

The Exchange Rate in a Resource-based Economy

The Case of Russia

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Vladimir Popov

New Economic School of Moscow

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The Problem: Back of the Envelope Calculations

In 2005, Russia exported about 150 million tons of oil and 150 billion cubic meters of gas worth about \$100 billion (all numbers are rounded for simplicity). The price of oil and gas varied greatly. In just less than a decade, oil prices went from \$10 to over \$60 per barrel (from \$60 to \$360 per ton), and gas prices changed accordingly as they are strongly correlated with oil prices. Imagine a not unrealistic scenario, in which oil prices would drop to \$10 a barrel and would stay at this level for five years. Annual Russian revenues from exports of hydrocarbons would fall to about \$20 billion instead of \$100 billion, resulting over five years in an accumulated \$400 billion shortfall. Russian gross domestic product at the official exchange rate in 2005 totaled \$600 billion. How could Russia adjust to such a negative trade shock and deterioration in terms of trade?

There are basically three options for a country dependent on export/import of commodities with highly volatile prices to cope with terms of trade (TT) shocks: 1) to adjust by importing/exporting capital; 2) to carry out adjustment via changes in foreign exchange reserves and/or a stabilization fund with appropriate sterilization and without changing the

real exchange rate (RER); and 3) to adjust via changes in RER, allowing either a change in the nominal exchange rate or the reduction of money supply leading to a slowdown of inflation. The first two mechanisms, assuming other good macroeconomic policies, are not associated with an adjustment in real trade flows and, hence, do not entail adjustments in the real sector of the economy because the RER remains stable. The third mechanism implies that the volumes of export and import change in response to changes in RER; hence the real sector of the economy also responds through output changes.

Options for Managing External Shocks

Option #1: Borrowing abroad to dampen the negative trade shock. Private international capital flows are volatile and do not fully mitigate fluctuation in terms of trade. They seem to be pro-cyclical, rather than countercyclical: when the terms of trade deteriorate, capital flees the country instead of coming in. The empirical evidence suggests that this is true for most countries and, in particular, for Russia. So private capital flows add insult to injury and reinforce the shocks arising from terms of trade changes. Official capital flows are countercyclical with respect to terms of trade shocks. International financial institutions (such as the International Monetary Fund and the World Bank) and national governments provide additional credits to countries affected by negative trade shocks. However, the amounts are too small (even negligible) to fully counter the negative impact of deterioration of the balance of payments caused by the fall in export prices and the outflow of private capital. Suffice it to recall the role of international financial institutions in recent currency crises in the world, including in East Asia in 1997, Russia in 1998, Brazil in 1999, and Argentina in 2002. In all these cases, official capital flows were not enough to counter the effects of private capital flight. So long as the international financial architecture remains as it is, countries are basically left to themselves to manage shocks that affect their current and capital accounts. In the Russian case, it is unreasonable to expect that a country would be able to borrow funds comparable to the size of its GDP in just several years.

Option #2. Running down foreign exchange reserves and the stabilization fund. Foreign exchange reserves and stabilization funds, if they are large enough, provide a reliable cushion to dampen the impact of negative trade and capital flow shocks. However, today among major resource exporters only Norway (an oil exporter) and Botswana (a diamond exporter) may have sufficient foreign exchange reserves and stabilization funds (more than their annual gross domestic products) to fully counter the impact of volatile prices for resources and of capital movements. By the end of 2005, Russia had about \$180 billion in foreign exchange reserves, including about \$40 billion in its stabilization fund. This is a substantial amount (about one third of GDP), but at least twice as much is

needed to survive the rainy day. One of the central implications of this memo is that under the current circumstances Russia needs a larger stabilization fund.

Option #3: Real devaluation. Putting aside part of the GDP into foreign exchange reserves and the stabilization fund is costly, even more so since this money should be invested in short-term low risk and hence low-yield securities abroad. This is exactly the reason why the current Russian policy of building up foreign exchange reserves and the stabilization fund faces heavy criticism at home and abroad: why not use this money for the improvement of health care and education, for helping the poor, and for investment into an ailing infrastructure? The counter-argument, however, is no less powerful: if there is no cushion in the form of foreign exchange reserves and a stabilization fund, the only way to cope with the negative trade shock and the associated outflow of capital is to devalue the real exchange rate. When oil prices fall and capital flees, the deteriorating balance of payments could be remedied only by nominal exchange rate devaluation (in case of a floating exchange rate) or by slowing the growth of the money supply. The latter measure would be necessary due to a reduction of foreign exchange reserves that is not sterilized; if it is sterilized, the balance of payments will not get back to equilibrium, so foreign exchange reserves would eventually be depleted. In both cases, the result is the real devaluation of the national currency, that is, the decrease of the ratio of domestic prices (expressed in foreign currency) to foreign prices. Such a real devaluation is bad policy because it inevitably causes adjustments in the real economy and these adjustments are, by definition, temporary.

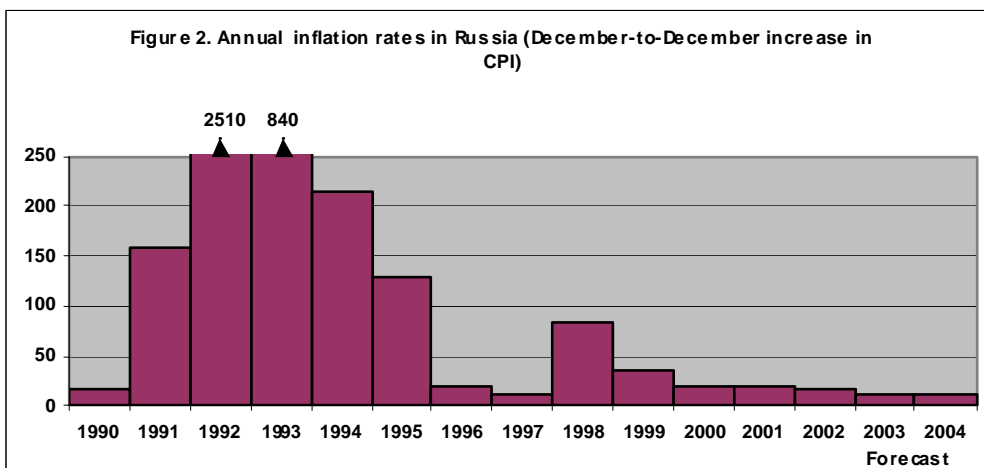
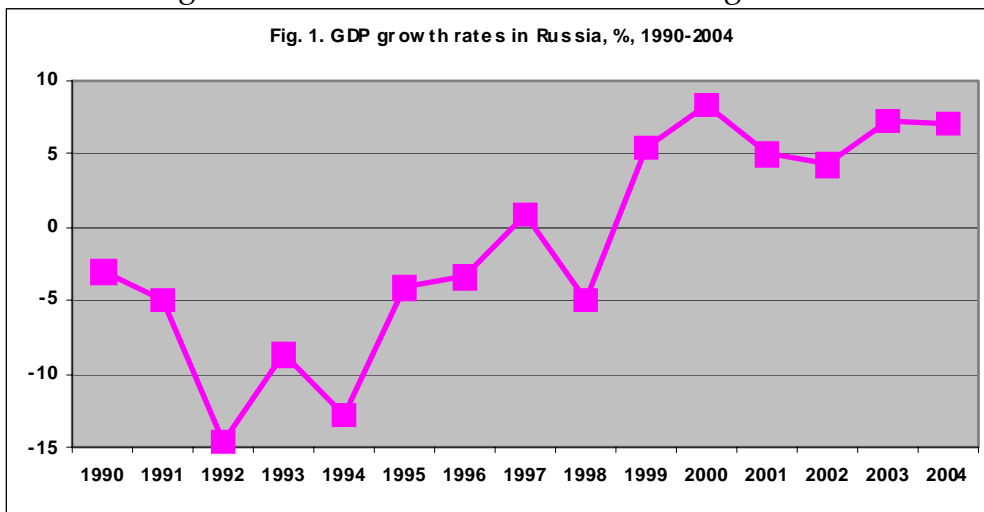
Suppose oil prices fall and the ruble is devalued to keep the balance of payments in equilibrium. For oil producers, the positive impact of devaluation neutralizes the negative impact of falling oil prices, but for other producers of tradable goods (machinery, for instance) real devaluation means higher prices and profits, so there is a reallocation of resources (capital and labor) from the oil to the machinery sector. The problem is that this reallocation is temporary, because after some time oil prices will rise and resources should flow in the opposite direction. Inasmuch as oil and gas prices fluctuate around the trend, it does not make sense to change the structure of the economy in response to their fluctuations, it is just too costly. To put it differently, the real exchange rate should be as stable as possible; if it fluctuates a great deal, this is a definite sign of bad policy that misleads economic actors.

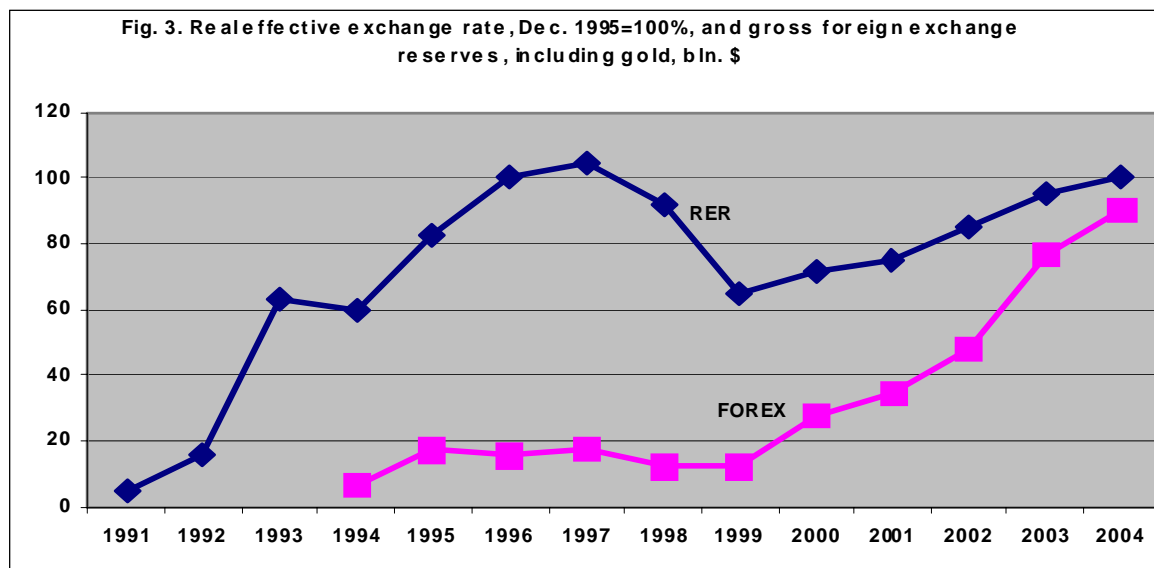
Empirical evidence suggests that the volatility of the RER was closely related to the volatility of GDP growth rates for a large sample of countries in 1975-2000. It also suggests that countries where changes in terms of trade are absorbed by the fluctuations in foreign exchange reserves (rather than by fluctuations of the real exchange rate) cope with trade shocks better than countries where changes in foreign exchange

reserves do not follow changes in terms of trade. Furthermore, it turns out that countries carrying out sterilization policies were most successful in reducing volatility of their economic growth.

Adjustment to External Shocks: Past Experience

Russian experience in managing external shocks in 1992-2005 does not look very impressive, to put it mildly. GDP growth rates fluctuated greatly (see Figure 1), the rates of inflation varied dramatically (Figure 2), and the real exchange rate was unstable, even though in the last five years monetary authorities tried to prevent its appreciation by accumulating foreign exchange reserves (Figure 3). In 1992-1996, the RER increased more than twofold, then fell during the August 1998 currency crisis nearly by half, and then increased again nearly twofold in 1999-2005 (Figure 3). Because volatility of output in all countries is closely correlated with fluctuations of the real exchange rate, no wonder Russian growth rates were very volatile. Unfortunately, Russia did not manage to prevent sharp fluctuations in the real exchange rate of the ruble, which disoriented producers and consumers and forced the economy to adjust to external shocks via real restructuring, which in turn caused greater volatility of output. It is no surprise that the highest volatility of output in Russia in the past 10 years was observed immediately after the 1998 currency crisis that led to the greatest devaluation of the real exchange rate.



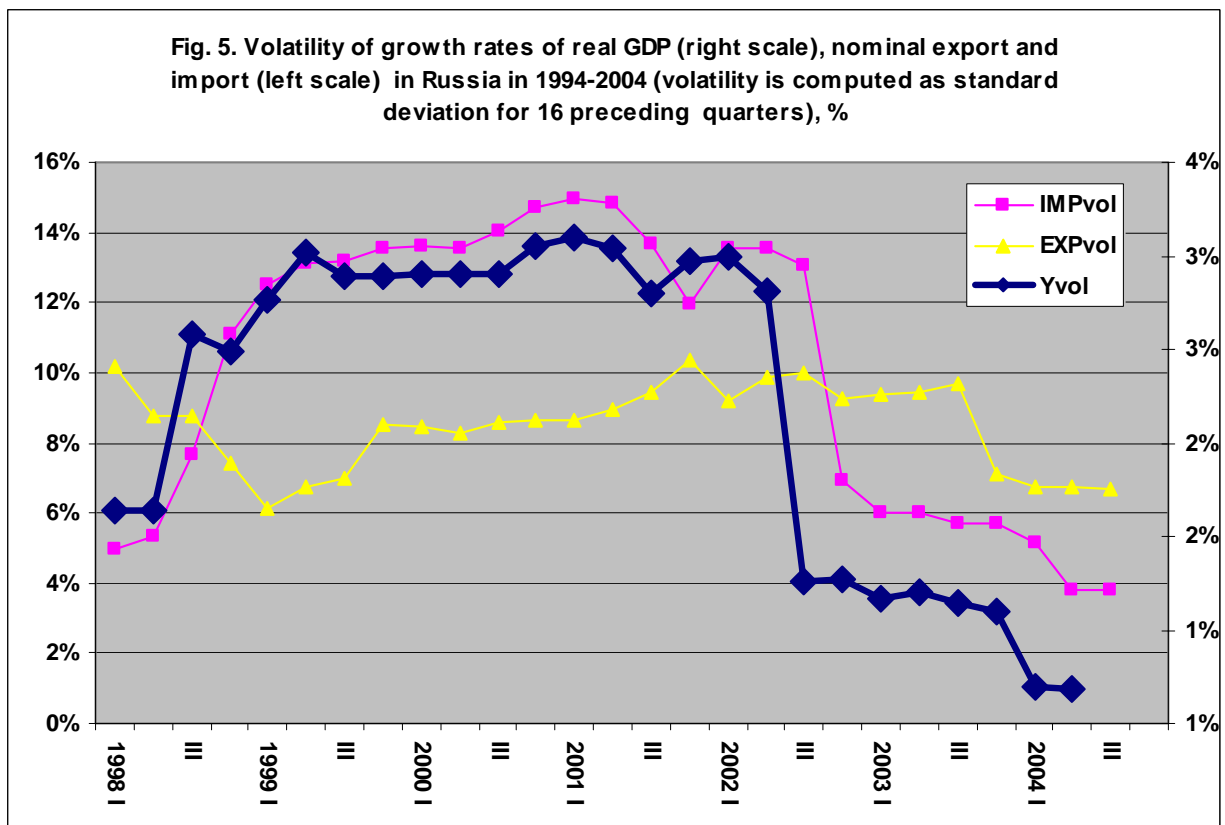
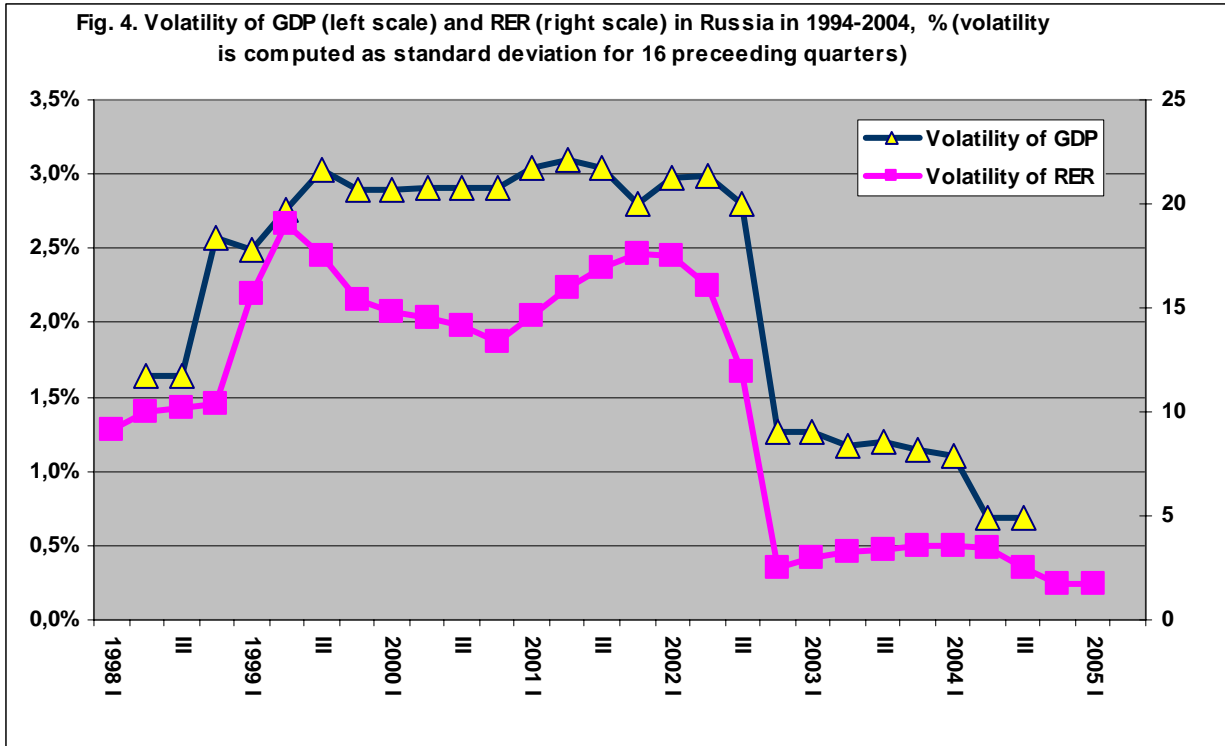


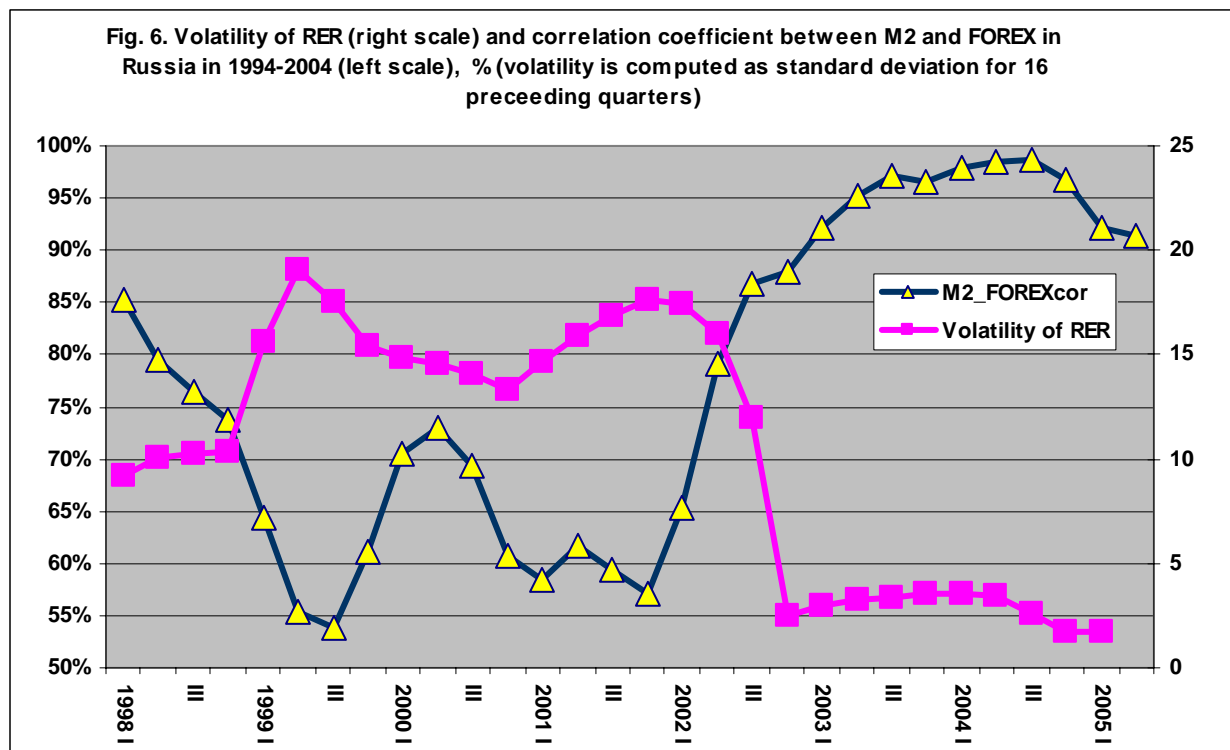
It is generally agreed that the volatility of growth rates is a negative phenomenon. First, stable growth is better than unstable growth, even if the average growth rates are the same. Second, it is well established that long-term average growth rates are negatively correlated with volatility: the higher the volatility, the lower the long-term growth rate.

In Russia, as in other resource-oriented economies, volatility of GDP growth rates is strongly correlated with the volatility of RER (Figure 4). However, there are some important inconsistencies with the conclusions from cross-country comparisons.

First, whereas volatility of GDP growth rates in Russia is linked to the volatility of external trade even more strongly than in most other countries, it is import, not export, volatility that is closely correlated with volatility of GDP growth rates. Even more so, as Figure 5 shows clearly, changes in import volatility sometimes lag behind changes in real GDP volatility, so it is plausible to conclude that the volatility of imports is caused by the volatility of GDP and not vice versa.

Second, high volatility of Russian GDP and RER is associated not so much with the volatility of oil prices, but with the absence of sterilization policy, that is, with a strong correlation between changes in money supply and foreign exchange reserves. The higher the correlation coefficient between the dynamics of money supply and foreign exchange reserves, the lower the volatility of RER and GDP: these indicators obviously move in opposite directions (Figure 6).





The negative impact of sterilization on volatility of GDP in the Russian case is directly the opposite of the relationship observed in the cross-country comparisons, and it seems to be inconsistent with economic logic. As was argued earlier, the best exchange rate regime for mitigating volatility is the stable real exchange rate achieved via a relatively stable nominal rate (crawling peg), absorption of terms of trade shocks by fluctuations in foreign exchange reserves, and sterilization of changes in money supply caused by foreign exchange reserve fluctuations. To reiterate, in cross-country regressions, a no-sterilization policy (high correlation coefficient between foreign exchange reserves and money supply, in this case M2) turns out to be an important and significant factor of higher, not lower, volatility of GDP growth rates.

Internal Versus External Shocks

This puzzle is resolved by making the distinction between external and internal shocks. If shocks are external, sterilization under a fixed nominal rate means a low correlation between foreign exchange reserves and money supply. The higher the correlation between foreign exchange reserves and the money supply, the less pronounced sterilization and the higher the volatility of growth. But if shocks come from domestic sources, for instance from the central bank altering money supply in the absence of any external shocks, a high correlation between money supply and foreign exchange reserves signifies the absence of internal shocks themselves.

How can money supply change if foreign exchange reserves remain stable and, on top of that, all changes in money supply are sterilized? Consider, for instance, an exogenous increase in money supply in the absence of external shocks. Under a fixed nominal rate, this would immediately cause an increase in prices (hence an increase in RER and additional RER volatility) and a drop in real interest rates, and ultimately a balance of payments deficit due to lower trade competitiveness and an outflow of capital, decrease in foreign exchange reserves, and, finally, the contraction of the money supply. Under a fully flexible rate, monetary expansion would also immediately cause an increase in prices and a decrease in real interest rates, and subsequent devaluation with no changes in foreign exchange reserves. In both cases, RER would initially change, which is bad for volatility of GDP, while the correlation between money supply and foreign exchange reserves would be low as money supply increases, but foreign exchange reserves do not. High GDP and RER volatility would thus be associated with a low correlation between foreign exchange reserves and money supply. A high correlation between foreign exchange reserves and money supply under these circumstances is possible only if money supply does not change without a change in foreign exchange reserves, that is, there are no exogenous monetary shocks. That is why under a domestically generated monetary shock, the lower volatilities of GDP and RER are associated with higher, not lower, correlation coefficients between foreign exchange reserves and money supply. This higher coefficient proves that the exogenous monetary shocks are largely absent.

Hence, it may be hypothesized that the main causes of volatility in Russia were not foreign, but domestically made. Volatility of growth resulted not from the volatility of terms of trade, even though the latter was high and Russia was very dependent on exports of oil and gas with highly volatile prices, but from domestic economic policy.

Conclusions and Policy Implications

- In countries like Russia that export resources with highly volatile prices, volatility of economic growth is associated with volatility of RER, which in turn is mostly caused by the inability to accumulate enough reserves in foreign currencies and the stabilization fund.
- In Russia, volatility of GDP growth rates in the last 10 years was associated less with objective circumstances (terms of trade), than with poor macroeconomic policies, primarily the inability to keep the RER stable. Even more so, despite intuition, the volatility of RER was caused by internal monetary shocks rather than by external terms of trade shocks.

- The proper macroeconomic policy for Russia would be: 1) not to generate monetary shocks, and 2) to cope with inevitable external shocks via changes in foreign exchange reserves and the stabilization fund, while keeping the RER stable.

