EXCHANGE RATE IN A RESOURCE-BASED ECONOMY IN THE SHORT-TERM: THE CASE OF RUSSIA

Vladimir Popov

The problem: back of the envelope calculations

Russia exported in 2005 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 – only in two recent decades oil prices went from $10 to over $60 a barrel ($60 to $360 a ton), and gas price changed accordingly – they are strongly correlated with oil prices. Imagine a pretty bad (for Russia), but not totally unrealistic scenario – oil prices would drop to $10 a barrel and would stay at this level for 5 years. Annual Russian revenues from exports of hydrocarbons would fall to about $20 billion instead of $100 billion, so that in 5 years there would accumulate a $400 billion shortfall (Russian GDP at official exchange rate in 2005 totaled about $600 billion). How could Russia adjust to such a negative trade shock (deterioration in terms of trade)?

There are basically three options for the 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 (FOREX) and/or Stabilization Fund (SF) with appropriate sterilization and without changing real exchange rate (RER), (3) to adjust via changes in RER (allowing either the change in nominal exchange rate or the reduction of money supply leading to slowdown of inflation). The first two mechanisms (assuming other good macroeconomic policies) are not associated with the 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 (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 mitigate fully fluctuation in terms of trade. They seem to be pro-cyclical, rather than countercyclical – when 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, in fact, private capital flows add insult to injury and reinforce the terms of trade shocks. Official capital flows are counter-cyclical with respect to terms of trade

shocks – international financial institutions, such as IMF and World Bank, and national governments provide additional credits to countries affected by negative trade shocks, but the amounts are too small, if not to say 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 – in East Asian countries in 1997, in Russia in 1998, in Brazil in 1999, in Argentina in 2002: in all these cases the official capital flows were by far 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 in just several years funds abroad comparable to the size of its GDP.

Option #2. Running down foreign exchange reserves and 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 flows shocks. However today among major resource exporters only Norway (oil exporter) and Botswana (diamond exporter) may be have enough money in FOREX and SF (more then their annual GDPs) to counter fully the impact of volatile prices for resources and capital movements. By the end of 2005, Russia had about $180 billion in FOREX and another $30 billion in SF – this is definitely a tangible amount (1/3 of GDP), but at least twice as much is needed to survive the "rainy day". One of the central arguments 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 FOREX and SF is costly, even more so that this money should be invested in short-term low risk and hence low yield securities abroad. This is exactly the reason, why current Russian policy of building up FOREX and SF 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 ailing infrastructure (the list could be continued, of course), say the critics. The counter-argument, however, is no less powerful: if there is no cushion in the form of FOREX and SF, 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 floating exchange rate) or by the slow down of growth of money supply (due to reduction of FOREX that is not sterilized; if it is sterilized, the balance of payments will not get back to the equilibrium, so FOREX would eventually be depleted). In both cases the result is the real devaluation of the national currency,

i.e. the decrease of the ratio of domestic prices (expressed in foreign currency) to foreign prices. Such a real devaluation is a bad policy because it inevitably causes adjustments in the real sector and these adjustments are by definition temporary.

Suppose oil prices fall and the ruble is devalued to keep the balance of payments in the 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 oil to 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 – this is just too costly. To word it differently, real exchange rate should be as stable as possible; if it fluctuates a lot, this is a definite sign of bad policy that misleads economic agents.

The empirical evidence (Popov, Peresetsky, Polterovich, 2005) suggests that volatility of RER (coefficient of variation, i.e. standard deviation divided by the mean) was closely related to the volatility of GDP growth rates (standard deviation) 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 the fluctuations of the real exchange rate) cope with the trade shocks better than countries where changes in foreign exchange reserves do not follow changes in terms of trade[1]. Besides, it turns out that countries carrying out sterilization policies (low M_FORcor), were most successful in reducing volatility of their economic growth[2].

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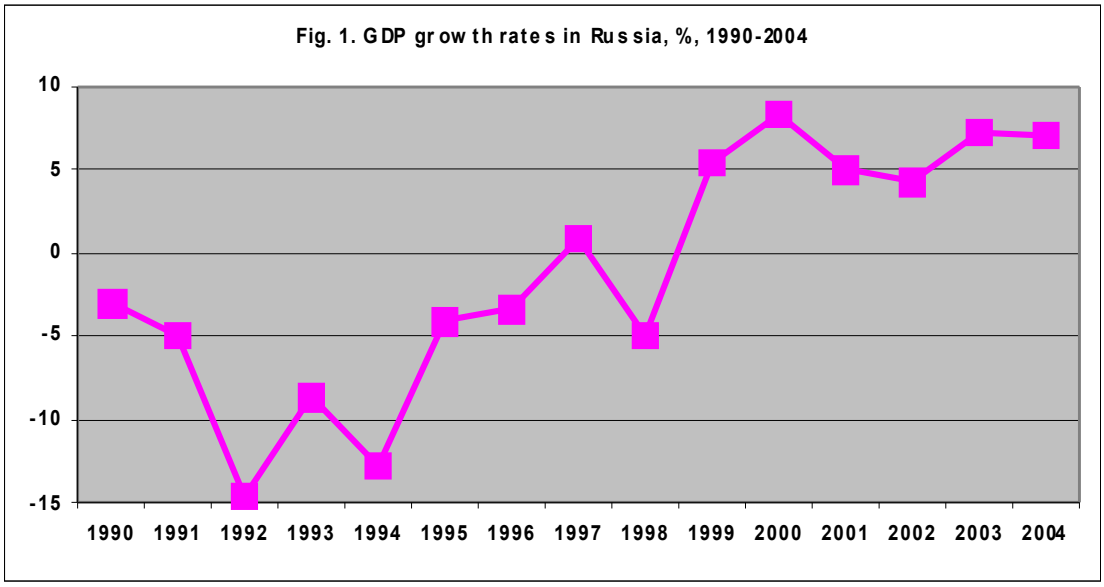
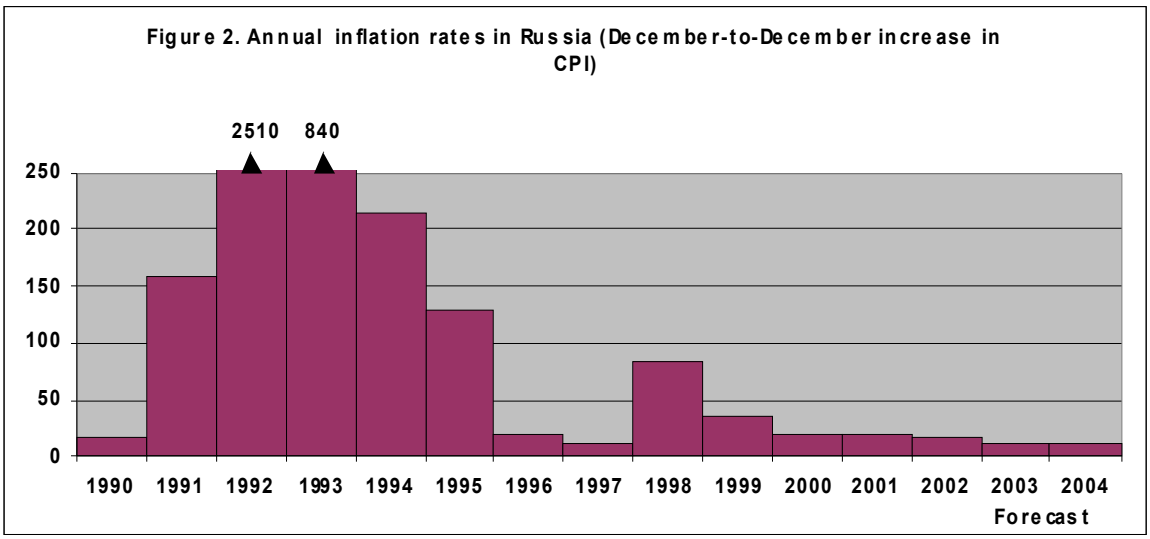
[1] GDP volatility = CONST. + CONTR.VAR. + Trade Volatility*(0.002TR/Y – 0.04 TT_FORcorr)
(Adjusted R2 = 41%, N=66, all coefficients significant at 10% level or less), where:
Trade volatility - standard deviation of trade to PPP GDP ratio in 1980-99, %,
TR/Y – average ratio of external trade to PPP GDP in 1980-99 (no data for 1975-80),
TT_FORcorr – correlation coefficients between the index of terms of trade and the ratio of foreign exchange reserves to GDP, calculated for the period of 1975-99,
Control variables - PPP GDP per capita in 1975, $, and annual average growth rates of GDP per capita in 1975-99, %.
The equation suggests that, if the correlation coefficient is positive (i.e. reserves move in line with the terms of trade), volatility of GDP is lower. But if correlation coefficient is negative (i.e. reserves move in the direction opposite to changes in terms of trade), the volatility of GDP increases.

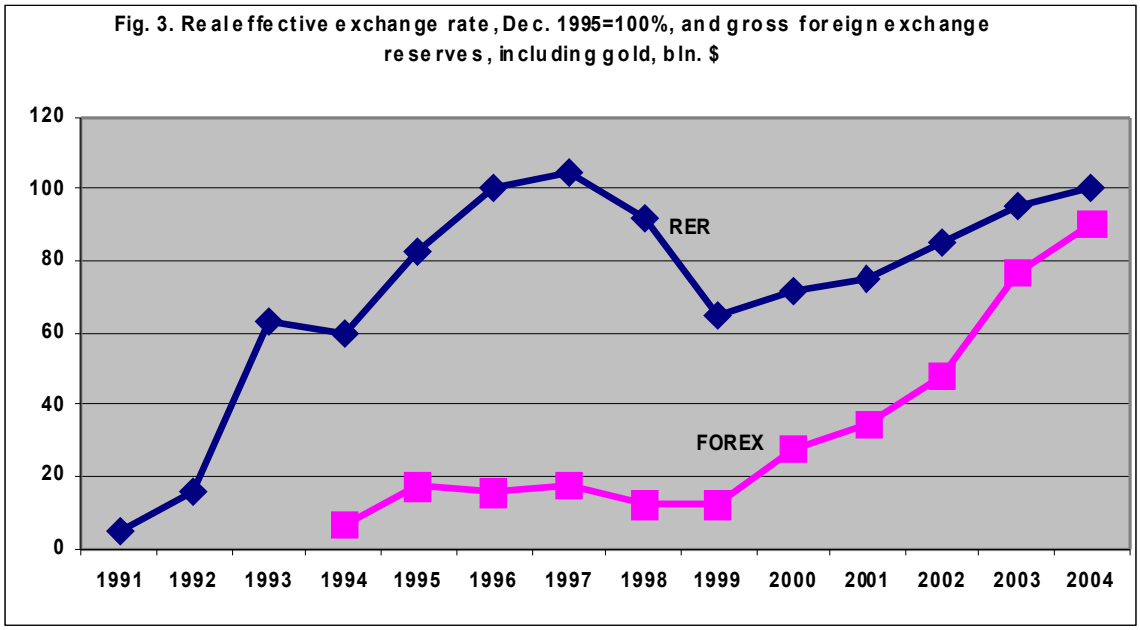
[2] GDPvol = CONST. + CONTR.VAR.+0.24TR/Y + 0.044TTvol + 2.44FORvol – 1.65TT_FORcor + 1.23RER_FORcor + 1.02M_FORcor
(N=58, R2=47, all coefficients significant at less than 8% level, except for TTvol coefficient, which is significant at 13% level), where
M_FOR cor – correlation coefficient between FOREX to GDP ratio and M2 to GDP ratio in 1975-99,
RER_FORcor – correlation coefficient between real exchange rate and FOREX,
FOREXvol – coefficient of variation (standard deviation to average ratio) of foreign exchange reserves to GDP ratio for 1975-99 period, and all other notations are same as before,
Control variables - PPP GDP per capita in 1975, $, and annual average growth rates of GDP per capita in 1975-99, %.

Adjustment to external shocks: past experience

Russian experience in managing the external shocks in 1992-2005 does not look very impressive, to put it mildly. GDP growth rates fluctuated greatly (fig.1), the rates of inflation varied dramatically (fig. 2) and real exchange rate was most unstable even though in recent 5 years monetary authorities were trying to prevent its appreciation by accumulating FOREX (fig.3). In 1992-96 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 (fig. 3). Because volatility of output in all countries is closely correlated with the fluctuations of real exchange rate, no wonder Russian growth rates were very volatile. Unfortunately Russia did not manage to prevent sharp fluctuations in 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. No surprise, the highest volatility of output in Russia in recent 10 years was observed immediately after the 1998 currency crisis that led to the greatest devaluation of real exchange rate.







It is generally agreed that the volatility of growth rates is a negative phenomenon. First, stable growth is better than the unstable, 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, pretty much like in other resource oriented economies volatility of growth rates of GDP is strongly correlated with the volatility of RER (fig. 4). However, there are some important inconsistencies with the international story, i.e. with conclusions that could be derived from cross-country comparisons.

First, whereas volatility of GDP growth rates in Russia is linked to the volatility of external trade even stronger than in most other countries, it is import, not export, volatility that is closely correlated with the volatility of GDP growth rates. Even more so, it is clearly visible on the chart below (fig. 5) that 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 – high correlation between changes in money supply (M2/GDP ratio) and foreign exchange reserves (FOREX/GDP ratio). The higher

the correlation coefficient between M and FOREX, the lower the volatility of RER and GDP – these indicators move obviously in opposite directions (fig.6).

Fig. 4. Volatility of GDP (left scale) and RER (right scale) in Russia in 1994-2004, % (volatility is computed as standard deviation for 16 preceeding quarters)

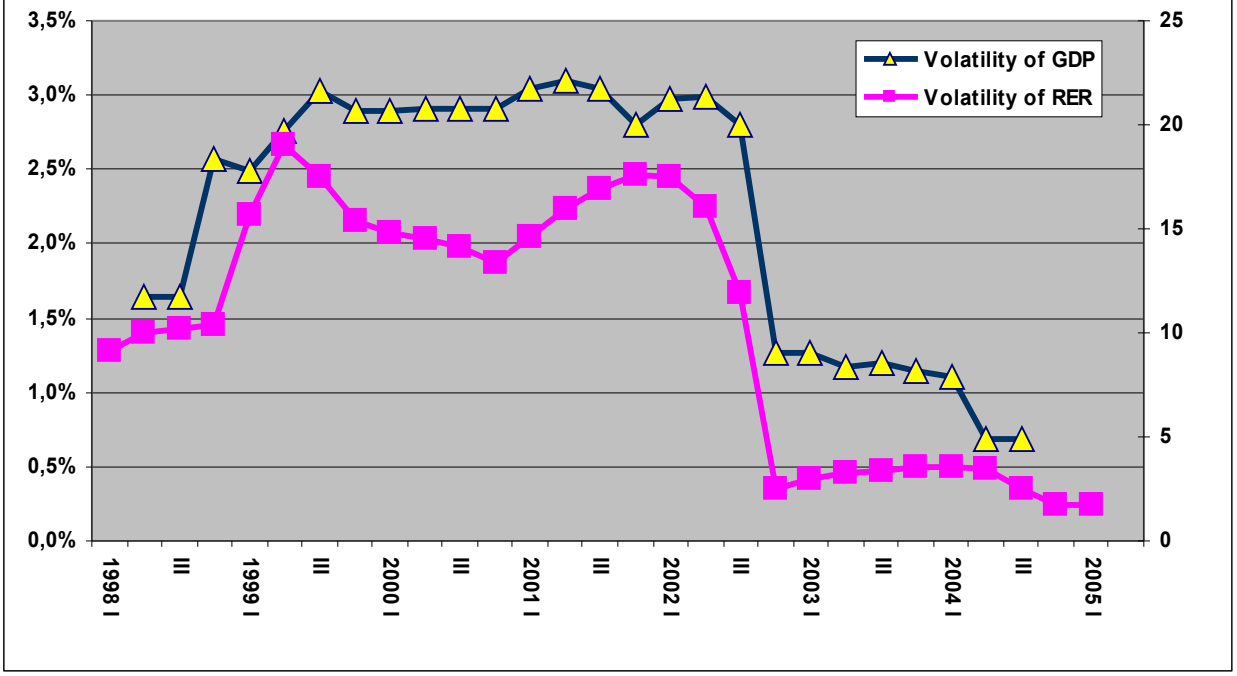
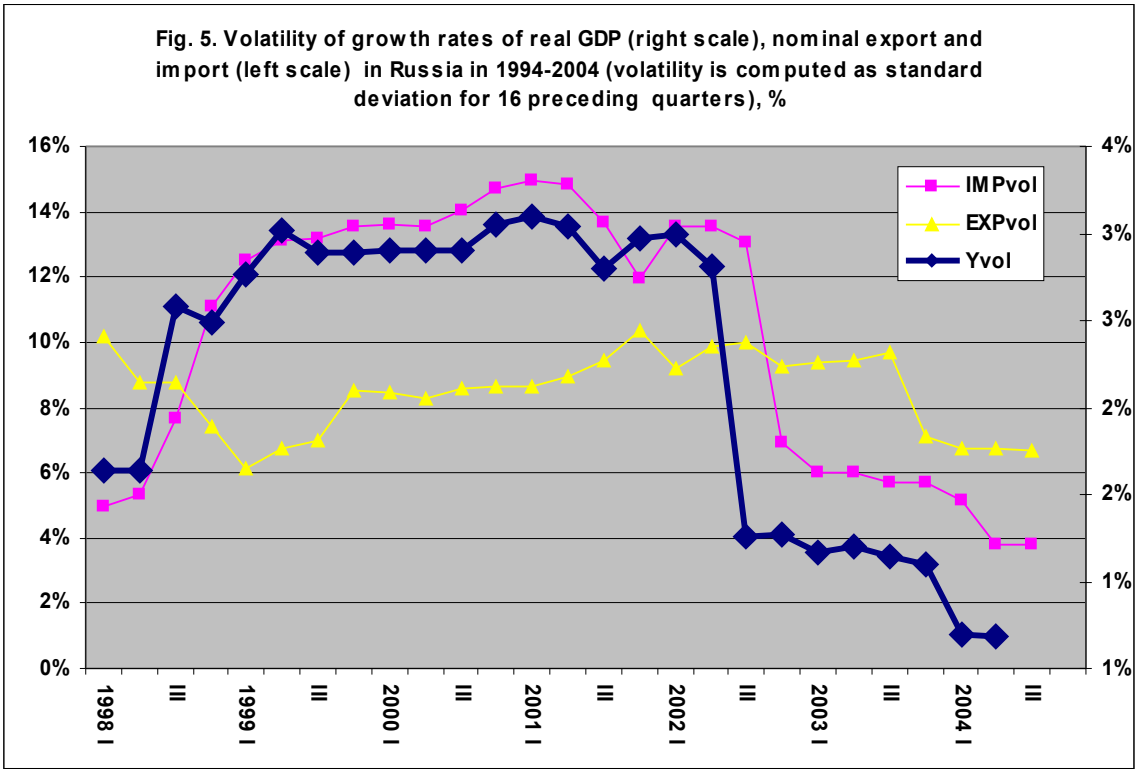
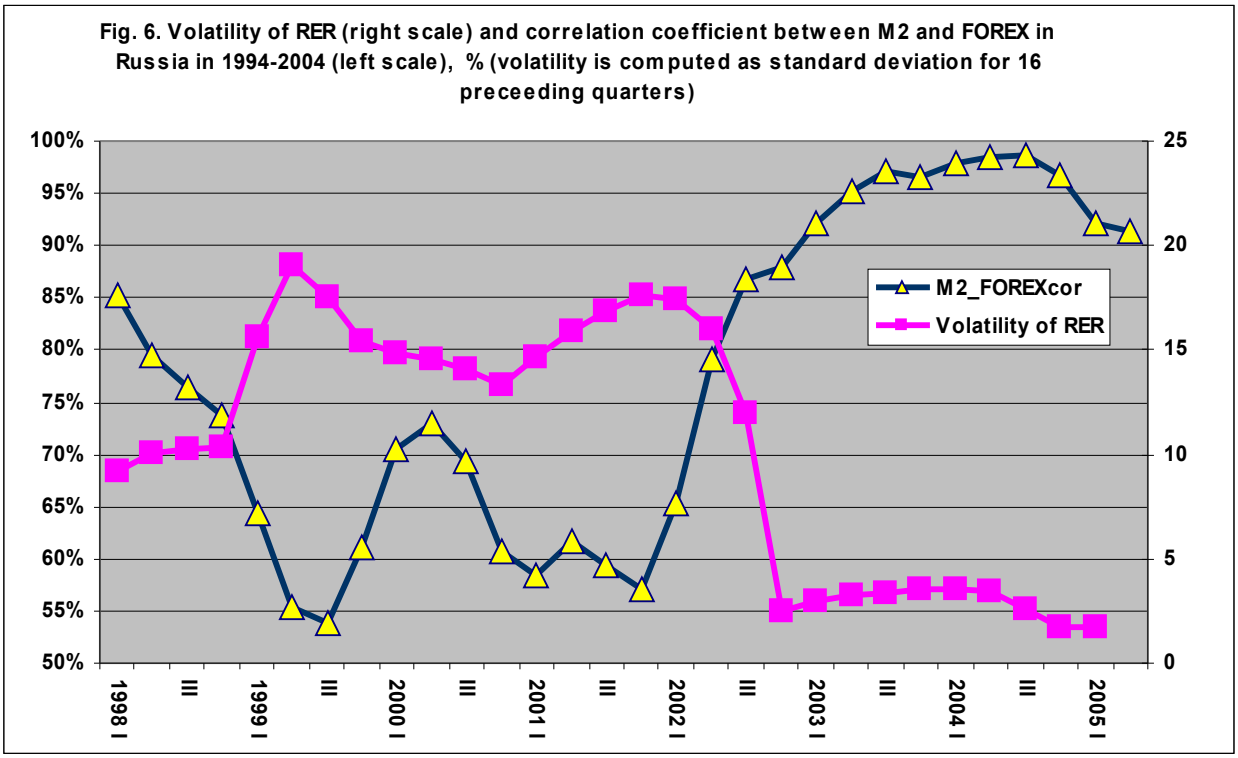


Fig. 5. Volatility of growth rates of real GDP (right scale), nominal export and import (left scale) in Russia in 1994-2004 (volatility is computed as standard deviation for 16 preceding quarters), %





Such a result – negative impact of sterilization on volatility of GDP – is directly the opposite from the result 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 relatively stable nominal rate (crawling peg), absorption of TT shocks by the fluctuations of FOREX, and sterilization of changes in money supply caused by the FOREX fluctuations. To reiterate, in cross country regressions no-sterilization policy (high correlation coefficient between FOREX and 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 shock, sterilization under fixed nominal rate means low correlation between FOREX and money supply, so the higher this correlation, 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 without any external shocks, high correlation between M and FOREX signifies the absence of internal shocks themselves – how can money supply change, if FOREX 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 fixed nominal rate this would immediately cause the increase in prices (hence increase in RER and additional RER volatility) and a drop in real interest rates, and later – the balance of

payments deficit (due to lower trade competitiveness and outflow of capital), decrease in FOREX and finally – the contraction of the money supply. Under fully flexible rate monetary expansion would also immediately cause increase in prices (hence increase in RER) and decrease in real interest rates, and later devaluation (with no changes in FOREX). In both cases initially RER would change, which is bad for volatility of GDP, while the correlation between money supply and FOREX would be low (money supply increases, but FOREX do not), so high GDP and RER volatility would be associated with low correlation between FOREX and M. High correlation between FOREX and M under the circumstances is possible only if money supply does not change without change in FOREX, i.e. there are no exogenous monetary shocks. That is why under the domestically generated monetary shock, lower volatilities of GDP and RER are associated with higher, not lower correlation coefficients between FOREX and M. This higher FOR_Mcor coefficient proves in fact 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, i.e. the volatility of growth resulted not so much from the volatility of terms of trade (even though TTvol was high and Russia was very dependent on exports of oil and gas with highly volatile prices).

Conclusions and policy implications

- In countries that export resources with highly volatile prices, like Russia, volatility of economic growth is associated with volatility of RER, which in turn is mostly caused by the inability to accumulate enough reserves in FOREX and SF.
- In Russia, volatility of GDP growth rates in recent 10 years was associated not so much with objective circumstances (TT shocks), but with poor macroeconomic policies – inability to keep the RER stable. Even more so, despite intuition, volatility of RER was caused by internal monetary shocks rather than by external terms of trade shocks.
- The good macroeconomic policy for Russia would be (1) not to generate monetary shocks (2) to cope with inevitable external shocks via changes in FOREX and SF, while keeping the RER stable.

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Reference: Popov, V., A. Peresetsky, V. Polterovich (2005). International Financial Architecture, Macro Volatility, and Institutions. Country Study – Russia. Working paper draft, available from vpopov@nes.ru