8
Russia

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8.1   Introduction

Would a particular country be willing to reduce volatility at the expense of lowering the long-term growth rate if there were a trade-off between volatility and growth? Fortunately, there is no such trade-off. As many studies have documented (see Aghion et al., 2004 for a recent survey of the literature) the relationship between volatility and growth is negative, that is, rapid growth is associated with lower volatility. This result holds if one compares fast- and slow-growing countries, as well as periods of fast and slow growth/recession in the same country. So, policies to promote growth, if successful, are likely to reduce volatility as well, even though the mechanism of such a spin-off is not well understood. Nevertheless, the volatility of macro variables cannot be totally explained by their growth rates: even when controlling for the average speed of change, there remain huge variations in volatility in various countries and periods.

Russia, following its 1992 transition to the market economy, was definitely one of the most volatile countries. The goal of this chapter is to identify sources of volatility in Russia in 1992–2004 and to examine the role of domestic and international financial architecture in propagating/mitigating economic instability. Following the introduction to the project (Fanelli, 2004), we organize the discussion around the five hypotheses formulated for the country studies.

In Section 8.2 we provide measures of volatility of Russian GDP, consumption, investment, external trade, capital flows, and financial markets and discuss the patterns of change of these indicators for particular periods of recent Russian economic development as compared to other countries. Import volatility, as in other countries, tends to be higher than export volatility, even though 50 per cent of Russian exports consist of oil and gas with highly volatile prices. In addition, it appears that the volatility of GDP is not very correlated with the volatility of exports, whereas the correlation of GDP growth with the volatility of imports is high due to the impact of GDP on imports, and not vice versa. These relationships signal the existence of other internal sources of volatility, which are identified later (monetary shocks).

Russia constitutes a somewhat special case in this study. It did not become a market economy until 1992, when prices were deregulated. It experienced huge supply shocks associated with the dramatic change in relative prices, institutional collapse, privatization, and so on during the transition to the market economy (from a centrally planned economy). Because of these special circumstances, aggregate Russian volatility in the first half of the 1990s was extremely high. For this reason we focus our analysis on the 1994–2004 period, that is, when the reduction of output due to the transformational recession (nearly a 40 per cent fall in 1989–94) was largely over.

In Section 8.3 we start with the investigation of the contributions of the external shocks (the change in oil and gas prices) to aggregate volatility. We show that the aggregate volatility of GDP growth rates is closely linked to the volatility of the real exchange rate (RER), whereas the volatility of the RER itself cannot be explained totally by the external (terms of trade and capital flows) shocks. A large portion of the variation of RER should be attributed to the bad quality of macroeconomic policy, not to objective circumstances like the external shocks. In particular, we argue that there are two basic flaws in Russian macroeconomic policy: (1) the inability to perform a countercyclical management of foreign exchange reserves in the Central Bank and in the Stabilization Fund (created in 2004) to stabilize the RER (accumulation of reserves in good times and running them down on 'rainy days'); (2) monetary shocks, the instability of monetary policy – the inability to ensure predictable and stable growth rates of money supply.

In Section 8.4 we examine the Russian financial system and its role in mitigating/propagating the volatility of the whole economy. The 1998 crisis resulted in the demonetization and dollarization of the Russian economy and the weakening of the banking system (which was not very strong to begin with). The security of contracts and contract rights were badly damaged when the Russian government defaulted on its bonds and Russian banks defaulted on their forward contracts and other obligations. It was not until 2000 that the ratio of bank assets and other financial indicators to GDP began to grow and it was not until 2002 that the share of long-term credits that fell sharply after the crisis began to rise again. According to our findings, in Russia we have a sort of vicious circle: crises + a volatile environment + deficiently designed institution-building and policies → low financial development → bad risk management → crisis → high volatility → worsening of policies and institutions.

In Section 8.5, we discuss the implication of our analysis for the reforms of the DFA and IFA. The general desirable direction of these reforms is quite obvious. For the DFA, better macroeconomic policy (changing FOREX in line with terms of trade, so as to keep the RER relatively stable; stable and predictable monetary policy without monetary shocks; control over the short-term capital flows) and a stronger financial system (tight prudential regulations guaranteeing financial contracts and the stability of financial institutions plus the easy access of economic agents to credits and financial contracts diminishing risks). For the IFA, greater availability of funds from foreign governments and international financial institutions to counter adverse terms of trade shocks and destabilizing

private capital flows, greater control over the short-term capital flows, and price-stabilization funds for commodities with highly volatile prices. However, these measures are not easily implementable due to political economy constraints, implying the existence of vicious and virtuous circles. We discuss the most promising way to break the Russian vicious 'volatility – poor DFA – volatility' circle.

8.2   Excess volatility and crises

Analysis of aggregate volatility

Russia became a market economy in January 1992, after prices were deregulated.[1] The transition to a market economy was associated with an unprecedented transformational recession: the reduction of output continued for 9 years (1990–98), GDP at the 1998 trough was only 55 per cent of the 1989 level. The recession was partly structural (caused by a dramatic change in relative prices after deregulation); it was partly due to the collapse of the state institutions (the increase in the crime rate and a shadow economy that worsened the business climate greatly) and should be partly attributed to poor macroeconomic policies, in particular high inflation of 1992–95 (up to several thousand per cent a year).[2]

In 1995 the Russian government enacted a program of exchange rate-based stabilization. It appeared to work for three years – the nominal exchange rate was generally stable (a crawling-peg regime), high inflation subsided to single digits, and in 1997 there was even a modest increase in GDP by 1 per cent. This stabilization, however, led to the appreciation of the real exchange rate; imports increased substantially, while exports stagnated (partly due to the fall in oil prices) producing a deterioration in the Russian balance of payments and the currency crisis of August 1998.

The month after the currency crisis, in September 1998, the Russian economy started to grow and is still growing. Initially, right after the crisis, there was an outburst of inflation in the last months of 1998, which later went down. Formally, Russia has had a floating exchange rate since 1998, but in reality it is a very dirty float with a virtually stable nominal rate. The real exchange rate has appreciated considerably since then and is not causing a balance of payments crisis only because of high world market fuel prices (fuel is a major Russian export).

To assess whether the economy experiences a degree of volatility that exceeds the one justified by fundamentals we use the magnitude of the volatility in developed countries as a benchmark, considering differences in the volatility between developing and developed countries as 'excess volatility'.

The sources of this 'excess volatility' could be classified in the following way:

- Excess volatility resulting from the external sector, for instance, from more volatile changes in terms of trade (Russia is more dependent than other countries on the export of commodities – oil and gas – with very unstable prices) and unstable capital inflows/outflows.

- Greater market imperfections in developing countries that do not allow the country to digest the natural shocks and thus avoid volatility (the reasons for these imperfections are associated partly with poor institutions, partly with the poor development of the financial sector that does not allow it to spread shocks intertemporally). A high share of commodities in exports does not preclude many open economies from limiting volatility to very low levels.
- Poor government policies in developing countries that do not mitigate natural shocks in the same way that these policies do in developed countries (partly due to bad institutions, partly due to political economy considerations).
- Poor government policies (due to political economy considerations) that create shocks and volatility by themselves, even in the absence of natural internal or external shocks.

Consider the volatility in output, for instance: in few countries, if any, has volatility in the recent decade been more pronounced – growth rates ranged from –15 per cent to +10 per cent. The bulk of this volatility was directly triggered by poor government policy. The supply-side recession (adverse supply shock) occurred due to immediate rather than to the gradual deregulation of prices, which resulted in huge changes in relative prices. For fuel, energy, steel, non-ferrous metals and food industries, the terms of trade shock was positive (relative prices increased), whereas most secondary manufacturing industries experienced a deterioration in the terms of trade. The exchange proportion of fuel and non-ferrous metals to light-industry goods (clothing and footwear) changed from 1:1 in 1990–91 to 1:3 in 1992 and afterwards. It is no surprise that light industry lost 90 per cent of its output in 1990–98. Generally, the reduction in output was strongly correlated with the change in relative prices.

Components of aggregate volatility

Even incomplete data show that volatility was extremely high during the first several years of transition (standard deviation of quarterly GDP growth rates was close to 10 percentage points in Latvia and Lithuania) and decreased to levels that are typical of market economies in 'good times', that is, in the absence of recession (1–2 percentage points), only by the end of the 1990s, that is, a decade after the shock associated with the deregulation of prices.

It is noteworthy that different measures of volatility[3] give very similar results. Figure 8.1 shows seasonally adjusted quarterly growth rates: seasonal fluctuations were eliminated in the first case through X11 procedure and in the second case through a simple 4-quarter moving average. The results are very much the same, as trends calculated by applying the Hodrick-Prescott (H-P) filter are virtually identical. Similarly, the rolling 16-quarter window standard deviations (computed as explained above, with the assumption of linear trend[4]) and from the trend computed by applying H-P filter are very much the same.

Investment in Russia, as in other countries, is the most volatile component of GDP. It could be expected that the volatility of consumption is lower than that of output because it is mitigated by a countercyclical behavior of government
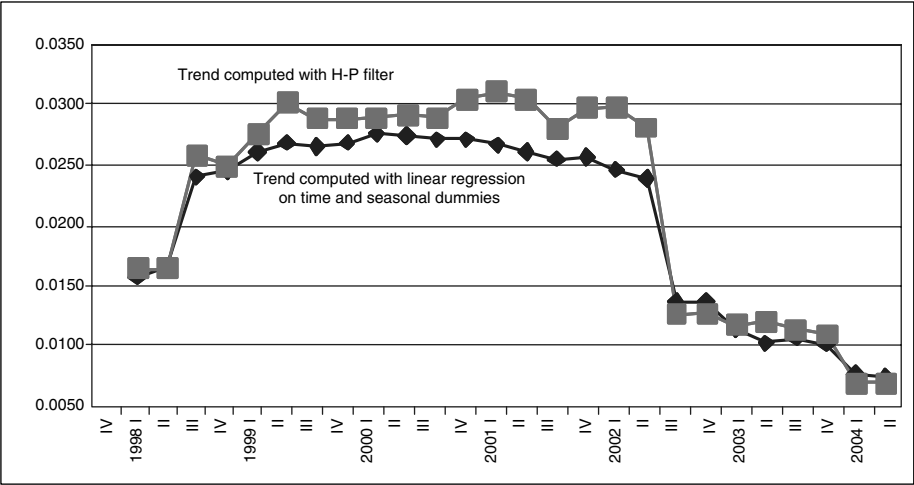
Figure 8.1 Volatility of quarterly growth rates of GDP (standard deviation from trend computed with and without H-P filter)

purchases of goods and services and, perhaps, net exports (if international capital markets help to smooth internal shocks). In Russia, however, volatility of consumption was higher in the 1990s than that of GDP suggesting that (1) external shocks probably contributed to total volatility, and (2) international financial markets did not help to lower the excess volatility of consumption (higher than the volatility of output).

This is further confirmed by looking at the volatility of exports and imports, which was way above that of GDP (Figure 8.2). Growth rates of exports and imports, unlike growth rates of GDP, are measured in current dollar prices, that
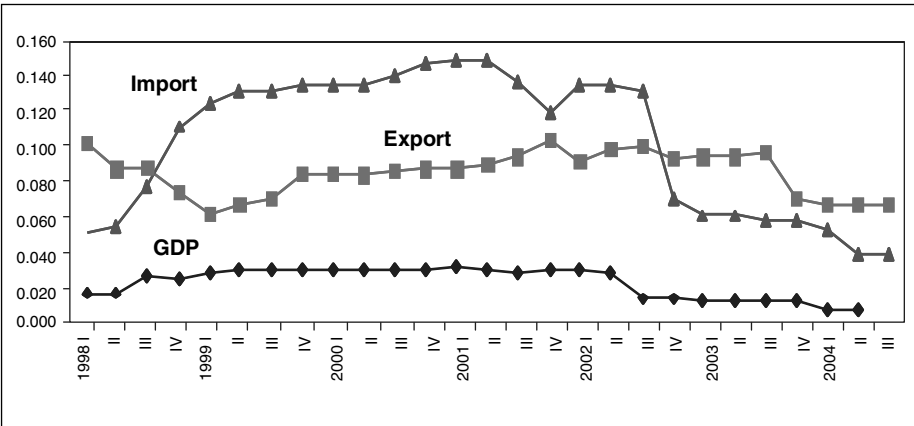

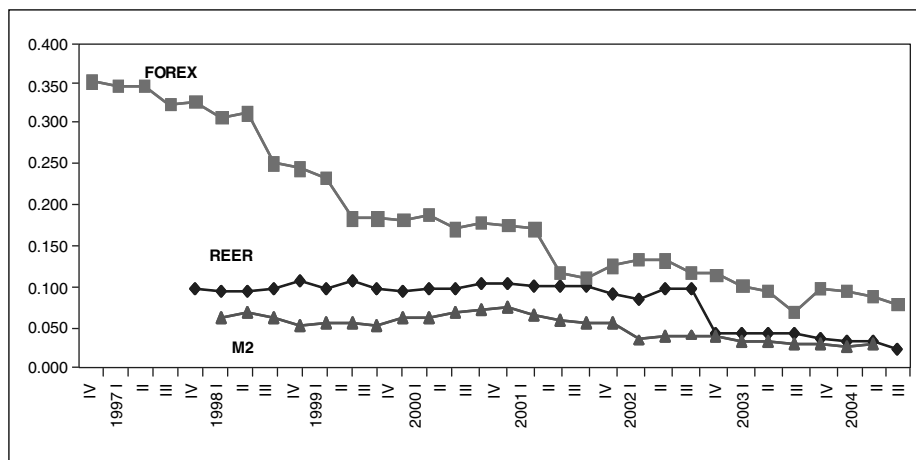*Figure 8.2* Volatility of quarterly growth rates of export, import and GDP, 1994–2004 (III)

Figure 8.3 Volatility of quarterly growth rates of real effective exchange rate, foreign exchange reserves and M2 to GDP ratio, 1994–2004 (III)

is, they include not only changes in volumes, but also changes in dollar prices for exported and imported goods (there are no indices of export and import prices in Russia, unfortunately). We will later examine prices of major Russian export items (oil and gas) to see what the contribution of these factors was to the total volatility of the value of exports and imports.

It is also of interest to look at the volatility of the real exchange rate (RER), which is comparable to the volatility of exports and imports, and the volatility of foreign exchange reserves (FOREX), which was extremely high before the August 1998 currency crisis, before and during the period of exchange rate-based stabilization (1995–98), which decreased afterwards, but was still twice as high as the volatility of RER in 2000–04 (Figure 8.3).

8.3   Structural factors, shocks, and excess volatility

Sources of volatility

Given the short period of existence of the market economy in Russia and the data constraint (as we have data for only ten years, which precludes the analysis of the volatility with annual data, we have to use quarterly data), it is reasonable to use cross-country regressions for the prolonged period – 1975–99 – to develop some understanding of the role of external factors in aggregate volatility and to apply these findings to Russian quarterly data to see if the results hold.

Some important conclusions from the cross-country regressions are the following (see note 4):

- The volatility of GDP growth rates, even after controlling for GDP per capita and average GDP growth rates, is higher for countries that are more

dependent on trade (higher trade to GDP ratio) and that experience terms of trade shocks (high volatility of terms of trade index or of the trade-GDP ratio).

- Private capital flows move synchronically with the terms of trade so that they exacerbate external trade shocks instead of mitigating them.

Using these predictions from cross-country regressions as a guide when considering the Russian story, we observe that the volatility of GDP growth rates in Russia is even more strongly linked to the volatility of external trade than in most other countries. Over 50 per cent of Russian exports consist of fuel goods (gas, oil, and oil products) with highly volatile prices. Among fuel exporting countries – all countries with the share of fuel in total exports of over 50 per cent are shown in Figure 8.4 – Russia is least dependent on fuel exports, but as compared to large countries (with larger or comparable GDP – Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Pakistan, UK, US) shown on the left side of the figure, the Russian Herfindahl index of export concentration is rather high. We need to bear in mind that the dominant export category for these countries is 'manufacturing goods', which include many different varieties of products with less volatile prices.

Despite intuition, however, it is import, not export, volatility that is closely correlated with the volatility of GDP growth rates. Additionally, 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.

Given the dependence on oil and gas exports, we could hypothesize that the volatility of Russian growth is caused by the terms of trade shocks, that is, changes in the world prices for oil and gas. However, the volatility of exports and
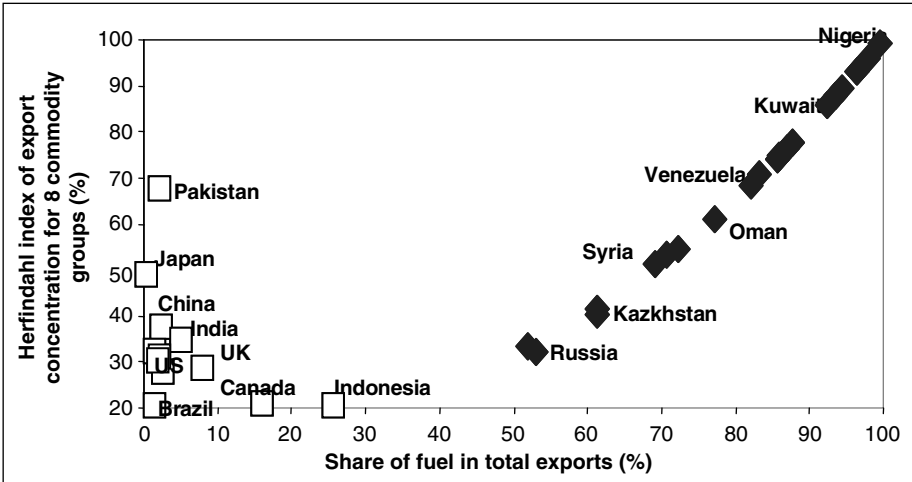

Figure 8.4 Share of fuel in total exports and Herfindahl index of export concentration for oil exporting countries (%, 2003 or latest available year)

volatility of oil and gas prices are not closely related to the volatility of GDP growth rates.

Overall, the volatility of GDP growth rates in 1994–2004 is very well explained by the volatility of external trade.[5]

$$GDPvol = -0.0015 - 0.11Ygr + 0.36TRvol$$

($N = 28$, $R^2 = 86$ per cent, all coefficients are significant at 1 per cent level, DW = 1.87), where
GDPvol – standard deviation from trend of GDP growth rates in 16 preceding quarters,
Ygr – average growth rates of GDP for 16 preceding quarters,
TRvol – volatility of nominal $ value of external trade (export + import) in 16 preceding quarters.[6]

However, this regression obviously captures the post-factum impact of GDP volatility on import volatility when import changes responded to changes in income (GDP). To analyze the mechanism of the influence of terms of trade shocks on the volatility of GDP, it is necessary to take a closer look at the changes in the real exchange rate and foreign exchange reserves.

Aggregate volatility and the current account
We compare the co-movement of output, investment, and private consumption (retail sales) in real terms and the current account in dollar terms. At face value
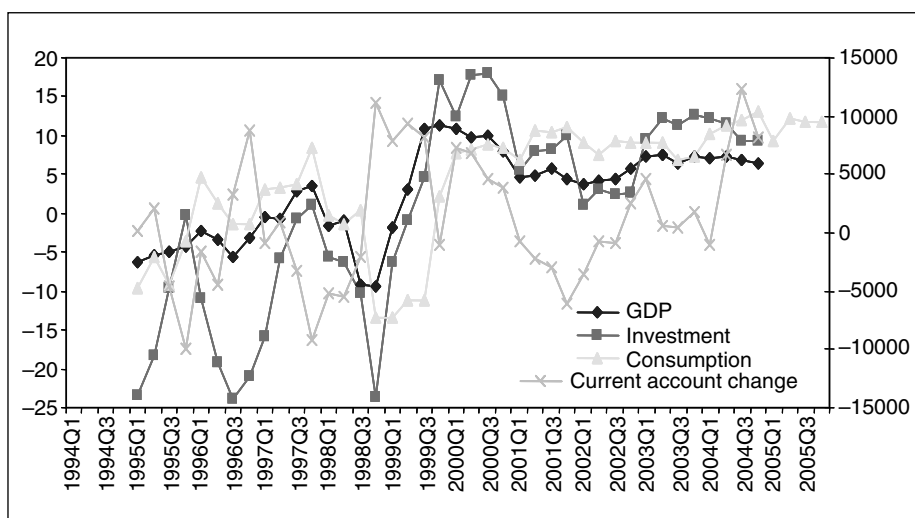

Figure 8.5 Annual (quarter to previous year quarter) change in real GDP, investment, private consumption (left scale) and quarter to previous year quarter increase in current account ($ million right scale)

(see Figure 8.5), consumption seems to fluctuate in line with the other components of GDP – less intensively than investment, but more intensively than output – which is typical of developing countries. In developed countries, the volatility of output is absorbed by the synchronical movement of savings (investment + government budget deficit + current account surplus) so that consumption is smoothed. But in developing countries, fluctuations of investment and the current account balance are not enough to reduce the volatility of consumption below the volatility of output.

Data show that the current account balance appears to change countercyclically with the gap between consumption and output growth rates. That is, when consumption grows faster than output, the current account deteriorates. It is thus plausible that there are mechanisms at work that smooth consumption – prevent it from growing faster than production (for instance: high growth of consumption → increase in imports → exchange rate depreciation → decline in imports and consumption). This was certainly the case after the August 1998 currency crisis: the dramatic devaluation of the ruble led to brisk improvement in the current account and a sizable drop in consumption (Montes and Popov, 1999).

It is quite obvious, though, that these mechanisms did not operate in the periods before and after the 1998 crisis, in 1995–97 and 1999–2006 (the exchange rate was de facto fixed and the real exchange rate was constantly appreciating, allowing consumption to grow faster than output). Under the de facto fixed exchange rate, sharp fluctuations in terms of trade (oil prices) led to unaffordable long-run increases in consumption. Additionally, periods of growing and high oil prices were often associated with a faster growth in consumption as compared to production.

Aggregate volatility and capital flows

Fanelli (2004) shows that a close relationship between the volatility of imports and exports exists in the case of both high-income and developing countries, although the volatility of imports tends to be higher than the volatility of exports in many countries, suggesting that the bulk of macroeconomic fluctuations falls on imports. This suggests that imports and exports are correlated and this is consistent with the Feldstein-Horioka puzzle (Feldstein and Horioka, 1980) according to which financial market imperfections are present all around the world and impede countries from generating large current account deficits.

The strong evidence emerging from the cross-country regressions (not shown here, but available from the authors upon request) is that private capital flows do not help to smooth consumption. The Russian experience in this respect is no different from the experience of other developing countries. To begin with, the Russian capital account (including unregistered capital flight appearing as 'errors and omissions' of the balance of payments) during the whole transition period was mostly negative, so Russia had to earn a positive current account to finance the outflow of capital. High risk, caused in part by poor DFA – macroeconomic uncertainty and weak financial infrastructure – placed Russia in a position of a

net lender to the world during times when the country badly needed not only domestic, but also foreign savings. Whereas all other transition economies in Eastern Europe and the former Soviet Union were net importers of capital over the last 15 years, Russia's savings – equal to several per cent of GDP annually – were flowing abroad, which predictably had an adverse impact on consumption. In 1994–2004, current account surplus was on average $23 billion a year; this surplus turned into deficit only once – in 1997, right before the currency crisis. By 2004, the surplus increased to $58 billion; the cumulative surplus in 1994–2004 totaled $250 billion.

To investigate the issue more closely, we grouped all capital flows into three categories: (1) *PCF* – net private capital flows (including sizable 'errors and omissions' in the balance of payments that are widely believed to be a euphemism for capital flight), the minus sign indicates the outflow of capital; (2) *NPB* – net borrowing by the public authorities, the minus sign indicates the outflow of capital; and (3) *dFOREX* – the increase in FOREX, the plus sign indicates the outflow of capital. The sum of these items equals the current account deficit (*CA*):

$$CA = PCF + NPB - dFOREX$$

It turns out that *PCF* moves mostly in line with oil prices (terms of trade), although the correlation is weak; *NGB* is negatively (also weakly) correlated with oil prices, whereas the increase in FOREX (*dFOREX*) exhibits quite a high positive correlation with oil prices.

Because it is known that real incomes and consumption in Russia are closely linked with terms of trade (fuel prices), the described relationships could mean that private capital flows do not help to smooth consumption, but contribute greater volatility, whereas net government borrowing and changes in foreign exchange reserves have a de facto stabilizing effect on consumption. This could be observed in figures 8.6 and 8.7 below: outflows of private capital are to an extent being balanced by the inflows of capital due to public borrowing and to a
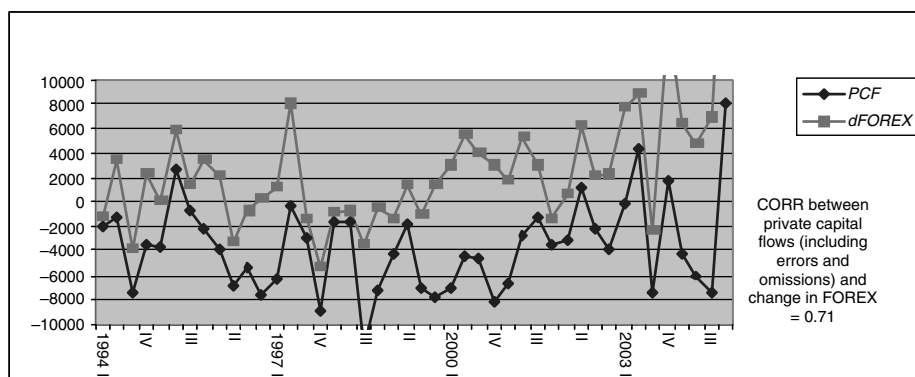

Figure 8.6 Private capital flows (including errors and omissions) and change in FOREX, 1994–2004 ($ million)
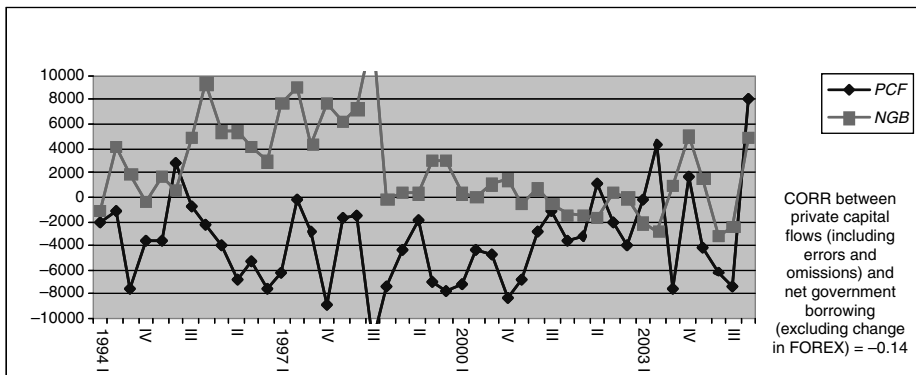
Figure 8.7   Private capital flows (including errors and omissions) and net government borrowing (excluding change in FOREX), 1994–2004 ($ million)

decrease in FOREX. To what particular extent? Does public policy – government borrowing and the management of reserves – counterweigh the negative effects of private capital flows on consumption volatility?

Options for managing terms of trade shocks

In 2005 Russia exported about 150 million tons of oil and 150 billion cubic meters of gas worth about $100 billion (all numbers have been rounded). The price of oil and gas varied greatly – only in recent decades have oil prices gone from $10 to over $60 a barrel ($60 to $360 a ton), and gas prices, which are strongly correlated with oil prices changed accordingly. In a rather bad (for Russia), but not totally unrealistic scenario 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, so that in five years there would be an accumulated $400 billion shortfall (Russian GDP at the 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 a country dependent on the export/import of commodities with highly volatile prices to cope with terms of trade (TOT) 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 an adjustment of nominal exchange rate or a change in money supply altering the rate 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).

Three options for managing TOT shocks under different exchange rate regimes are summarized in Table 8.1. Under a fixed exchange rate with no sterilization

Table 8.1   Options for managing the terms of trade shock for a resource exporting country

Patterns of change in variables/ Exchange rate and macro regime	FOREX	Nominal exchange rate	RER	Correlation between			
				FOR-M	TOT-FOREX	TOT-RER	FOR-RER
External shocks							
Fixed exchange rate without sterilization (currency board)	VOLAT	STABLE	VOLAT (prices)	HIGH	HIGH	HIGH	HIGH
Fixed exchange rate with sterilization	VOLAT	STABLE	STABLE	0	HIGH	0	0
Clean float	STABLE	VOLAT	VOLAT (nom. rate)	HIGH	0	HIGH	0

the nominal exchange rate is stable, but domestic inflation accelerates when FOREX expands due to a positive trade shock, so RER appreciates. Under a floating rate, a positive TOT shock causes the appreciation of the nominal exchange rate, which leads to the appreciation of RER. And only under a fixed exchange rate regime (including crawling pegs and dirty floats with nominal rate following a stable trend) with full sterilization of money supply changes resulting from FOREX fluctuations due to TOT shocks, can RER remain relatively stable – because all TOT shocks are absorbed by an increase/decrease in FOREX, which in turn are fully sterilized (Popov, 2003a; 2003b; 2005).

Empirical evidence: how Russia managed external shocks

The results from cross-country regressions suggest that good macroeconomic policies (which help to reduce volatility) are the following:

- Stable RER helps to reduce volatility of growth (in fact there is a strong correlation between volatility of GDP growth rates and volatility of RER).
- Stability of RER is achieved through policies of absorbing the TOT shocks via changes in FOREX and sterilizing the impact of FOREX fluctuations on money supply (high correlation of TOT and FOREX, low correlation between FOREX and RER and low correlation between M and FOREX).

To test this hypothesis explicitly we regressed volatility of GDP growth rates (cross-country regressions) on a variable for sterilization – correlation coefficient between FOREX to GDP ratio and M2 to GDP ratio (the higher this coefficient, the lower the sterilization of changes in the money supply resulting from the fluctuations of FOREX). The resulting equation is given below:

$$GDPvol = CONST. + CONTR.VAR. + 0.24TR/Y + 0.044TOTvol + 2.44FORvol - 1.65TOT\_FORcor + 1.23RER\_FORcor + 1.02M\_FORcor$$

($N = 58$, $R^2 = 47$, all coefficients significant at less than 8 per cent level, except for *TOTvol* coefficient, which is significant at 13 per cent level), where

Control variables – PPP GDP per capita in 1975, $, and annual average growth rates of GDP per capita in 1975–99 in per cent
M_FORcor – correlation coefficient between FOREX to GDP ratio and M2 to GDP ratio in 1975–99, and all other notations are same as before

It turns out that countries, which were carrying out sterilization policies (low *M_FOREXcor*), while responding to TOT shocks via changes in FOREX (high *TOT_FORcor*) and not allowing the RER to fluctuate together with FOREX (low *RER_FORcor*) were most successful at reducing the volatility of their economic growth.

The Russian story, however, is different from the international story that was derived from cross-country regressions. As Figure 8.8 suggests, the volatility of GDP is highly correlated with the volatility of the real exchange rate: periods of high volatility of Russian GDP growth appeared to be associated not so much with volatility of oil and gas prices, but rather originated in direct government mismanagement – the inability to keep the RER stable. Volatility of RER in time-series regressions for Russia turns out to be by far the most important and the most statistically significant variable.

As Figure 8.9 suggests, the high volatility of Russian GDP and RER are associated not so much with the volatility of oil prices, but with the absence of a sterilization policy – high correlation between changes in money supply (M2/GDP
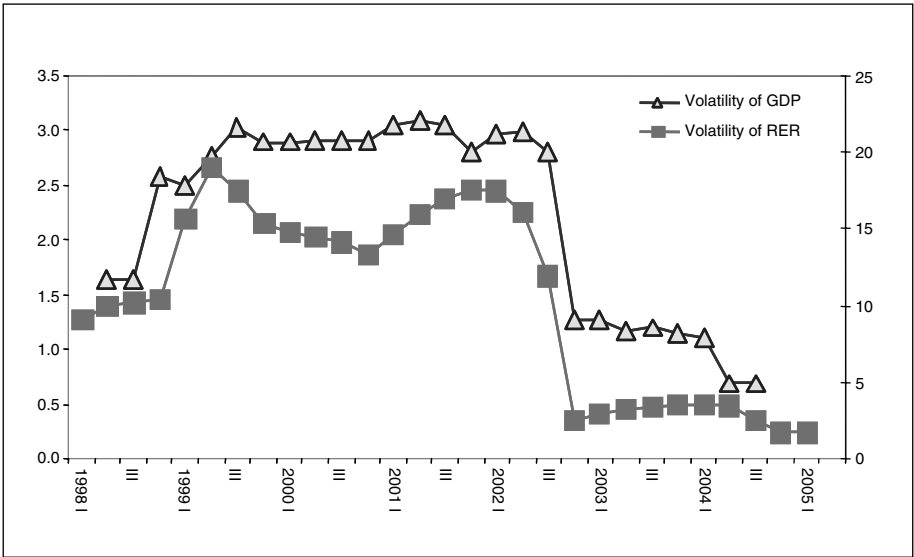

Figure 8.8   Volatility of GDP (left scale) and RER (right scale) in Russia, 1994–2005 (%)
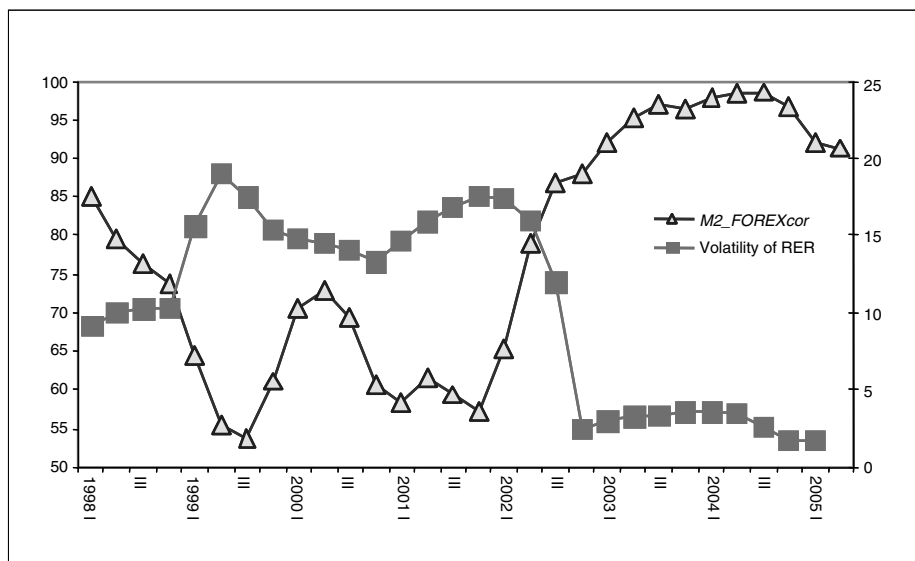
Figure 8.9 Volatility of RER (right scale) and correlation coefficient (left scale) between M2 and FOREX in Russia, 1994–2005 (%)

ratio) and foreign exchange reserves (FOREX/GDP ratio). The higher the correlation coefficient between M and FOREX was, the lower the volatility of RER and GDP – these indicators obviously move in opposite directions.

This puzzle is resolved by making the distinction between external and internal shocks. As was argued earlier (see Table 8.1), in the presence of an external shock, sterilization under a fixed nominal rate means a low correlation between FOREX and money supply, so the higher this correlation is, the less pronounced sterilization and the higher is the volatility of growth. But if shocks come from domestic sources, for instance from the central bank altering money supply without any external shocks, a high correlation between M and FOREX signifies the absence of internal shocks themselves – how can money supply change, if FOREX remains stable and all changes in money supply are sterilized? Consider, for instance, an exogenous increase in money supply by the CB 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 later, the balance of payments deficit (due to lower trade competitiveness and outflow of capital) and a decrease in FOREX, and finally the contraction of the money supply. Under a fully flexible rate monetary expansion would also immediately cause an increase in prices (hence, an increase in RER) and a decrease in real interest rates, and later devaluation (with no changes in FOREX). In both cases initially RER would change, which is bad for GDP volatility, while the correlation between money supply and FOREX would be low (money supply increases, but FOREX would not), so high GDP and RER volatility would be associated with a low correlation between FOREX and M. A high correlation between FOREX and M

Table 8.2 Impact of internal monetary shocks on volatility (no terms of trade shocks)

Patterns of change in variables/ Exchange rate and macro regime	FOREX	Nominal exchange rate	RER	Correlation between			
				FOR-M	TOT-FOREX	TOT-RER	FOR-RER
Internal monetary shocks (in the absence of external shocks)							
Fixed exchange rate without sterilization (currency board)	VOLAT	STABLE	VOLAT (prices)	0	0	0	HIGH
Fixed exchange rate with sterilization	Sterilization means the absence of internal monetary shocks by definition (high FOR_Mcor)						
Clean float	STABLE	VOLAT	VOLAT (nom. rate)	0	HIGH	0	0

under the circumstances is possible only if the money supply does not change without a change in FOREX, that is, there are no exogenous monetary shocks.[7]

Table 8.2 summarizes changes in the variables in question caused by an internal monetary shock. The bottom line is that, unlike in Table 8.1, which describes the dynamics of variables during the external shock, in this case, under the domestically generated monetary shock, lower volatilities of GDP and RER are associated with higher and not lower correlation coefficients between FOREX and M. These higher *FOR_Mcor* coefficients prove, in fact, that the exogenous monetary shocks are largely absent.

Regressions on Russian time-series data provide additional support for the existence of the described relationship. First, unlike in cross-country regressions, *TOTvol* does not have any significant explanatory power for *RERvol*, even when included on the right-hand side of the equation without any other variables. Although *TOTvol* matters for explaining the GDP growth rates volatility, the significance of coefficient of *RERvol* is much higher. Second, unlike in cross-country regressions, the correlation coefficient between *TOT* and *RER* is negative, not positive. And, third, unlike in cross-country regressions, *FOR_Mcor*, the correlation coefficient between M and FOREX, characterizing the absence of sterilization policies, enters on the right-hand side with the significant, but negative sign:

$$RERvol = 34.1 - 0.52AR(-1) - 30.7FOR\_M2cor - 4.7TOT\_RERcor + 0.01TOTvol$$

($N = 28$, $R^2 = 91$, all coefficients significant at less than 1 per cent level, except for *TOTvol*, which is insignificant (99 per cent); AR(–1) term is included because without it the Durbin-Watson (DW) statistic is bad)

and

$$RERvol = 16.5 + 0.95AR(-1) - 16.4 \ RER\_FORcorr$$

(N = 28, R^2 = 95, all coefficients significant at less than 1 per cent level; AR(–1) term is included because without it the DW statistic is bad), where

AR(–1) – volatility of RER in the preceding quarter
RER_FORcorr – correlation coefficient between RER and FOREX
FOR_M2cor – correlation coefficient between M2 and FOREX
TOT_RERcor – correlation coefficient between RER and FOREX
TOTvol – volatility of oil prices, $ a barrel

These equations imply that the volatility of RER is negatively, and not positively as in cross-country regressions, linked to the non-sterilization indicator (correlation between changes in FOREX and M2) and to the correlation between RER and FOREX. As was argued above, this is consistent with the assumption that the volatility of RER in Russia was primarily caused by internal monetary shocks: the expansion, for instance, of money supply without any apparent reason led to the increase in prices and appreciation of RER (higher volatility of RER); whereas TOT did not change (so the correlation between TOT and RER was low) and FOREX was stable (so the correlation between money supply and FOREX was low), the volatility of GDP was on the rise due to RER appreciation.

Hence, it may be hypothesized that the main causes of volatility in Russia were not foreign, but domestic, that is, the volatility of growth resulted not so much from the volatility of the terms of trade (even though *TOTvol* was high and Russia was very dependent on exports of oil and gas with highly volatile prices).[8] This is one of the main conclusions of this chapter: even in countries that export resources with highly volatile prices, like Russia, the volatility of economic growth could be associated not so much with objective circumstances (TOT shocks) as with poor macroeconomic policies – the inability to keep the RER stable. Poor macroeconomic policy, in turn, was largely inevitable in bad-quality institutions and a highly volatile and crisis-prone environment (see next section).

Figure 8.10 presents additional evidence of poor macroeconomic policy in Russia. First, Russia failed to respond to the TOT fluctuations by altering FOREX – only in 3 quarters out of 28, for which correlation coefficients between TOT and FOREX were computed for a 16-quarter moving window; these correlation coefficients were higher than 50 per cent. Second, for most sub-periods of 1994–2005 these correlation coefficients were moving in the direction opposite to the volatility of oil prices – when volatility of TOT increased, government policies of stabilization of RER through moving FOREX together with TOT were especially weak. Instead of mitigating the volatility from external shocks, the Russian government and monetary authorities were adding insult to injury by contributing to the economic volatility by generating their own monetary shocks.

In a regression linking RER volatility with the volatility of terms of trade (proxied by the volatility of oil prices) and the volatility of M2 growth rates, only the latter variable is significant, while the former is not:

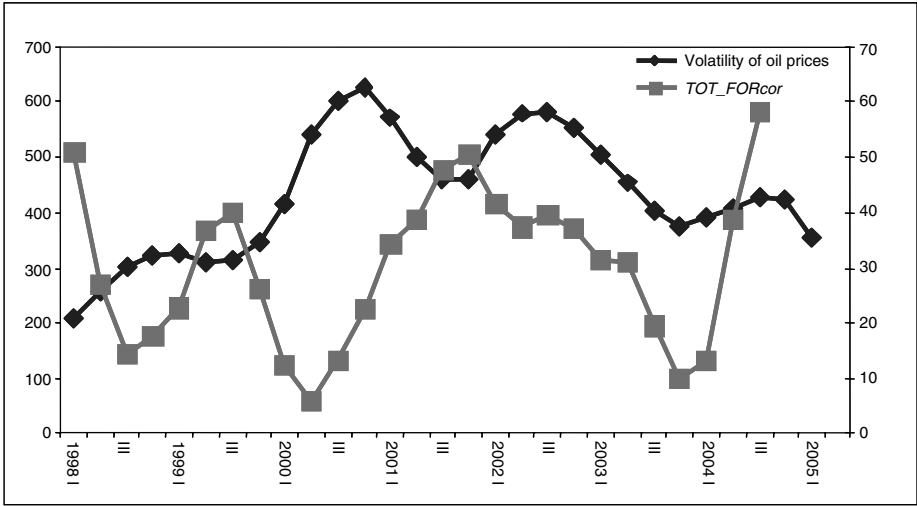$$RERvol = -0.02 + 0.83 AR(-1) + 0.01 TOTvol + 1.14 Mvol$$

Figure 8.10 Volatility of TOT (oil prices, cents a barrel – left scale) and correlation coefficient between TOT and FOREX (right scale, %) in Russia, 1994–2005

($N = 27$, $R^2 = 85$ per cent, DW = 2.08, all coefficients significant at 6 per cent level or less, except TOT volatility coefficient, which is insignificant), where:

Mvol – standard deviation of M2 quarterly growth rates in 16 preceding quarters

That is, the instability of RER is determined mostly by the instability of the money supply, not by the instability of the terms of trade.

Similarly, in a regression linking GDP growth rates volatility to TOT volatility, RER volatility and M2 volatility, all three explanatory variables are highly statistically significant:

$$GDPvol = -0.01 + 0.003TOTvol + 0.07RERvol + 0.27Mvol$$

($N = 28$, $R^2 = 87$, DW = 1.7, all coefficients significant at less than 2 per cent level).

That is, even controlling for the volatility of the terms of trade and the volatility of RER, the volatility of output growth in 1994–2004 in Russia was dependent on the volatility of money supply caused by unstable monetary policy.

8.4 The DFA, financial market failures, and aggregate fluctuations

Cross-country comparisons (Aghion et al., 2006) suggest that a higher level of financial development allows mitigating volatility resulting from domestic and external shocks.

In this section we examine the vicious circle between aggregate volatility and financial institutions: general economic volatility undermines the banking system and the depth of financial markets, leads to demonetization and dollarization of the economy, destroys the security of financial contracts, especially long-term contracts, whereas all these negative developments in DFA preclude the diversification of risks and thus do not create an environment that is conducive to the reduction of volatility. On the basis of the evidence provided in previous sections, we show that a volatile environment with deficient rules of the financial game (flawed financial liberalization, bad corporate governance, and fiscal imbalances) induced adaptive responses that severely hindered financial developments and ultimately resulted in low financial deepening.

Monetization and volatility

In virtually all countries that experienced high inflation, monetization fell and credits as a percentage of GDP decreased markedly. Figure 8.11 shows the demonetization of the Russian economy that occurred in recent years. To make it worse, there is a ratchet effect here, so that many years of low inflation will be necessary to drive monetization back to high levels.

Many transition economies experienced a similar collapse in monetization and bank credit due to high inflation. In fact, only China and Visegrad countries managed to avoid dramatic declines in real bank credit by keeping inflation in check, whereas in FSU states and even in most Balkan countries the ratio of bank credit to GDP fell several times.

The collapse of bank credit was part of the broader process of the demonetization of the economy under high inflation: due to dollarization, barterization and the accumulation of payment arrears in inflationary transition economies,
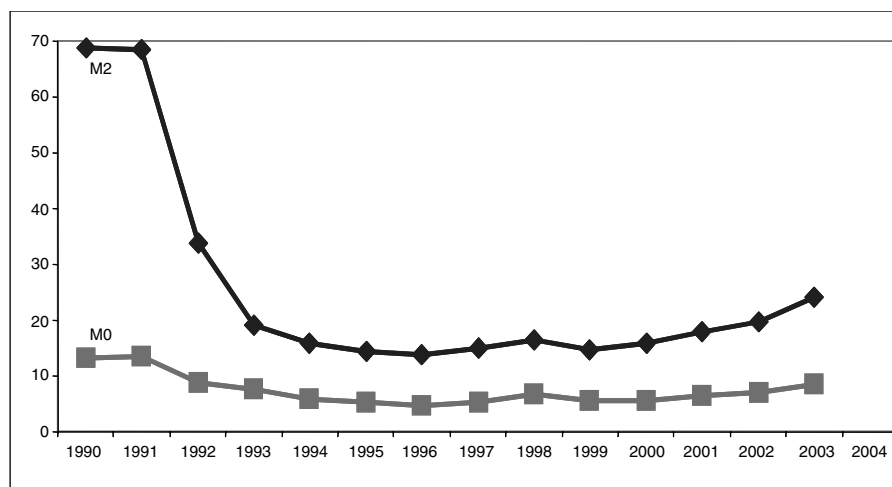

Figure 8.11   Monetary aggregates (end of year), 1990–2004 (% of GDP)

M2/GDP ratios decreased markedly, that is, money velocity jumped due to the proliferation of explicit and implicit money substitutes, such as foreign currency, barter trade, and non-payments. As the data suggest, there is a strong link between inflation and demonetization, between demonetization and total domestic bank credit, and between the latter and credit to the private sector in particular.

Under the Soviet government, total bank credit to enterprises exceeded half of GDP with long-term credits alone amounting to 12 per cent of GDP. After the deregulation of prices in 1992 the demonetization of the economy proceeded surprisingly quickly: total bank credits outstanding fell to about 10 per cent of GDP by the end of 1996, while the long-term credits shrank to less than 1 per cent of GDP.[9] When the possibility of the bank crisis was discussed in the summer of 1996 the frequently-made argument was that the total bank assets were so small as compared to the size of the economy that even the collapse of major banks would not become a disaster.

Like the cross-country regressions for the longer period of time, regressions on Russian time series prove the negative relationship between monetization and volatility of growth rates:

$$GDPvol = 0.001 + 0.002TOTvol - 0.001RERvol - 0.014M2/Y$$

($N = 28$, $R^2 = 96$, all coefficients significant at less than 1 per cent level, DW = 2.28), where

GDPvol – standard deviation from trend of GDP growth rates in 16 preceding quarters
TOTvol – volatility of world oil prices, \$ a barrel, in 16 preceding quarters
RERvol – volatility of RER index in 16 preceding quarters
M2/Y – ratio of M2 to GDP in preceding 16 quarters

As in cross-country regressions, there is an issue of endogeneity between monetization and volatility, so we used Granger test for likely causation (see Table 8.3). It turned out that *M2/Y* ratio is a good predictor for the volatility of growth rates lagged by 1 and 2 quarters, whereas volatility of GDP growth rates best predicts the level of monetization 5 to 7 quarters afterwards. This is generally consistent with intuition: it takes little time (1–2 quarters) for monetization to influence volatility, but a longer time (1–2 years) for volatility to have a negative impact on monetization.

Banking system and volatility

In the first half of the 1990s Russian enterprises mostly relied on internal financing and to a lesser extent on bank financing, whereas government bonds and stock markets emerged virtually from scratch only in 1995–98. During the August 1998 currency crisis Russia defaulted on government bonds and the stock market crashed. In the subsequent years the stock market recovered, but the government bonds market remained weak.

Table 8.3 Granger test for *Yvol* and M2/Y ratio

Null hypothesis	Obs	F-Statistic	Probability
Lags: 1			
Yvol does not Granger cause M2/GDP ratio	27	2.39429	0.13487
M2/GDP ratio does not Granger cause *Yvol*		7.55532	0.01118
Lags: 2			
Yvol does not Granger cause M2/GDP ratio	26	1.15675	0.33375
M2/GDP ratio does not Granger cause *Yvol*		3.82788	0.03825
Lags: 3			
Yvol does not Granger cause M2/GDP ratio	25	0.80677	0.50645
M2/GDP ratio does not Granger cause *Yvol*		2.52268	0.09030
Lags: 4			
Yvol does not Granger cause M2/GDP ratio	24	0.96659	0.45430
M2/GDP ratio does not Granger cause *Yvol*		2.04690	0.13911
Lags: 5			
Yvol does not Granger cause M2/GDP ratio	23	3.16093	0.04752
M2/GDP ratio does not Granger cause *Yvol*		1.52748	0.25322
Lags: 6			
Yvol does not Granger cause M2/GDP ratio	22	5.60612	0.01118
M2/GDP ratio does not Granger cause *Yvol*		1.26271	0.36126
Lags: 7			
Yvol does not Granger cause M2/GDP ratio	21	11.5075	0.00421
M2/GDP ratio does not Granger cause *Yvol*		1.97461	0.21263
Lags: 8			
Yvol does not Granger cause M2/GDP ratio	20	5.73996	0.08913
M2/GDP ratio does not Granger cause *Yvol*		2.02097	0.30415

One of the strong beliefs in Russia is that the expansion of the market for government bonds in 1995–98 was counterproductive because limited savings were used for the construction of the financial pyramid rather than for investment in tangible assets. Enterprises switched to barter exchange, and non-payments mounted because investment in government bonds was so much more profitable.

Some elements of the DFA may cause more volatility than others depending on the stage of development. One of the hypotheses may be similar to that of Bolton and Freixas (2000) – they suggest that the equilibrium combination of bank credit, bond and equity financing depends on the riskiness (credit rating) of the firms. Their analysis may be applied to industries and whole economies at different stages of development and with different investment climates (that is, under a poor investment climate, equity and bond financing do not work that well). Most transition economies developed a German-Japanese institution-based financial system, whereas Russia's very low concentration in the banking sector, which is focused mostly on payment functions rather than on deposit-credit

operations, may be an exception (Popov, 1999). In Russia's highly volatile high-risk environment, bond and stock markets cannot function that well, but the banking system fills the gap because of its weak and low concentration (owing to historical reasons).[10] This may be exactly the case of a 'low-institutional high-volatility trap equilibrium' described in Fanelli (2004).

After high inflation in the first half of the 1990s the credit/GDP ratios, like the M/GDP ratios, fell dramatically, to levels several times lower than in developed countries, and even several times lower than the ones that had been observed in the late 1980s in Russia itself, when the economy was centrally planned. These ratios only began to recover very slowly during the short-lived period of macroeconomic stabilization of 1995–98, falling again after the currency crisis of 1998. In 1996–98 the Central Bank of Russia introduced regulations that were very similar to those required by the Basel I Accord, although this did not save Russian banking from bankruptcy or license withdrawal after the August 1998 currency crisis. The number of commercial banks in Russia decreased from 1697 on 1 January 1998 to 1274 on 1 January 2001 and remained around this level afterwards (1249 on 1 January 2006). CBR intends to comply with Basel II Accords by 2008–09.

Credits to and deposits of non-financial enterprises as a percentage of GDP reached the bottom in 1999, one year after the crisis, whereas total assets of the banking system and deposits of individuals as a percentage of GDP continued to decline for another year and bottomed out in 2000 (see Table 8.4). From that time virtually all items of assets and liabilities of banks as a percentage of GDP

Table 8.4　Selected balance sheet indicators of the Russian banking sector (% GDP, end of period)

Indicator	1998	1999	2000	2001	2002	2003	2004
Number of operating credit institutions	1476	1349	1311	1319	1329	1329	1299
Assets	39.8	32.9	32.3	35.3	38.3	42.4	42.5
Capital (own funds)	2.9	3.5	3.9	5.1	5.4	6.2	5.6
Funds attracted from physical persons	7.6	6.2	6.1	7.6	9.5	11.5	11.7
Funds attracted from enterprises and organizations	10.7	9.7	9.9	10.1	10.1	10.5	11.8
Credits extended to non-financial enterprises and organizations	13.0	9.9	11.0	13.2	14.7	17.2	18.8
Credits extended to non-financial enterprises and organizations as percentage of total assets	32.7	30.1	34.1	37.4	38.4	40.6	44.2

Source: Central Bank of Russia.

increased gradually (the slowdown of growth of personal deposits to GDP ratio in 2004 was associated with the small banking crisis in the summer 2004), but only in 2003–05 did they reach pre-crisis levels (see Table 8.4). Banks are now more involved in the financing of the real sector of the economy. (Before the crisis they preferred to operate in the government securities market (GKO) which was less risky and much more profitable.) Credits extended to non-financial enterprises and organizations to GDP ratio in 2004 (42.5 per cent) are still lower than those in East European countries (67–121 per cent) and much smaller than in the EU (280 per cent).

Equity (banks' own capital) as a proportion of GDP has increased twofold since the crisis – from 2.9 per cent in 1998 to 5–6 per cent in 2003–04 (see Table 8.4), whereas the ratio of banks' own capital to total assets[11] grew from 7 per cent in 1998 to 13–14 per cent in 2003–04, which is believed to be prudent enough to ensure the stability of the banking system. This ratio stays at about 5–6 per cent for developed countries and 20 per cent for some countries in Africa and Latin America. On the one hand, it may be argued that the banking system today is more stable than before the crisis. On the other, this is a definite sign of the poor credibility of the banking sector – doubling equity to assets ratio was needed just to restore the level of development of the banking system that existed before the crisis.

The concentration in the banking sector increased after the 1998 crisis (due to the bankruptcy and closure or mergers/restructuring of many smaller banks). However, Russia still has too many banks and the process of concentration significantly slowed down after 2001. One positive sign, though, is that the determinants of successful performance of banks after the 1998 crisis do not look as extraordinary as they did before the crisis. In the post-crisis period the probability of default of banks depends negatively on their profit before taxes, negatively on loans to non-financial institutions and positively on the amount of overdue loans. Before the crisis the coefficients of these variables were insignificant and/or had the 'wrong' signs (Peresetsky et al., 2004), which could have been caused by poor accounting practices, as well as by the existence of 'pocket banks' of enterprises and large investment into government securities.

Dollarization, contract duration, and volatility

The 1998 crisis seriously impacted the credibility of the national currency: the share of total loans denominated in rubles (which was quite low to begin with) fell in the anticipation of and during the crisis from 60 to 30 per cent and could only recover the pre-crisis level by 2001. After the crisis, the share of ruble loans grew in all segments. In 2001–03 these shares were stable, but from 2004 the share of ruble loans started to increase again. Most of the short-term (less than 1 year) loans from 2000 were denominated in rubles. But the share of long-term loans (over 1 year) only reached pre-crisis levels (about 50 per cent) in 2004. The longer the term of the loan, the greater the share of dollar-denominated loans in total credits. This means that the credibility of the central bank in ensuring the stability of the ruble exchange rate is still quite low. So, when it comes to issuing

loans of one year and more, banks prefer to denominate these loans in hard currency rather than rubles. The effect of the 1998 crisis on the denomination of long-term loans lasted for a full six years (1999–2004).

The impact of the 1998 crisis on the duration of loans was a bit less pronounced but much more lasting than the impact on the credibility of the national currency. The share of 'long loans' (with over 1 year duration) decreased from nearly 50 per cent right after the crisis, in the first quarter of 1999,[12] to below 30 per cent in 2001–02. From 2002, the share of 'long' loans steadily increased, but was still below the 1999 level of nearly 50 per cent even by mid-2005.

Regarding credits to non-financial enterprises and organizations by loan duration, the central bank registered an increase in the share of long-term (> 1 year) loans from the end of 2001. The largest share of ruble loans falls on credits of the duration of between 6 months and a year and 1–3 years, whereas the largest share of foreign currency loans is provided for the duration of 1–3 years, 6 months–1 year and >3 years. Banks are obviously more inclined to denominate long-term loans in foreign currency.

Effects of the 1998 crisis on the denomination and the term structure of credits

Figure 8.12 demonstrates the relationship between GDP volatility and the share of ruble and long credits in total credits. Remember that the GDP volatility is measured for the period of 16 preceding quarters, so that the volatility shown for
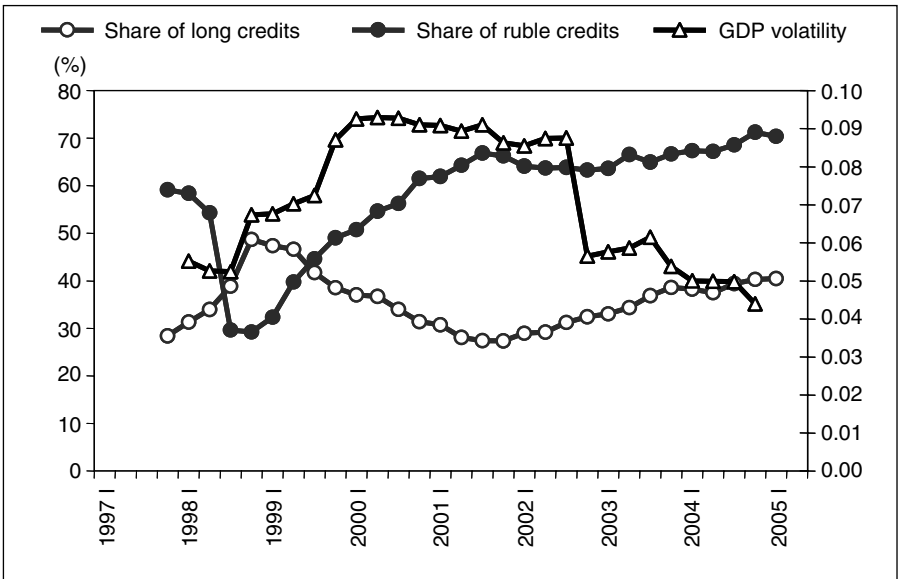

Figure 8.12   The volatility of GDP versus share of ruble credits and share of long credits, 1997–2005

the first quarter of 1998 is, in fact, the volatility of GDP for the period of 1994/1–1997/4. Taking this into account one can observe a very sharp, but short-lived dollarization impact of the 1998 crisis and a substantial and extremely lasting negative impact on long-term financial contracts. That is, the credibility of the national currency that was undermined by the 1998 crisis was restored quite quickly, reaching pre-crisis levels in just two years, whereas the credibility of financial contracts, as measured by the share of long-term credits, only approached pre-crisis levels in the 2004–06 period after the crisis. Credit markets definitely have a longer memory than currency markets. Default on government bonds in August 1998 thus seems to have done more damage than the devaluation.

Figure 8.13 is even more telling; it shows the share of long-term credits against the share of credits in rubles. It is obvious that the positive correlation between the share of long-term credits and the share of ruble credits, observed over the 1998–2004 period, was interrupted by the 1998 financial crisis (points for 1–2 quarters of 1998 are more in line with points for 2002–04 than they are with the points for the period of 3/1999 to 4/2002). The 'stable' relationship between the share of ruble credits and the share of long-term credits would have been a positive one if it had not been interrupted by the 1999–2002 period, when the relationship between these variables was negative owing to a lag in the reaction of credit markets to a crisis as compared to currency markets.

Main problems of risk management under excess and extreme volatility

It seems obvious that Russia's 1998 currency crisis badly damaged the emerging and still very weak system of financial institutions. It led to a new demonetization
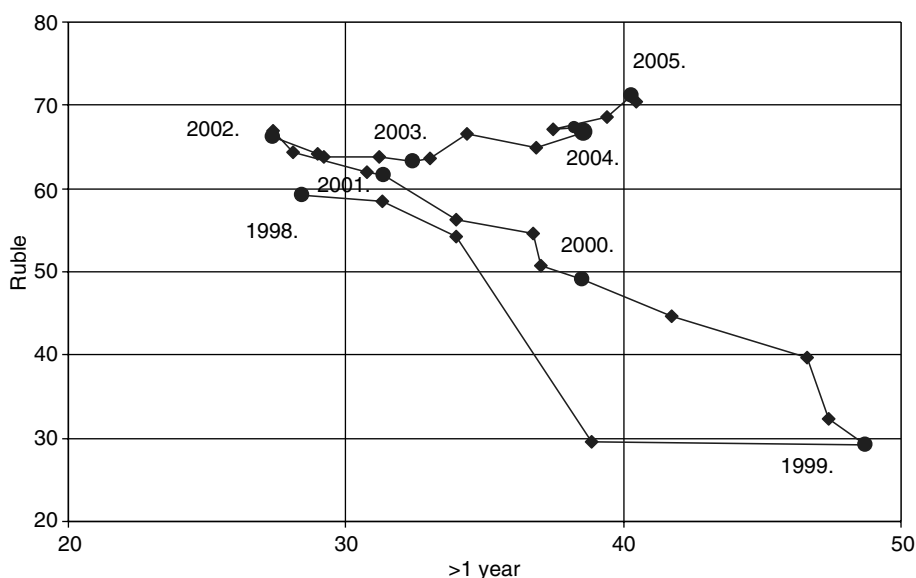

Figure 8.13 Scatter plot: share of ruble credits versus share of long credits (%)

and dollarization of the Russian economy, completely wiping out all modest positive trends that had been observed during the short-lived macrostabilization of 1995–98. It took two to six years of non-stop economic growth in a favorable external environment (high oil prices) to achieve pre-crisis levels of monetization and the credibility of the national currency. In addition, the crisis undermined the security of financial contracts – only six years after the crisis did the share of long-term credits in total loans approach the pre-crisis level. In turn, the weakness of financial institutions obviously makes another financial crisis more probable. How does one break this vicious circle?

The strength of the national banking and financial system is supposed to help reduce the volatility of growth almost by definition – because it contributes to the inter-temporal distribution of risks in the economy. It is not exactly clear, however, what particular regulations help to build a healthy banking and financial system. Prudential regulations were strengthened in Russia after the 1998 crisis, and some obvious fraud schemes (like financial pyramids) were prohibited. But prudential regulations in the East Asian countries largely conformed to the Basel guidelines, which did not insulate them from the crisis. The ratio of liquid assets of banks to their total assets does not seem to have had an impact on volatility in cross-country regressions. This indicator has a predicted (negative) sign, but is not statistically significant. Indeed, institutional memory – traditions that emerge from learning by doing, including traditions in the enforcement of regulations – probably has greater impact on the stability of the financial system than particular prudential regulations themselves.

A more promising way to break the 'volatility–institutions–volatility' vicious circle seems to be the creation of built-in stabilizers and checks and balances that preclude irresponsible macroeconomic policies. Strong financial institutions cannot emerge in the macro-unstable environment, whereas a responsible macroeconomic policy can be carried out even with weak financial institutions. Hence, the first thing to do is to break the vicious circle in macroeconomic policy. If it is not straightened out, the chances for successful financial institution-building are close to zero. After all, unlike the East Asian currency crises that were caused by private sector over-borrowing and over-lending, the Russian 1998 financial collapse was produced by the wrong macroeconomic policy – exchange rate-based stabilization leading to the overvaluation of the RER. This is exactly how poor macroeconomic policies destroyed the entire efforts to create a solid financial infrastructure.

8.5   Conclusions

In a closed economy volatility of growth is associated with domestic supply and demand shocks in various markets. These shocks are inevitable, but the government can mitigate their impact by making markets more competitive and carrying out stabilization policies. Furthermore, the government itself can generate shocks or strengthen autonomous shocks by carrying out 'wrong' policies. In an open economy, especially in an economy that exports/imports resources with

highly volatile prices, there are additional sources of volatility – external shocks associated with terms of trade changes and volatile private capital flows (which, unfortunately, reinforce terms of trade shocks instead of mitigating them). Thus, in an open economy, the government should assume another responsibility – managing the external shocks in such a way as to reduce their impact on the volatility of the national economy. With new responsibilities come new dangers, however: an open economy becomes not only vulnerable to external shocks, but also to new policy mistakes in managing these shocks. Instead of mitigating external shocks the government with the 'wrong' policies can reinforce existing shocks or even create new ones.

The volatility of GDP growth rates in Russia in the first half of the 1990s was due mostly to the unique policy-generated supply shock – the immediate deregulation of prices that created the need to reallocate resources between industries. The impact of this shock, together with the collapse of state institutions (another supply shock), caused an unprecedented reduction of output (about 40 per cent in 1989–95). By 1995, however, the impact of this initial shock was largely over and subsequent development was very much comparable with that of a typical resource-exporting developing country or emerging market economy. We focus in our study on this latter period (1994–2004), when domestically generated real shocks largely exhausted themselves, and conclude that the volatility of output was caused mainly by poor macroeconomic policies – not only did the government and the central bank do a poor job in managing external shocks, but they also contributed to the instability by generating monetary shocks themselves. As a result, the volatility of the GDP quarterly growth rates in Russia in the first part of the period in question (1994–2000) was not only higher than in developed countries, but also one of the highest in the world (standard deviation of 3 p.p.). Only in the second period (2000–04) did volatility decrease to levels observed in other developing countries for quarterly GDP growth rates (1 or 2 percentage points).

In countries that export resources with highly unstable prices, like Russia, the excess volatility of economic growth is associated mostly with the volatility of RER, which, in turn, is caused mainly by the inability to accumulate enough reserves in FOREX and in a Stabilization Fund. The option of attracting foreign capital during difficult times, when the country faces a negative trade shock, seems to be unavailable for resource-based developing countries because private capital flows change procyclically with terms of trade, thus reinforcing the trade shocks, whereas official capital flows, even though they may be countercyclical, are not enough to compensate the destabilizing effect of private capital movements.

Volatility in Russia is obviously associated with the volatility in the terms of trade – in fact GDP and investment growth rates closely follow the dynamics of world oil prices. However, it is the volatility of Russian imports, not exports, that exhibits the highest correlation with the volatility of GDP and it is the result rather than the cause of the GDP volatility. The link between TOT volatility and GDP volatility is RER and the complication is that the RER can change not only

in response to TOT and capital flows shocks, but also due to internal monetary shocks that have played a prominent role in Russia in the past ten years.

It turns out that volatility of RER is linked positively (although not significantly) to the volatility of terms of trade, to the correlation between FOREX and M (no sterilization indicator), positively and significantly to the correlation coefficient between FOREX and RER (suggesting that volatility of RER is higher, when, for instance, the accumulation of FOREX cannot prevent the appreciation of RER), but it is linked negatively to the correlation coefficients between TOT and FOREX (that is, when FOREX does not change in response to TOT shocks, RER changes) and between TOT and RER (suggesting that when RER changes without TOT shocks, that is, due to domestic shocks, this correlation coefficient is low and volatility of RER is high).

Whereas in cross-country regressions the volatility of output and RER was lower in countries that carry out sterilization policies (low correlation between FOREX and M), Russia's experience was exactly the opposite: periods of high volatility of output and RER were associated with a higher sterilization activity of the central bank. This means that the monetary authorities, unlike in other countries, were generating shocks themselves instead of mitigating external shocks. The pre-1998 currency crisis monetary policy is a case in point – despite the fall in oil prices in 1997–98 the central bank was tightening monetary policy in an attempt to prevent the devaluation of a grossly overvalued exchange rate of the ruble that finally led to balance of payments and currency crises.

Therefore, the main causes of volatility in Russia were not foreign, but domestic. That is, the volatility of growth resulted not so much from the volatility of terms of trade (even though TOT volatility was high and Russia was very dependent on oil and gas exports with highly volatile prices). This is one of the main conclusions of our chapter: even in countries that export resources with highly volatile prices, like Russia, the volatility of economic growth could be associated not so much with objective circumstances (TOT shocks), but with poor macroeconomic policies – the inability to keep the RER stable.

Private capital flows did not help to reduce the volatility of GDP and consumption, but rather reinforced the effects of TOT shocks on volatility. Even more surprising is the fact that fluctuations in FOREX contributed to the volatility of consumption rather than to smoothing consumption. After controlling for changes in output (which also moves largely synchronically with oil prices and consumption) it turns out that fluctuations in FOREX were contributing to the volatility of consumption (outflows of state capital in the form of FOREX accumulation were high during periods of the largest differences between consumption and production growth rates). Only net government borrowing had a stabilizing effect on consumption, but it was completely counterweighed by the destabilizing impact of private capital flows and changes in FOREX.

The role of financial infrastructure is crucial for the reduction of volatility. Theoretically, perfect financial markets spreading the costs of adjustment intertemporally can reduce volatility resulting from demand and supply shocks, no matter whether they are caused by domestic autonomous developments,

external instability, or poor government policies. Financial deepening helps to reduce volatility – this is a very robust result that is observed in cross-country comparisons and in time series for Russia. It appears that causation here runs both ways: higher monetization reduces volatility very fast (in the following 1–2 quarters), whereas lower volatility helps to increase monetization after 1–2 years. But because the causation runs both ways, in a volatile environment the economy enters a vicious circle: sound financial institutions do not emerge in the unstable environment, whereas without a sound financial infrastructure it is difficult, if not impossible, to reduce volatility substantially.

There is enough evidence that the financial infrastructure was badly damaged by the transformational recession. In particular, the high inflation of 1992–95 resulted from the inability of major interest groups to take the necessary collective actions to raise government revenues. Besides, there emerged previously unheard of mutations in financial and payment contracts, such as the proliferation of non-payments, barter and monetary substitutes. There is also much evidence that Russia's 1998 crisis weakened the financial infrastructure that had just begun to emerge in the period of macroeconomic stabilization of 1995–98: monetization and the ratio of bank deposits and credits to GDP fell, dollarization increased, short-term financial contracts expanded at the expense of long-term contracts.

Figure 8.14 illustrates the vicious circle: general economic volatility deteriorates the quality of macroeconomic policy and weakens financial infrastructure, which, in turn, leads to greater volatility. The complication is that the poor quality of macroeconomic policy undermines financial infrastructure not only indirectly, via the impact on volatility, but also directly, through changes in exchange rate, inflation, interest rates, and so on. So, the surest and shortest way out of this vicious circle is to fix the macroeconomic policy first. Another argument is that it may be easier to fix macroeconomic policy than to build sound financial institutions. Prudent macroeconomic policy is by no means a sufficient
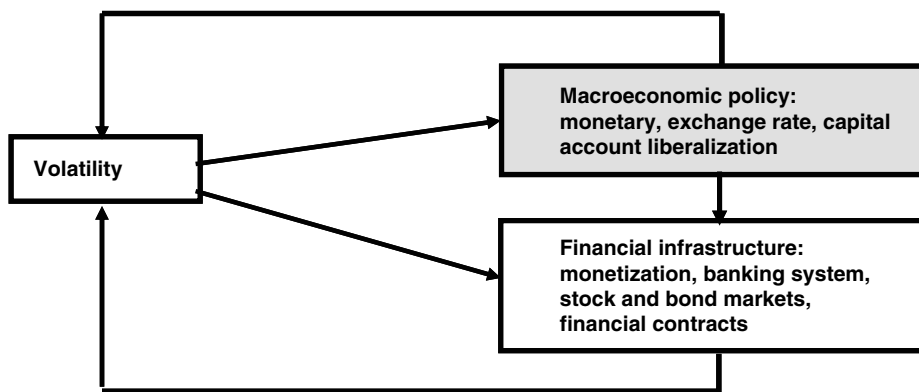

Figure 8.14　Volatility, macroeconomic policy and financial infrastructure

condition for low volatility, but it is definitely a necessary condition and a prerequisite for breaking the vicious circle.

The policy implications for the DFA are thus pretty obvious. A good macroeconomic policy for Russia would be: (1) not to generate monetary shocks and (2) to cope with inevitable external shocks via changes in FOREX and SF, while keeping the RER stable. To reach this goal, reserves in FOREX and SF should be sufficient to withstand an adverse trade shock, that is, judging by previous experience, should be roughly equal to annual GDP. Preservation of capital account controls for short-term capital flows would make it easier to cope with external shocks.

Needless to say, measures to strengthen the financial system, such as the increase in the concentration of the bank assets, tight prudential regulations, and the promotion of long-term financial contracts, even if this would require direct guarantees from the government, would contribute to diminishing volatility. But without prudent macroeconomic policy, these measures are not likely to yield impressive results. In addition, government and external indebtedness should be kept within reasonable limits. Even though the Russian time series does not allow us to prove the negative impact of debt on volatility, there is strong support for this conclusion from cross-country regressions.

Among the policy implications for the IFA are measures to limit short-term speculative capital flows (Stiglitz, 2000; Griffith-Jones et al., 2001; Singh, 2002; Kose et al., 2003), to strengthen the international organizations' lending capacity to countries affected by external shocks (TOT shocks and capital flows), as well as by domestic shocks, and to create price stabilization funds for resource commodities. It would be in Russia's interests to participate in the International Stabilization Fund which would receive contributions from resource exporters and lend this money to resource importers in periods of high prices in commodities, while in periods of low resource prices it would carry out borrowing-lending operations in the opposite direction.

Notes

1. Before that it was a centrally planned economy (CPE). There are studies of volatility in centrally planned economies, in particular studies showing that actual indicators were weakly correlated with the planned targets, and studies of business cycles in CPEs, as well as studies comparing volatility in CPE and market economies. Though fascinating, this topic goes beyond the current project.
2. See Popov (2000) for the analysis of factors of transformational recession in transition economies.
3. Volatility is computed as the standard deviation from trend. The trend, in turn, is a linear regression for 16 quarters (of GDP quarterly growth rates on time and quarter dummies to capture seasonal fluctuations). So, the result is the 16-quarter standard deviation growth rate calculated on a basis of a 16-quarter rolling window. The point on Figure 8.1 for the first quarter of 1998 shows the volatility in 16 preceding quarters, that is, in 1990/1–1993/4.

4. The results of this analysis are not reported here, but are available from the authors upon request.
5. All regressions in the chapter which use overlapping time series (that is, annual growth rates with quarterly frequencies) were estimated with Newey-West standard errors, which give consistent estimates of coefficients' standard errors in the presence of heteroskedasticity and autocorrelation.
6. We control for the average growth rates of GDP (because the empirical relationship between the volatility and growth is well documented, even though it is not well understood). Because there may be an endogeneity problem (not only growth affects volatility, but also vice versa), we tried a number of instruments, such as money supply growth rates and M2/GDP ratio, squared and cubed indicators of *TRvol* – the result was that coefficients did change, but their signs significance remained intact. Also, the Granger test for GDP growth rates and volatility of these growth rates did not reveal any possibility for the causation relationship.
7. This argument is consistent with the findings of Edwards and Magendzo (2003): they find that dollarized economies and currency unions have higher volatility than countries with a currency of their own. Our argument, though, is a bit different: among countries with currencies of their own external shocks are best dampened (evened out, mitigated) when FOREX completely absorb TOT shocks and fluctuations of FOREX are completely sterilized, so that RER stays stable.
8. For a discussion of theoretical issues of Russian monetary policy and the Taylor rule for the Russian central bank see Sosunov and Zamulin (2005), Vdovichenko and Voronina (2004).
9. Total assets of Russian banks may have been as much as two times lower than the official statistics suggest if international accounting standards (excluding double count) are applied (*Finansoviye Izvestiya*, 18 November 1997).
10. For the analysis of the Russian banking system as compared to other countries see Dmitriyev et al. (1996), Filatochev (1997), Frye (1997), Fan et al. (1996), Hayashi (1997), Peresetsky et al., (2004).
11. This ratio is similar to the 'capital adequacy', N1, prudential ratio set by CBR. N1 ratio is equal to: (Capital, computed according to CBR regulations)/(Risk weighted assets net of reserves).
12. The reason why the share of long-term loans peaked only 2 quarters after the August 1998 crisis is the simple balance sheet inertia: after August 1998 almost no banks issued new loans, but old 'long' loans were still alive, so the share of long-term loans increased.