significant negative impact on output and equity prices. We find that the ability of monetary policy to influence economic activity is very strong, whereas the evidence of transmission of the short-term interest rate to inflation is still limited, as a big part of the inflation is not driven by demand conditions in these economies. The impulse responses confirm that the major focus of monetary policy in these five large emerging economies has been more toward stabilizing output than toward controlling inflation.

6. CONCLUSION

Using modern estimation techniques, we provide evidence on monetary policy transmission for five key emerging market economies: BRICS.

We show that a monetary policy contraction (i) has a negative effect on output; (ii) produces a small liquidity effect; (iii) has a strong and negative impact on equity markets; and (iv) generates an appreciation of domestic currency. In addition, it happens together with a quick fall in the commodity price, whereas the aggregate price level either gradually falls (in the case of India, China, and South Africa) or exhibits strong persistence (for Brazil and Russia). A switch to a more flexible exchange-rate regime in the time period considered in this study (with the exception of China) and the move away from monetary aggregates to the interest rate as the monetary policy instrument appear to have established the countercyclical

output effects of monetary policy in these five large emerging market economies. Prior to the 1990s, monetary policy based on targeting monetary aggregates was highly inflationary. Although in the past decades monetary authorities seem to have targeted low inflation, output stabilization has taken priority over inflation stabilization, as the impact of monetary policy shocks on inflation remains less significant. This has been due partly to inflation persistence in these economies, which is largely driven by supply shocks (such as weather-related jumps in food prices).

The current paper is the first stage for further work. Specifically, a promising research avenue that we aim to explore refers to the estimation of the monetary policy rule in the BRICS. Indeed, it will provide the basis for forecasting future central bank policy behavior in those countries and, simultaneously, allow us to understand the major economic developments to which the monetary authority reacts in a systematic manner. We leave this line of investigation for the future.

NOTE

1. Also see Granville and Mallick (2010) for more details on recent policy shifts in Russia.

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