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# 400

Ulrich Thießen

Financial System Development,  
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# Financial System Development, Regulation and Economic Growth: Evidence from Russia

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## Abstract

Recent contributions to the empirical analysis of the relationship between financial system development and economic growth found that an exogenous component of financial system development causes economic growth, is a good predictor of growth and that its growth impact is relatively large. In addition, the empirical literature on banking crises predicts that their adverse effects on economic growth will rise in the absence of an adequate response by the government. Given these findings and considering that the Russian government failed to respond adequately to the 1998 banking crisis, Russia's strong economic growth since the crisis is a puzzle. The paper attempts to analyze Russia's growth process and to empirically make visible the impact of the banking crisis. It is found that the growth costs of the crisis may have been even larger than suggested by a simulation that uses growth coefficients from the literature. This adverse growth impact was compensated by other expansionary effects. The finding corroborates those studies that argue for the importance of financial system development in promoting growth in transition countries.

Keywords: Financial system stability, economic growth, banking crisis

JEL classification: C53 ; G28; O16; O40

## 1. Introduction

The Russian banking crisis of 1998 may be important in economic history for two main reasons: Firstly, its immediate adverse effects on deposits, lending, and net worth of commercial banks were extreme, and secondly, there was no official response for more than four years with any serious banking restructuring program. Instead the banking system was “stabilized” through central bank credit and forbearance concerning rule enforcement. This offers a unique opportunity to study the economic growth effects of a banking crisis under the condition that the authorities do not respond with serious banking restructuring measures.

In addition, since the empirical literature on banking crises unanimously concludes that their adverse effects on economic growth and thus their costs will rise without such measures, Russia’s strong economic growth since the banking crisis is a puzzle. The large ruble real devaluation in 1998 served as the immediate trigger of the banking crisis but also liberated the economy from the ruble overvaluation supported by advice and loans from the IMF. Thus, it may be hypothesized that the Russian banking crisis dampened economic growth but its effect was compensated by other expansionary effects such as the currency depreciation and oil price rise. The paper attempts to empirically make visible the growth costs of the banking crisis using -for the first time that this has been done for a transition country- a quantitative assessment of the contribution of the financial system to economic growth in Russia. This involves a broader attempt in explaining Russian growth. Illustrative simulations show how real GDP could have evolved had there not been the banking crisis. The analysis is largely based on the cross-country empirical analysis of the relationship between financial system development and economic growth, especially the causality aspect, as in Levine, Loayza, and Beck (2000), who found that an exogenous component of financial system development causes economic growth and is a good predictor of future economic growth. The empirical analysis of banking crises (e.g. Dziobek and Pazarbasioglu, 1997, Tang et al., 2000) identifies requirements for minimizing their economic costs, which were clearly not carved out in the Russian case. The failure of the Russian government to meet the requirements for successful banking restructuring calls into question the effectiveness of western loan conditionality and necessitates a broader discussion. The analysis challenges the view that “given the small size of the financial sector, the macro-economy would be relatively little affected by the immediate impact of financial sector distress” (IMF, 2003, p.1), and it has implications beyond Russia also because such an assessment for a key transition country has not yet been undertaken.

The paper starts in section 2 with a brief review of the recent literature on financial sector development and economic growth and arguing in section 3 that after the Russian crisis the requirements for successful banking restructuring were not met. Section 4 presents the empirical analysis of the impact of the banking crisis on economic growth including illustrative growth simulations. Section 5 concludes.

## 2 Brief review of the recent literature on financial sector development and economic growth

In their empirical study of the relationship between financial market development and economic growth, King and Levine (1993) suggested four indicators to define financial development. Since their study used a large sample of some 80 developing and developed countries, their indicators were limited by data availability and thus they were relatively crude. Nevertheless, these indicators proved powerful in describing financial development and are readily available for transition countries including Russia. King and Levine's financial indicators are given in table 1 in columns one to four for different groups of countries. The table also includes two advanced transition countries (Hungary and Poland) and Russia for 1993 and 2002. For later use in simulations, maximum values of these financial indicators worldwide are shown in column 5. In addition, for the transition countries two indicators not used by King and Levine (1993) are shown, namely the ratio of total bonds outstanding to GDP and the ratio of stock market capitalization to GDP.

As can be seen, for the long period examined by King and Levine (1993), higher per capita growth is associated with higher levels of financial development. (The indicators tend to rise with higher economic growth). Their regressions do not only find statistically significant contemporaneous correlations between financial indicators and per capita growth, capital accumulation and a measure of total factor productivity growth, but also significant correlations between *initial* levels of financial development and subsequent economic growth, capital accumulation and TFP growth.<sup>1</sup> The latter finding supports the hypothesis that financial development can cause economic growth and be a predictor of long-run growth. In the cross-sectional study by Levine, Loayza, and Beck (2000) the causality between financial development and economic growth was explicitly analyzed.<sup>2</sup> It was found that economic growth is at least partly explained by the effect of the exogenous component of financial development and that this quantitative impact is relatively large as estimated below also for Russia.

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<sup>1</sup> In King and Levine (1993) the cross-country per capita growth regressions are based on a standard modern growth model that includes as independent variables alternately the first four financial indicators given in table 2 (significant at least at the 5% level) and that controls for initial income, initial secondary school enrollment rate, ratio of trade to GDP, ratio of government spending to GDP, and average inflation rate.

<sup>2</sup> Two econometric methods were used that address specifically the problems induced by endogeneity of the explanatory variables such as in growth regressions, and which enable one to extract the exogenous component of financial intermediary development: Dynamic GMM panel estimators, which the authors use with data for 74 countries averaged over seven 5-year intervals composing the period 1960-95, and, in addition, a purely cross-sectional estimator but with instrumental variables technique and using averaged data for 71 countries over the same period, i.e. one observation per country. Although these estimations do not reject the view that financial development is influenced by economic growth, they show that the latter is not the only cause for the significant positive correlation between the two.

Table 1

Average levels of financial development of a large sample of developing and developed countries (excluding major oil exporters) during the period 1960-1989, and for Poland, Hungary and Russia in 1993 and 2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Very slow growing countries 1)	Slow growing countries 2)	Fast growing countries 3)	Very fast growing countries 4)	Maximum average levels during 1960-1995 found for a group of 71 countries 5)	Hungary 1993 2002	Poland 1993 2002	Average level of Hungary and Poland 2002	Russia 1993 2002
<b>Indicator 1:</b> Financial depth (broad money /GDP)	0.22	0.29	0.38	0.60	1.43 (Malta)	0.46 0.47	0.31 0.45	0.46	0.13 0.22
<b>Indicator 2:</b> Importance of banks relative to central bank 6)	0.60	0.71	0.73	0.81	0.98 (Austria)	0.55 0.88	0.60 0.96	0.92	0.59 0.79
<b>Indicator 3:</b> Share of credit to nonfinancial private sector in total credit	0.51	0.61	0.56	0.70	n.a.	0.42 0.68	0.30 0.70	0.69	0.39 0.68
<b>Indicator 4:</b> Ratio of credit to nonfinancial private sector to GDP	0.13	0.20	0.27	0.35	1.41 (Switzerland)	0.28 0.34	0.12 0.25	0.30	0.07 0.15
<b>Indicator 5:</b> Ratio of total bonds outstanding to GDP 7)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a. 0.37	n.a. 0.26	0.32	n.a. 0.05
<b>Indicator 6:</b> Ratio of stock market capitalization to GDP	n.a.	n.a.	n.a.	n.a.	n.a.	0.02 0.19	0.00 0.15	0.17	0.00 0.37
Memorandum item: Long run per-capita real GDP growth rate 8)	-0.5	1.4	2.6	4.5	-	1.1	2.8	-	-2.7

1) Annual real GDP per capita growth rate < 0.5.

2) Annual real GDP per capita growth rate > 0.5 < 2.0.

3) Annual real GDP per capita growth rate > 2.0 and < 3.0.

4) Annual real GDP per capita growth rate > 3.0.

5) Levine, Loayza, and Beck (2000), Table 8, pp. 64-66

6) Ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets.

7) Bonds denominated in domestic currency.

8) for Hungary, Poland, and Russia: 1990-2002.

Note: Data for 2002 are preliminary. Arithmetic averages of this years end-of-period and last years end-of-period financial stocks are used to mitigate the problem of deflating financial stocks by GDP flow.

Sources: Central Bank of Russia (2003), EBRD (2002), International Monetary Fund, International Financial Statistics, King and Levine (1993), Levine, Loayza, and Beck (2000).

Table 1 shows also that financial indicators of Hungary and Poland during 1993-2002 improved substantially to levels of fast or very fast growing countries. By contrast, Russia's financial development indicators during this period were retarded (Table 2).<sup>3</sup> Indicators 1 (financial depth), 2 (importance of banks relative to central bank), and 4 (credit to nonfinancial private sector relative to GDP) were in 2002 still very substantially below the respective average levels achieved by Poland and Hungary.

Table 2

Russia: Evolution of financial market indicators 1993-2002

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<b>Indicator 1</b> Financial depth (broad money/GDP)	0.13	0.13	0.13	0.15	0.17	0.17	0.16	0.18	0.21	0.22
<b>Indicator 2</b> Importance of banks relative to central bank	0.59	0.61	0.65	0.67	0.70	0.63	0.58	0.67	0.74	0.79
<b>Indicator 3</b> Share of credit to nonfinancial private sector in total credit	0.39	0.38	0.39	0.32	0.32	0.34	0.32	0.45	0.61	0.68
<b>Indicator 4</b> Ratio of credit to nonfinancial private sector to GDP	0.07	0.07	0.07	0.07	0.08	0.10	0.09	0.09	0.13	0.15
<b>Indicator 5</b> Ratio of total bonds outstanding (denominated in domestic currency) to GDP	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.03	0.05
<b>Indicator 6</b> Ratio of stock market capitalization to GDP	0.0	0.1	4.6	9.7	29.5	16.5	41.7	15.3	25.7	37.4
Memorandum items:										
EBRD Index of banking sector reform	1.0	2.0	2.0	2.0	2.3	2.0	1.7	1.7	1.7	2.0
EBRD Index of reform of non- banking financial institutions	1.7	1.7	2.0	3.0	3.0	1.7	1.7	1.7	1.7	2.3

Note: Indicators 1-4: The annual figures are averages of four quarterly values. Indicators 5-6: end of period. The EBRD indices for policy reforms are based on a scale ranging from 1, which is the lowest grade, to 4+, representing the highest score. They are explained in detail in the annual transition reports by the EBRD.

Sources: EBRD (2002), International Monetary Fund, International Financial Statistics (2003), Russian Central Bank (2003).

<sup>3</sup> The levels of indicators 1 and 4 in 2002 were still at a level comparable to that of the group of very slow growing countries. And regarding indicators 2 and 3 a substantial improvement occurred only recently during 2001 and 2002.



Only Russia's stock market capitalization indicator developed better than those of Hungary and Poland, which was due to Russia's wealth in energy and raw materials in association with the rise in oil prices since 1999. Table 2 shows that the currency and banking crisis of 1998 had a substantial impact on Russia's financial indicators. Until 1998 most indicators had improved almost continuously.<sup>4</sup> The crisis reversed this rising trend but since about 2000 the positive trend returned and accelerated together with the economic recovery. The table also shows the annual evaluation of financial sector reforms by the EBRD showing that the quality level of financial system supervision and regulation was relatively low even before the crisis and that it fell afterwards to very low standards until about 2002.

### 3 Russia's paradox: Strong growth with no banking reform

The large Ruble currency depreciation and the government's default on its domestic Ruble debt in August/September 1998 became instantaneously an open banking crisis.<sup>5</sup> Causes of the crisis and its immediate effects are described in the appendix, which also provides additional evidence of inadequate banking supervision in the years following the crisis. However, Russia's output recovered quickly and strongly following the severe crisis. The recovery started already in October 1998 and annual real GDP growth reached 5.4% and 9% in 1999 and 2000, respectively, and remained afterwards above 4%.<sup>6</sup> This is impressive since the empirical analysis of banking crises (e.g. Sundararajan and Balino, 1992, Borish et al., 1995, Gray and Holle, 1996 and 1997, Dziobek and Pazarbasioglu, 1997, Tang et al., 2000) identifies the following requirements for minimizing the economic costs associated with such crises, which were clearly not carved out in Russia:

- comprehensiveness of a banking restructuring program, i.e. operational and systemic restructuring of the banking sector. Successful systemic restructuring of banks implies that both the stock of non-performing loans and the flow of new bad loans are reduced to very small proportions. Operational restructuring means improvement of the internal operations of

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<sup>4</sup> The substantial decrease of indicator 3 in 1996 is due to banks' buying of short-term Russian government treasury bills, which crowded out lending to the private sector. This was one cause for the banking crisis due to the government's default on its debt. The decrease of indicator 3 during two years prior to the crisis is thus highly interconnected with the crisis. This is a relevant aspect in the following simulations of developments that assume absence of the banking crisis. The reader may ask why indicator 4, which has the same numerator as indicator 3, did not decrease in 1996. The reason is that the denominator of indicator 4, nominal GDP, was strongly dampened due to the drastic reduction of inflation during 1996 and 1997 so that this ratio remained constant.

<sup>5</sup> See Buchs (1999), Chapman and Mulino (2001), and Thießen (2000).

<sup>6</sup> There are two main explanations for the recovery. The first is that the real currency depreciation "liberated" the economy from the brakes put on it by the previous long lasting overvaluation. The depreciation caused import substitution and growth of real non-energy exports. The second explanation is the strong rise of oil prices during 1999 and 2000 associated with a continuous moderate increase in oil production since October 1998 boosting energy export revenues. Econometric analysis below attempts to clarify the role of these factors during the recovery.

banks, including their risk-management systems, and possibly replacement of managements and owners.

- prompt corrective action (i.e. implementing a restructuring program within a time period that does not exceed say 10 months following the crisis), and
- bank restructuring undertaken by the government and not the central bank (in order to avoid the risk that non-transparent central bank financial support to banks inflates the costs of restructuring that eventually fall on the budget and may risk high inflation).

At the outset of a banking crisis it is difficult to distinguish between insolvent banks and temporarily illiquid ones and thus the Central Bank of Russia (CBR) met its lender of last resort function by providing liquidity to most banks that faced liquidity problems so as to mitigate further adverse effects. But these measures were seriously flawed because this process was neither transparent nor orderly.<sup>7</sup> Perhaps more crucially, the CBR (who has the responsibility for banking regulation and supervision) and the government failed to implement promptly both a transparent bank restructuring program and improvement and enforcement of prudential regulations for banks. The government failed to implement promptly an indispensable program to deal with bank debtors, i.e. restructuring of non-financial enterprises, and enforcement of liability for any overdue debt with property of the debtor.<sup>8</sup> This lack of action in connection with both leniency of the central bank regarding the violation of prudential rules and its generously granted “stabilization credits”, most of which were uncollateralized, reinforced incentives for bank managements and their owners to “gamble for resurrection” of their banks, take high risks, distribute “profits” despite solvency problems and engage in “asset stripping” and lobbying for further leniency and state support.

In the view of many observers the lack of government action with regard to implementing serious banking restructuring measures continued through several years after the crisis (e.g. MFK Renaissance Capital, 2000), which is corroborated by the evaluation of financial sector reforms through the European Bank for Reconstruction and Development (EBRD) (shown at the bottom of Table 2).

As a result most of the bankrupt banks were not liquidated. In fact, Table 3 shows that after the financial crisis the number of revoked licenses for credit institutions surprisingly even decreased drastically. The number of institutions liquidated on the ground of violation of legislation increased after the crisis but many banks were not

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<sup>7</sup> There was little control over the use of the funds provided, the criteria regarding the selection of banks that received support were not defined, and the transfer of deposits from commercial banks to Russia’s dominating savings bank (Sberbank) has in many cases not been associated with a transfer of assets to Sberbank of equal market value. To some extent these problems may have been the result of political influences on the CBR. See, for instance, the very critical assessment by MFK Renaissance Capital (2000).

<sup>8</sup> Although the improved bankruptcy law, which came into effect in March 1998, caused a substantial increase in the number of bankruptcies, many enterprises, particularly large ones, large debtors to energy producers, and also the latter, continued to enjoy leniency.

liquidated despite having lost their license, which resulted in the phenomenon of “phantom banks”.

Table 3

Russia: Number of credit institutions and revoked licenses 1995-2002  
(End of period)

	1995	1996	1997	1998	1999	2000	2001	2002
Number of credit institutions registered by CBR	n.a.	2589	2562	2481	2376	2124	2004	1826
Change	n.a.	n.a.	-27	-81	-105	-252	-120	-178
Revoked licenses	216	275	329	227	127	33	12	10
Credit institutions liquidated owing to revocation of license for violation of banking legislation	n.a.	n.a.	52	73	100	258	144	216

Source: Central Bank of Russia, Bulletin of Banking Statistics, various issues, IMF (2002).

Thus, the financial crisis of 1998 was allowed to impact on economic growth unhindered, all other things held equal. For this unique case, where the authorities are not implementing any serious banking restructuring program in response to a major banking crisis, we attempt in the following section to simulate the growth costs. This is also the first time such an analysis is carried out for a transition country.

The view needs to be acknowledged, however, that there can be an optimal degree of forbearance in a crisis situation depending on factors such as the nature of the shock and its degree of permanence and on the authorities' ability to carry out an effective restructuring program. This could call for an analysis of the pros and cons of forbearance relative to restructuring of the banking system in the specific Russian situation. However, the country samples used by the cited empirical literature on banking crises included a large number of such crises, which were caused by different types of shocks and which occurred in countries with large differences in their economic development and quality of their governments. But on the basis of these many cases of banking crises, which were also examined individually, this literature unanimously finds that forbearance and delaying implementation of a comprehensive restructuring program tends to raise the real economic costs of such crises substantially, i.e. it makes things only worse. Nevertheless there could be well defined exceptions to this rule, which this literature may have overlooked and it must be admitted that a deeper analysis as to whether Russia could be such an exception is not offered here.<sup>9</sup> However, since the

<sup>9</sup> Many observers of Russia's financial system development argue, however, that forbearance during and after the crisis in 1998 was further damaging the financial system. See, for instance, Russian European Centre for Economic Policy (1999) and MFK Renaissance Capital (2000).

incentives provided by the IMF in the form of large and relatively cheap adjustment loans failed in convincing the government to adopt a banking restructuring program one should think of alternatives to these loans. Alternatives appear to be advice, which is offered not with a “carrot and stick” policy (i.e. providing cheap loans and then threatening of ending to supply them further) but which is provided by an international mix of completely politically independent economists who have no loans to offer and thus are dependent on truly convincing their Russian counterparts if they want to achieve that any improvements are actually implemented. Appendix B attempts to provide a brief discussion of policy options that could help to improve financial development.

#### 4. Empirical analysis: Simulations of the impact of the 1998 banking crisis on economic growth

We perform two types of illustrative simulations to assess the impact of the banking crisis on economic growth. Firstly, growth regressions for Russia are estimated, which, following King and Levine (1993) and Levine, Loayza, and Beck (2000), include as explanatory variables the financial indicators. The regressions should produce an ex-post forecast for real GDP as accurately as possible so that it can be used in simulating the impact of financial development scenarios on economic growth. Secondly, these results are then briefly compared with those obtained using estimated coefficients of the impact of the same financial indicators on per capita economic growth from the cross-country regressions by Levine, Loayza, and Beck (2000).

##### a) Growth regressions for Russia

Growth regressions for Russia were estimated using quarterly data for the period 1995-2003 using the data from the Russian European Centre for Economic Policy. At the outset it must be emphasized that the objections concerning estimating such regressions for one country and a relatively short period are recognized. Owing to the relatively few degrees of freedom they cannot be convincingly rejected and therefore those simulations that are based on these regressions are illustrative only. However, the results obtained from using the coefficients from the literature point in the same direction as those obtained from using growth regressions for Russia. Thus, both types of simulations support the view that the contribution of the financial sector to growth is often underestimated, which provides incentives to strengthening reforms in this sector. In addition, the exercise sheds light on the growth process in Russia. It should be viewed as a first step that should be followed by performing simulations based on cross-section data and where a clear link between financial development variables and regulatory and institutional characteristics is established, which admittedly is now still missing.

Preliminary estimations using as a natural starting point the augmented Solow growth model as suggested by Mankiw, Romer, and Weil (1992) and adapted for

the one country Russian case, made clear that this model does not adequately describe the transition period. It was also found that both the Chow breakpoint and Chow forecast test strongly rejected the hypothesis of parameter constancy before and after the financial crisis in 1998. All this underlines the complexity of the growth process in Russia during transition, and it suggests to include in regressions that cover the whole transition period a dummy variable that represents the structural break in 1998 or to treat the two periods before and after the crisis separately. Regressions were therefore run for the period 1995:1-2003:1 and for the period after the currency crisis 1999:1-2003:1. Also a more pragmatic approach following King and Levine (1993) and Levine, Loayza, and Beck (2000) was taken. Their approach is not based on a particular theoretical growth model but uses as explanatory variables a set of those that have been found statistically significant in previous growth studies.<sup>10</sup> All of these are essentially control variables in estimating the coefficient of primary interest, which is that of each of the discussed financial development indicators, where one equation is estimated for each indicator. For Russia data availability allowed to use government size (proxied by the log of the ratio of consolidated government expenditures to GDP), the CPI inflation rate, and openness to trade (proxied by the log of the sum of the ratios of exports and imports to GDP). Additional explanatory variables were successively included that may have been important growth determinants during transition, namely the log of the share of industry in GDP as an indicator of structural difficulties, the ratio of the fiscal balance to GDP, the log of the real exchange rate, and the log of the US-Dollar oil price.

Tests for stationarity of the variables involved suggested that for the period 1995-2003 almost all of them should be differenced once in order to become stationary (Table 4). Hence, the dependent variable in the equations for 1995-2003 was differenced log real per capita GDP (the growth rate of real per capita GDP). However, for the period since 1999 almost all potential explanatory variables appeared to be stationary so that levels were used in these equations.<sup>11</sup>

Table 4  
Tests for unit roots of variables used in regressions

The main results of the estimations for the two periods are shown in Table 5. For the two periods “base” regressions (equations 1 and 3) were defined that included those explanatory variables that were found to be consistently statistically

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<sup>10</sup> These include initial per capita GDP and the initial level of educational attainment (such as school enrolment), variables that control for economic policies such as measures of government size, inflation, the black market exchange rate premium, and openness to international trade, and also variables that measure political stability and ethnic diversity.

<sup>11</sup> Of course, the limited number of observations particularly concerning the period 1999-2003 is a serious qualification not only for these tests but for the entire simulation analysis. It suggests to repeat these regressions in future with more data and also to perform a cross-section analysis.

significant and relatively robust to the inclusion of other independent variables.<sup>12</sup> Regarding the period 1995-2003 (equation 1), these explanatory variables were the dummy variable for the structural break in 1998:3<sup>13</sup>, the ratio of the fiscal balance to GDP, and the growth rates of the investment share in GDP and of the real exchange rate. Growth of the oil price was also included in this base regression (equation 1) despite its insignificance, because it was mostly statistically significant in the robustness tests. Owing to time lags involved that could be longer than the quarterly frequency used, it was expected that using lagged explanatory variables would yield better estimation results. Tests with different time lags suggested, however, that only the real exchange rate in addition to the financial indicators discussed below appeared to influence growth with a lag of more than a quarter.<sup>14</sup> Hence, these variables were lagged. All explanatory variables had the expected sign, i.e. increases in the investment share and in the oil price promoted economic growth, whereas real currency appreciation, rising fiscal deficits, and of course the currency crisis were detrimental to growth. In the equations for the shorter period since 1999 only two explanatory variables were consistently statistically significant and robust, the investment share and the oil price (equation 3).

Table 5  
Economic growth regression results

Both base regressions (equation 1 and 3) had a relatively good forecast quality as judged by the root mean squared error and by a visual evaluation of the fitted real GDP development. Using Theil's inequality coefficient (Table 5, last column), an excellent forecast quality had the regression for the shorter period since 1999 (equation 3).

Following King and Levine (1993) and Levine et al. (2000), the two base equations were augmented with the financial indicators. Specifically, a composite financial indicator was used, which gives the individual indicators equal weight.<sup>15</sup> As shown in Table 5, equations 2 and 8, this resulted in a considerable improvement of the overall quality of the estimated base equations 1 and 3, including a substantially higher adjusted  $R^2$ , an improved D.W. statistic, higher significance of most

<sup>12</sup> Also, the estimated coefficient values of these variables appeared to be more robust than the coefficient values of the other potential explanatory variables.

<sup>13</sup> It takes the value of one since third quarter of 1998 and zero otherwise.

<sup>14</sup> Especially investment but also the oil price could have been expected to affect growth with longer lags. Regarding investment an explanation why this was not found here could be that at least for the period since 1999 the strong investment growth since then was concentrated in the oil, gas and metals industries (Hanson, 2003, p. 367), and these investments may have been largely capacity increasing allowing increases in production in the same quarter.

<sup>15</sup> Each of the four indicators was transformed into an index set to 1 for December 1994 and these four indices were multiplied by 0.25 and then added.

explanatory variables, and the composite financial indicator had the expected positive sign and was highly statistically significant.<sup>16</sup> With regard to the shorter period since 1999, table 5 shows that the estimated coefficients of the *individual* financial indicators were consistently positive and significant (equations 4-7), which was, however, not the case with regard to the longer period since 1995.

A major question concerning these results is, of course, the potential endogeneity of the explanatory variables, in particular of the financial development indicators. Although subject to the qualifications already mentioned there are three arguments, which may support the estimations here:

Firstly, the cross-section studies by King and Levine (1993) and Levine et al. (2000) found that for their large country sample and long period examined, financial development is leading economic growth. They based this conclusion mainly on an examination of the relationship between initial values of financial development and subsequent economic growth and on dynamic panel estimates, which use the GMM estimators and instruments (to deal with the endogeneity of the explanatory variables), where they tested the validity of these instruments before using them. It is difficult to believe that what has been found for so many countries may work differently in the Russian case, especially also considering the causality test results for Russia reported below.

Secondly, a formal test for endogeneity of the financial development indicators and other variables, which could potentially be endogenous in the regressions for Russia, the Hausman specification test, was performed. All explanatory variables, except the oil price and the dummy variable for the structural break, which may be considered to be exogenous, were included as potentially endogenous variables in the test.<sup>17</sup> For the period 1995-2003, the null hypothesis that there is no simultaneity (i.e. that the estimated coefficients of the residuals are jointly equal to zero) was not rejected at the 5 percent level.<sup>18</sup> For the period 1999-2003 it was rejected,<sup>19</sup>

<sup>16</sup> The individual financial indicators were also used. However, in the regression for the longer period 1995-2003 the coefficients and significance of the first differences of all financial indicators were fragile in robustness tests and especially financial indicators 2 and 3 were consistently statistically insignificant with an often changing estimated sign.

<sup>17</sup> The test was performed for the longer and for the shorter period and for the case that there are several endogenous variables. It consists of two steps: First, regressions were run of each of the potentially endogenous regressors (i.e. the composite financial indicator and, in the case of the period 1995-2003 the differenced variables  $\log(I/GDP)$ ,  $\log(REXR)_{t-2}$ , and  $FB/GDP$ , and, in the case of the period 1999-2003,  $\log(I/GDP)$  on all other explanatory variables. Thus there were four equations estimated for the period 1995-2003 obtaining four residuals and two equations estimated for the period 1999-2003 obtaining two residuals. For the period 1995-2003 the four residuals were then used as additional explanatory variables in a regression of the growth rate of real per capita GDP on the actual composite financial indicator values and for the period 1999-2003 the respective two residuals were used as additional regressors in a regression of the log real per capita GDP on the actual composite financial indicator values (Pindyck and Rubinfeld, 1990, p. 304). An F-test was used to test the null hypothesis that the estimated coefficients of the residuals are jointly equal to zero. If they are, there is no simultaneity.

<sup>18</sup> The F-statistic (4,23) was 2.74, which is below the critical value at 5% significance of 2.80.

<sup>19</sup> The F-statistic (2,13) was 25.79, way above any critical value.

although when performing the test assuming that  $\log(I/GDP)$  is exogenous, simultaneity was strongly rejected.

Thirdly, Granger causality between real per capita GDP developments and financial indicators, running in both ways, was tested using different numbers of lagged values in the test regressions. They showed that there is always causality running from real GDP to financial indicators, which appears natural. But in most of these tests causality is also significantly running from financial development to real per capita GDP.<sup>20</sup> This may also support the regressions and simulations presented here.

Equations 2 and 8 in table 5, which use the composite financial indicator and have the best forecasting power, were used to perform the simulations. Figure 1 shows the actual real per capita GDP development and the ex-post forecasts based on the two equations.

Figure 1

Real GDP per capita 1995-2003: Actual and Fitted Values

As can be seen, equation 2, table 5, (the regression for the whole period 1995-2003) has a relatively good ex-post forecasting quality regarding the earlier period 1995 until the financial crisis in 1998. Regarding the period since then, equation 8, table 5, yields a particularly excellent ex-post forecast. Hence, simulations of the growth impact of financial development for the period since 1999 should probably be based on equations estimated for this period and not earlier. However, for comparison of the results both equations were used for the simulations.

#### b) Simulations based on growth regressions for Russia

Three simulations of the impact of financial system development on economic growth were run: The first assumes that Russia's financial indicators continued their trend improvement before the financial crisis in 1998. As shown in figure 2, indicators 1 (financial depth) and 2 (importance of banks relative to central bank) were steadily rising in the years 1996-1997. It appears very reasonable to assume that this trend would have continued in the absence of the crisis as shown by the curves denoted simulation 1.

<sup>20</sup> For the quarterly data 1995-2003 the null hypothesis, that the composite financial indicator does not Granger cause the log of real per capita GDP, was mostly rejected:

	Obs.	F-Statistic	Probability for the null
2 lags in the test regressions:	31	5.337	0.01143
3 lags in the test regressions:	30	5.776	0.00427
and for null hypothesis that the composite financial indicator does not Granger cause the growth rate of real per capita GDP:			
2 lags in the test regressions:	30	5.180	0.01312
3 lags in the test regressions:	29	2.233	0.11279



Figure 2

Actual and simulated evolution of financial indicators 1 and 2, 1993-2002

Also indicator 4 (nonfinancial private sector credit to GDP) was rising in 1997 (Figure 2a) and this increase is assumed to have continued during the years 1998-2002 shown by simulation 1.

Figure 2a

Actual and simulated evolution of financial indicators 3 and 4, 1993-2002

By contrast, indicator 3 (nonfinancial private sector credit to total credit) decreased two years before the crisis. But this development reflected the enormous increase in lending by banks to the government relative to their lending to other sectors of the economy. Since the government defaulted on its debt in 1998, this decline can be interpreted as an early warning signal of the crisis in 1998. It was very closely associated with the crisis, which gives this financial indicator a different quality compared to the other three indicators. It could be argued that in a scenario that assumes absence of the financial crisis this indicator would not have declined during 1996 but instead it may have maintained its previous level or perhaps even improved as the other indicators did. However, in order to prevent any impression that this simulation 1 is based on unrealistically optimistic assumptions regarding the hypothetical financial development in the absence of the crisis, a moderate steady improvement of this indicator 3 (nonfinancial private sector credit to total credit) from its low level in 1997 is assumed for the period 1998-2002 (Figure 2a).

In the second scenario, simulation 2 in figures 2 and 2a, it is assumed that Russia's financial indicators would have risen linearly during 1998:2-2002:4 to reach the average level each indicator had in Hungary and Poland in the year 2002. It should be noted that this average level in Hungary and Poland is still modest by international comparison. As shown in Table 1 above, with regard to two of the four indicators, this level was considerably below the respective average level in the group of fast growing countries. Only with regard to indicator 2 (importance of banks relative to central bank) the average in Hungary and Poland was higher than this benchmark level.

Finally, the third scenario is a purely illustrative sensitivity analysis. It makes the assumption that Russia's financial indicators rise from 1998:2-2002:4 to the highest levels found by Levine et al. (2000) on average during 1960-1995 for a sample of

71 countries, which were shown in Table 1, column 5.<sup>21</sup> All scenarios use the index of the four financial indicators, which gives them equal weight. Figure 3 presents the results in log levels on the basis of the regression for the period 1999-2003 (equation 8, table 5).

Figure 3

Actual and simulated evolution of real per-capita GDP 1998-2003

The simulated curves obtained when using the regression for the whole period 1995-2003 (equation 2, table 5) are very similar to the ones on the basis of the regression for the period since 1999 shown in Figure 3. For simulations 2 and 3 they lie slightly above those shown, which means that the regression for the whole period forecasts a slightly higher growth impact of these simulated financial developments than the regression for the period since 1999. For a clearer exposition those results are not shown in figure 3 but all results are reported in table 6.

In order not to allow the forecast error to influence the calculated impact of the simulations on the per capita growth rate, this impact is calculated by comparing simulated per capita GDP growth rates with *forecasted* growth rates on the basis of the two regressions.<sup>22</sup>

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<sup>21</sup> Since the authors did not include indicator 3 in their study this scenario is built on indicators 1, 2 and 4 only.

<sup>22</sup> In other words, only the impact on economic growth, which is solely due to changing the financial indicator values, is considered. When using actual growth rates the differences are about 3 percentage points higher in the three simulations.

Table 6

Impact of simulations of financial market development on Russia's average annual per capita growth rate during 1998-2002 using equations 2 and 8, Table 5:

		Simulation 1: a)	Sensitivity analysis:	
			Simulation 2: b)	Simulation 3: c)
Difference between the simulated average annual real per capita GDP growth rate during 1998-2002 and the forecasted average annual growth rate (pure simulation impact)	Using regression estimated for the period 1999-2003 (equation 8, table 5):	0.010	0.069	0.517
	Using regression estimated for the period 1995-2003 (equation 2, table 5):	0.010	0.081	0.608

a) Assuming Russia's financial indicators had continued since 1998:2 their approximate trend improvement before the financial crisis in 1998.

b) Assuming Russia's financial indicators had increased linearly during 1998:2 until 2002:4 to the respective average level achieved by Poland and Hungary in 2002.

c) It is hypothetically assumed that Russia's financial indicators 1, 2 and 4 would have increased linearly from 1998:2–2002:4 to the maximum levels found on average during 1960-1995 for a group of 71 countries by Levine, Loayza, and Beck (2000). These levels are shown in Table 1, column 5.

Source: Author's calculations.

As can be seen, the simulations predict a considerably higher per capita growth rate ex-post than was forecasted on the basis of actual financial development: According to simulation 1 the per capita growth rate would have been 1 percentage point higher on average during 1998-2002 in each of these five years, had the banking crisis not occurred and had financial development continued the trend improvement it showed before the crisis. This impact is predicted by both regressions. Simulation 2 (i.e. Russia reaches average Polish and Hungarian financial development level by 2002) predicts an even 6.9 percentage points higher average annual growth rate on the basis of equation 8, or an impact of 8.1 percentage points on the basis of equation 2. And simulation 3, which is an admittedly unrealistic scenario chosen for purely illustrative purposes, predicts a theoretical 52-61 percentage points higher average annual growth rate. In sum, three main messages result from the simulations: Firstly, only considering the adverse effects of the financial crisis of 1998 on financial development indicators, the loss of economic growth is estimated to have been considerable, namely at least at about 1 percentage point on average during the years 1998-2002, if simulation 1 is regarded as a "minimum" financial development that, in the absence of a financial crisis, would at least have been met. Of course, the estimated economic growth loss is larger in the first year, 1999, that followed the crisis than in later years. Secondly, Russia's government could have

significantly promoted economic growth by implementing financial reforms that would have resulted in increases of the financial indicators. Thirdly, the simulations suggest that financial development has a substantial impact on economic growth in Russia and thus they are first time evidence for a single country that may corroborate the cross-section analyses by King and Levine (1993) and Levine et al. (2000).

c) Results of simulations based on growth coefficients from the literature

For the second approach of estimating the growth impact of Russia's financial crisis, the average growth coefficients estimated by Levine et al. (2000) for a large country sample and long period were used, which are shown in column 1 of Table 7.<sup>23</sup>

Table 7

Impact of simulations of financial market development on Russia's average annual per capita growth rate during 1998-2002 using growth coefficients from the literature. 1)

Financial indicator	Per capita growth coefficient 2)	Simulation 1:	(Sensitivity analysis):	
			Simulation 2:	Simulation 3:
Indicator 1	0.034	0.009	0.022	0.057
Indicator 2	0.113	0.020	0.024	0.030
Indicator 4	0.028	0.002	0.020	0.061
Average annual impact	-	0.010	0.022	0.049

1) The simulations are described in Table 6 and in the text above. Levine et al. (2000) did not include in their estimations indicator 3, which is therefore missing here. The impact on per capita growth is calculated by multiplying the growth coefficients with the annual difference between the log of the simulated and the log of the actual financial market indicator. Logs need to be used because the coefficients were estimated using logs of the financial indicators.

2) Largest growth coefficients estimated by Levine et al. (2000), Table 3, p. 46, in their regression "with full information set" for a sample of 71 countries and for the period 1960-1995.

Source: Author's calculations.

The same three simulations are run as before and the results are shown in columns 2-4: In simulation 1 (which assumes that the trend improvement of the financial indicators before the financial crisis of 1998 would have continued after the crisis), the average annual real per capita GDP growth rate during 1998-2002 would have been 1 percentage point higher than it actually was (column 1). Surprisingly, this result is exactly the same as found in the previous section (i.e. using the two regressions for Russia).

In simulation 2 (i.e. the catch up during 1998-2002 to the average Hungarian and Polish financial development level) the annual per capita growth rate would have been 2.2 percentage points higher. Although still sizable, this result is, however, 4 times smaller than the result above. And in simulation 3 (i.e. the illustrative

<sup>23</sup> The coefficients were estimated by the authors only for indicators 1, 2 and 4.

scenario where Russia's financial development reaches by 2002 those highest worldwide financial development levels) the growth rate difference would have been 4.9 percentage points each year, which is 10 times smaller than the estimated impact above. Thus, only for simulations that use relatively small deviations of hypothetical from actual financial development do these approaches yield the same result. The larger the deviation of hypothetical financial development to actual one, the larger will also be the difference between the forecasted average annual growth rates in the approach that is based on regressions for Russia compared to the approach that uses estimated average financial growth coefficients for a large set of countries. Or, in other words, the simulations based on growth coefficients from the literature yield a progressively lower impact of financial development on per capita growth when raising the assumed financial development indicators than the simulations based on regressions for Russia. However, this may not be an inconsistency: Since the growth coefficients from the literature are averages for a large country sample and a long time period, it is possible that behind this average exists a large and unknown deviation between the largest and lowest coefficient for individual countries. The coefficients estimated above for Russia could be comparable to relatively large invisible coefficients. Other factors that may be important are that Russia's circumstances during transition may have been different than those average circumstances during the 35 year period used by Levine et al. (2000) and that the latter derived their result by using a large set of statistically significant explanatory variables, most of whom were either not significant or not available in the Russian case.

In sum, the analysis shows that *irrespective* of the estimation approach, simulation 1 (the trend improvement of the financial indicators before the financial crisis of 1998 would have continued after the crisis) yields an economic growth impact of 1 percentage point each year, and in simulation 2 (financial indicators catch up during 1998-2002 to the average Hungarian and Polish financial development level) the minimum estimated growth impact amounts to 2.2 percentage points each year. This corroborates the hypothesis for financial development in Russia to have a considerable effect on economic growth and, thus, all reforms that raise the financial development indicators would also considerably promote economic growth.

## 5 Concluding remarks

Russia's banking crisis showed that assessments of the progress made in banking supervision, in improving the legal and regulatory framework and in its enforcement had been overly optimistic. Together with the crisis banking sector reform and supervision even deteriorated and for several years the sector was left largely on its own with supervisory authorities not even able or willing to close institutions whose license was revoked. Given these deficiencies and the large empirical literature on banking crises which argues that not implementing structural reforms in the banking sector after a crisis very likely raises the economic damage caused by the crisis, one may expect that Russia's banking crisis and the response

of the authorities to it had a pronounced adverse impact on economic growth despite the very good actual economic performance. The evidence found in this paper, which is subject to a number of qualifications owing to the limited time length and data availability, may support this view. The impact during 1998-2002 on the average annual per capita growth rate is estimated to have been at least 1 percentage point irrespective of whether the simulations are based on growth regressions for Russia or on the estimated average long run impact of financial development on growth for a large country sample in a recent cross-section study that specifically addresses the problem of causality. This identical result of two independent studies could be interpreted as an indication of the meaningfulness of the studies. Assuming that in the absence of the crisis, Russia's financial development would have been very strong to reach the average development level in Hungary and Poland, the annual growth impact of the crisis may have amounted to at least 2.2 up to 7 percentage points. Although this scenario is illustrative only such a significant impact of financial development on per capita growth may call for a reconsideration of the hypothesis that the financial sector in Russia, whose development is still very considerably lagging behind other advanced transition countries, may not be of great importance for macroeconomic stability and development. Thus, the finding corroborates those studies that argue for the importance of financial system development in promoting growth in transition countries.

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## **Appendix A: Background of the Russian crisis in 1998 and the repetition of some of the mistakes that were leading to the crisis.**

At the end of 1997 an evaluation of the progress toward “a market-based financial system” in the 15 successor states of the former Soviet-Union was published.<sup>24</sup> The high ranking that Russia received in this assessment apparently was overly optimistic, particularly with regard to banking supervision. The most fundamental prudential rules for banking had not been enforced before the crisis, in particular regarding the foreign exchange rate risk and provisioning for bad debt. This together with a rapidly growing public debt to GDP ratio on account of issuance of short- and medium-term high interest yielding treasury bills (GKO/OFZ debt), sold to a large extent to commercial banks<sup>25</sup>, caused three major weaknesses in the latter’s aggregate balance sheet and in their off-balance sheet transactions: Banks were overexposed to the foreign exchange rate risk, to the credit risk (aggravated, for instance, by a Ruble depreciation, which could cause borrowers with foreign debt and no foreign currency income to become insolvent) and to the risk of default of the government.<sup>26</sup> Thus, the large currency depreciation in August/September 1998 and the government’s default on its domestic Ruble debt in August 1998 became instantaneously an open banking crisis. It caused the transitory collapse of the payments system and, to some extent, of new lending.

A very important contributory factor to the crisis has been (as in several other Asian and Eastern European countries who experienced a currency crisis during 1997 and 1998) the fixed exchange rate corridor (adopted in the beginning of 1998) backed by IMF lending. Given Russia’s little diversified export structure, considering the slow structural reform progress and other adverse developments such as the fall of oil prices and withdrawal of foreign investors from emerging markets, it proved to be a fundamental mistake.<sup>27</sup> This promise of relative nominal exchange rate

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<sup>24</sup> The study distinguished six functional areas of “central banking reforms”: Monetary operations and government securities markets, foreign exchange operations and market, banking supervision, bank restructuring, payments system, and central bank accounting and internal audit. Marks from 1 (indicating limited progress) to 3 (indicating substantial progress) for each of these reform areas were given and for an overall ranking. Russia received a mark of 3 with regard to the three first mentioned areas and a mark of 2 for the three last mentioned areas. See Knight et al. (1997).

<sup>25</sup> The share of credit to the government in bank’s total assets had steadily increased from about 5 percent at end of 1994 to about one third at end June 1998, mostly treasury bills (see Table 1).

<sup>26</sup> This corresponds to the findings of a “due diligence survey” of 18 Russian banks (15 of which were among the 30 largest Russian banks), performed by the World Bank in the second half of 1998: 14 of these 18 banks had a negative own capital! The losses incurred by the 18 banks were identified as having been loan losses (45 percent of the aggregate loss), foreign exchange related losses (37 percent) and losses on government debt (18 percent). The large state-owned Sberbank was not reviewed. See Russian European Center for Economic Policy (1999), p. 84.

<sup>27</sup> Most analyses agree that the exchange rate policy has been crucially flawed. See, among others, Welfens (1999), Roubini and Wachtel (1998), Dornbusch (2001), Chapman and Mulino (2001). In this respect the Russian devaluation and banking crisis of August/September 1998 is very similar to

stability with lax enforcement of prudential requirements for banks contributed decisively to the overexposure of banks to the exchange rate risk: For banks it thus appeared profitable to borrow at relatively low foreign interest rates (foreign currency debt amounted to about 30% of bank's balance sheet total, Table A1), lend at high domestic interest rates and to enter into unhedged off-balance sheet currency forward contracts. Not considering off-balance sheet items, Table 1 shows that just prior to the crisis the open foreign currency position amounted to about 18 percent of the balance sheet total. This open position may have even been larger when those foreign assets are excluded that were reported to have been diverted funds from IMF loans.<sup>28</sup> The risky lending to the government (mostly T-bills) had increased to one third of the balance sheet total.

Table A1:

Russia: Consolidated balance sheet of commercial banks at the eve of the currency and banking crisis (at end June 1998)

Assets	bn Rubel	in percent	Liabilities	bn Rubel	in percent
Bank reserves	58.7	9.4	Demand deposits	136.7	21.9
Foreign assets	73.1	11.7	Time and savings deposits	97.8	15.7
Claims on general government	207.8	33.3	Deposits with temporarily suspended access	18.2	2.9
Claims on non-financial government enterprises	30.1	4.8	Foreign currency deposits and other foreign liabilities	183.0	29.3
Claims on private sector	249.3	39.9	Money market instruments	38.9	6.2
Claims on financial institutions	5.0	0.8	General government deposits	15.1	2.4
			Credit from monetary authorities	10.5	1.7
			Other items	-32.3	-5.2
			Capital accounts	156.2	25.0
Total	624.1	100.0	Total	624.1	100.0
Memorandum item: In percent of GDP:	24.0	-		-	-

Source: Central Bank of Russia (2001).

Nevertheless, some authors (e.g. Buchs, 1999) did not regard the flawed exchange rate policy to have been one root cause of the crisis but rather the dramatic decline in tax revenues between 1992 and 1997 (from above 16% to 9.3% of GDP) and the

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the crises experienced in 1997 by several East-Asian countries casting doubt on the policy advice the countries received from western institutions.

<sup>28</sup> By definition IMF loans are supposed to increase the international reserves of the central bank and should not be passed on to commercial banks. Italian newspapers cited in October 1999 analyses performed by Russian judicial authorities which found that during the three months just prior to the currency crisis in 1998 a very substantial fraction of IMF loans (about several billion US-Dollars) had been diverted to Russian commercial banks.

large fiscal deficits. Buchs argued that they were the primary cause for the very high real interest rates on loans and treasury bills especially since 1996 until the crisis making fiscal policy not only vulnerable but unsustainable and attracting relatively large speculative short-term capital inflows. Buchs also argued that the Russian crisis was a typical example of crisis contagion and that its timing was caused by the Asian currency crisis. The real interest rate level is of particular importance here, because empirical studies found it to be the only variable, which is a consistently highly statistically significant determinant of both banking crises and of the costs of banking crises (e.g. Barth et al., 2000, Demirgüç-Kunt and Detragiache, 2000). In contrast to Buchs it may, however, also be argued that with a different exchange rate policy, i.e. a flexible exchange rate, and assuming that market participants could not have speculated on IMF lending to support an overvalued exchange rate, real interest rates on loans may never have climbed to their high and long lasting levels and the government would have been forced earlier to consider its solvency. The reason for this view is that under a flexible exchange rate regime the deteriorating solvency of the government is likely to have caused upward pressure on the exchange rate and thus on inflation, which would have forced market participants and the government to reduce the risks involved. It may be *precisely* the prevention of these market forces in the first place through the promise of a relatively stable exchange rate backed by IMF lending to uphold an unsustainable exchange rate, which allowed the government to continue its borrowing policy and banks to increase their risk exposure. In other words, had the exchange rate policy been different, the increasing underlying risks may have become apparent and corrected much earlier without a sudden extremely large currency devaluation.<sup>29</sup> Figure 1 shows that in the beginning of 2003, i.e. three years after strong capital investment during 2000-2002 associated with a drastic reduction in capital flight, the real exchange rate was still about one quarter below its level before the crisis and real interest rates have been rather moderate on average during this time. At least ex-post this may corroborate the many voices that argued during 1996 and 1997 that the currency was overvalued and that real interest rates were at a dangerously high level, views which were discredited by the IMF as contributing to destabilizing the economy.

#### Figure A1

As a starting point to assess the immediate effects of the currency and banking crisis, Table A1a shows the (official) aggregate balance sheet of commercial banks at end 1998 in constant Rubels of June 1998 allowing to evaluate the impact on the

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<sup>29</sup> This is also true with regard to the Asian currency crisis, see Dornbusch (2001). Roubini and Wachtel (1998) argued that IMF loans are often a signal of unsustainable current account imbalances. Therefore it is surprising that among the many indicators tested in the most prominent study on early warning signals of currency crises, IMF loans were not included in the list of potential candidates. See Kaminsky, M., Lizondo, and C. Reinhart (1998).

real credit, real deposit holdings, and real own capital of banks by eliminating the distortionary effect of the surge of inflation that followed the crisis.

Table A1a:

Russia: Consolidated balance sheet of commercial banks after the currency crisis at end 1998 in constant Rubel of June 1998

Assets	bn constant Rubel	in Percent	Change to June 1998 a)	Liabilities	bn constant Rubel	in percent	Change to June 1998 a)
Bank reserves	38,2	7,3	-34,9	Demand deposits	84,3	16,0	-38,3
Foreign assets	123,9	23,5	69,5	Time and savings Deposits	52,6	10,0	-46,3
Claims on general government	146,4	27,8	-29,6	Deposits with Temporarily Suspended access	12,8	2,4	-29,9
Claims on non- financial govern- ment enterprises	18,7	3,5	-38,0	Foreign currency deposits and other foreign liabilities	222,3	42,2	21,5
Claims on private sector	195,2	37,1	-21,7	Money market instruments	24,4	4,6	-37,2
Claims on financial institutions	4,1	0,8	-17,9	General government deposits	11,7	2,2	-22,7
				Credit from monetary authorities	40,6	7,7	286,4
				Other items	-11,1	-2,1	-65,8
				Capital accounts	88,9	16,9	-43,1
Total	526,5	100,0	-15,6	Total	526,5	100,0	-15,6

a) Percentage change of the respective asset or liability in real terms during July and December 1998.

Source: Central Bank of Russia (2001); nominal figures were deflated using the respective increase in the CPI.

It thus becomes clear that the central bank initially bore the major burden of stabilizing the banking system since it increased its lending to commercial banks in the 6 months after June 1998 by three times in real terms. This, of course, meant that the success in reducing base money growth to an annualized 11% during January-August 1998 came to an abrupt end. (Growth of base money exploded to an annualized 72% during August-December 1998, and it grew by 54% during 1999 and 60% in 2000). CPI inflation exploded from an annualized 7.2% during the first 7 months of 1998 to an annualized 185% during August-December 1998, falling thereafter continuously to below 10% in early 2003.<sup>30</sup>

The rise of inflation and run on deposits caused drastic declines in real Rubel denominated deposits and in real own capital of banks, which are even understated

<sup>30</sup> Despite the initial inflation surge measures of the real effective exchange rate increased only relatively moderately since 1999 because of nominal currency depreciation (figure A1).

with regard to most banks. The reason is that due to a lack of published disaggregated data, the balance sheets shown here include the relatively large Sberbank (Russia's state savings bank), which was regarded as relatively safe by depositors since it was the only bank whose deposits were insured by the government, and thus there was a major shift in deposits from commercial banks to the Sberbank.<sup>31</sup> Table A1a shows also that foreign assets of banks increased by 70% in real terms, which appears surprisingly low and thus suggests the disappearance of a considerable amount of foreign assets if one considers that the real currency devaluation during this six month period amounted to 88% and if one assumes that some of the alleged large transfer of foreign assets just before the crisis to banks occurred.<sup>32</sup>

Table A1a also shows a credit crunch. However, many observers will argue that since lending to the private sector and other enterprises was relatively small - amounting to about 40% of banks' balance sheet total and less than 12% of GDP in 1998- the adverse impact of the credit crunch on the economy may have been muted. But this ratio -as other financial indicators- was rising before the crisis, and the crisis reversed this improving trend, so that a consideration of the growth impact should take into account the potential further improvement of these indicators in the absence of a crisis as is done in the simulations below.

About three years after the currency crisis (in mid 2001) banks had reduced further their risk exposure to the government and to foreign exchange rate changes.<sup>33</sup> The shares of deposits and own capital recovered somewhat and particularly real lending to the private sector rose again. However, for two reasons this mid 2001 situation is mentioned: until about this time real lending to commercial banks by the central bank strongly accelerated (its level reached 600% in real terms compared to June 1998 and almost 10% of banks' balance sheet total) although banks were not forced into restructuring through a comprehensive banking restructuring program in exchange for this support. And, secondly, the open foreign currency position started to widen again after 2001. In early 2003 it had almost reached its pre-crisis level

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<sup>31</sup> During August 1998 and May 1999 about 60 percent of Ruble deposits at commercial banks excluding the Sberbank were transferred to the Sberbank. The latter's share in total Ruble denominated deposits increased from close to 80 percent before the crisis to nearly 90 percent in Summer 1999. While Ruble depositors incurred real losses mainly due to inflation, foreign currency depositors incurred losses due to the following reasons: when these deposits were transferred to the Sberbank, they were converted into Rubles using the exchange rate of September 1, 1998. When they were not transferred, in many instances the banks were not able to repay them. Several banks engaged in asset stripping. A popular method of this practice has been the establishment of new banks that took over assets but not liabilities. This, of course, demonstrates poor banking supervision, lacking property rights and weak law enforcement.

<sup>32</sup> The long process of "asset stripping", which caused also enormous losses on the part of foreign capital providers under the eye of supervisors and the IMF is assessed in MFK Renaissance Capital (2000), pp. 6-9.

<sup>33</sup> The share of claims against the government in total assets decreased from one third to 23% and the open foreign currency position (neglecting off-balance sheet items) fell from 18% to 7% of the balance sheet total (for reasons of space the corresponding balance sheet is not shown).

(Table A1b), indicating that since 2001 banks are repeating a fundamental mistake once again: This is inconsistent with an improved banking supervision.

Table A1b:

Russia: Consolidated balance sheet of commercial banks at end February 2003 in constant Rubel of June 1998

<b>Assets</b>	<b>bn constant Rubel</b>	<b>in Percent</b>	<b>Change to June 1998 a)</b>	<b>Liabilities</b>	<b>bn constant Rubel</b>	<b>in percent</b>	<b>Change to June 1998 a)</b>
Bank reserves	123.0	12.8	109.5	Demand deposits	163.5	17.0	19.6
Foreign assets	143.7	15.0	96.6	Time and savings deposits	162.2	16.9	65.9
Claims on general government	178.4	18.6	-14.1	Deposits with temporarily suspended access	11.2	1.2	-38.5
Claims on non-financial government enterprises	30.3	3.2	0.7	Foreign currency deposits and other foreign liabilities	287.2	29.9	57.0
Claims on private sector	474.9	49.5	90.5	Money market instruments	94.8	9.9	143.8
Claims on financial institutions	9.0	0.9	80.1	General government deposits	19.8	2.1	30.9
				Credit from monetary authorities	52.5	5.5	400.0
				Other items	-43.7	-4.6	35.3
				Capital accounts	211.8	22.1	35.6
<b>Total</b>	<b>959.3</b>	<b>100.0</b>	<b>53.7</b>	<b>Total</b>	<b>959.3</b>	<b>100.0</b>	<b>53.7</b>

a) Percentage change of the respective asset or liability in real terms during July 1998 and February 2003.

Source: Central Bank of Russia (2003); nominal figures were deflated using the respective increase in the CPI.

Thus, despite the strong economic recovery since 1999, which resulted in improvements in real lending, deposit taking and in a recovery of own capital, the banking system is still highly vulnerable to a macroeconomic adverse shock. This was also confirmed by a “stress test” analysis performed by a joint World Bank and IMF study group (IMF, 2003). These tests show that a large adverse shock similar to the one experienced in 1998 but excluding the possibility of yet another government default, would have an impact on banks’ balance sheets of about 3-5% of GDP. Since such an event is likely to be associated with a loss of confidence, deposit withdrawals and thus further pressure on the banking system, and considering that the ratio of stated own capital to GDP in early 2003 amounted to about 8% of GDP, the high vulnerability of the banking system becomes obvious.

In the absence of any significant banking sector reform since the currency crisis, the danger is that the moderate recovery of the banking sector in the wake of the increase in real production covers up an underlying poor banking sector performance, which may impose high costs on Russia’s long term economic



development. This is especially true if financial market development does not simply follow economic growth but “exerts a first-order influence” on it and is a good predictor of future growth (King and Levine, 1993, Levine, Loayza, and Beck, 2000).

## **Appendix B: Policy options for improving financial development**

### **a) Weaknesses of western prudential regulation**

Even without the banking crisis in 1998, Russia's financial system has been unstable and not been able to fulfill its functions. Improvements of the regulation of the financial system prior and since the crisis have been insufficient. The important point is, however, that even had there been a fully enforced prudential regulation of Russia's financial system according to western standards, the crisis may not have been averted:

Western prudential regulation centers around the capital adequacy rule according to the BIS (1988, 1996, 2003) definition (updated Cooke ratio). This rule determines that the ratio of own capital of a bank to its risk-weighted on and off-balance sheet assets needs to be no less than 8 percent, where own capital is defined as equity and retained earnings (core capital or tier I capital) plus certain financial instruments bearing characteristics that make them similar to equity (subordinated debt or tier II capital and also, since 1998, tier III capital). Although the capital adequacy rules are regularly revised in an attempt to consider the changing spectrum of risks and risk mitigating techniques in banking, there are currently still considerable drawbacks of the updated Cooke ratio. Some of them are addressed in the recent proposals for a new capital adequacy framework "Basel II" (BIS 1999, 2003). However, it may take considerable time until compromise on this proposal is reached and it also has substantial drawbacks (some of them are described in Adamson et al., 1999).

The problems begin with the definition of own capital, which is even not intended to be changed. The recognition of (even short-term) subordinated debt (up to certain limits) as own capital may not contribute to promote stability of the banking system: In case of, for instance, successive adverse shocks to a bank the latter's capital costs are likely to increase. Especially in transition and other emerging market economies this increase could be very substantial even to the point that it would not be possible to raise additional capital.

With regard to consideration of market risks in the required capital ratio, portfolio diversification of a bank and the interest rate risk are considered with regard to the trading book of a bank (financial assets intentionally held for short-term purposes) and not with regard to the banking book<sup>34</sup>. In addition, although there have been improvements regarding consideration of risk-increasing and risk-mitigating effects of off-balance sheet transactions, the mitigating effects are considered only rudimentarily. Several approaches for improvement are suggested in the BIS (1999, 2003) reform proposals which, owing to their complex nature, are likely to require considerable time until a compromise is implemented.<sup>35</sup>

Regarding credit risk it is also widely acknowledged that the current risk weighting of assets is too crude to be a satisfactory measure. Currently, the main determinants

<sup>34</sup> The recent 1999 and 2003 BIS proposal suggests to consider explicitly interest rate risks in the banking book for those banks where these risks are significantly above average.

<sup>35</sup> Currently, it is envisaged that new rules are introduced by the end of 2006.

of risk weighting are the distinction between OECD and non-OECD countries on the one hand, and between governments, banks, and other entities, on the other. For instance, claims with maturity of up to one year on banks incorporated in non-OECD countries, such as Russia, carry a risk weight of only 20 percent, (i.e. a capital charge of only 1,6 percent of such loans is levied). Non-OECD central governments are assigned a risk weight of zero percent (if the claim is denominated and funded in the respective national currency) or 100 percent (all other cases). Claims on banks from non-OECD countries with a maturity of over one year are assigned a risk weight of 100 percent (equivalent to a capital charge of 8 percent).

Given the arbitrariness of these assignments it is proposed to replace the current risk weighting with credit ratings (BIS 1999, 2003). The fundamental merit of this could be to make capital charges more sensitive to actual credit risk. However, it leaves in place a system of arbitrary asset allocation and capital charges: The proposed jumps in risk weights from one rating level to a higher or lower level are considerable. In addition, crucial still unanswered questions, which are very relevant for countries like Russia, concern the effects of a sudden downgrading of ratings during a crisis, the quality of the assessments of rating agencies, the selection of eligible agencies, and to what extent the behavior of these agencies is affected (and potential new conflicts of interest are created) should such a system come into effect. Another problem of the proposal appears to be that unrated banks, corporates and sovereigns receive a much lower risk weight than entities with a poor rating. This could provide incentives not to receive a rating.

- b) Could the banking crisis of August 1998 have been prevented had western prudential regulation for banks been enforced?

Given the apprehensions about some aspects of the proposed reform of the capital adequacy framework and given the uncertainty regarding its implementation, it may not be warranted currently to rely on it as the new western model of prudential regulation. Using then the current capital adequacy framework it appears that several of its weaknesses, in particular a weak definition of capital, unsatisfactory consideration of portfolio diversification, interest rate risk and credit risk in the banking book, and unsatisfactory consideration of liquidity and operational risks, are more pronounced during transition. This is because of the mentioned legal and institutional imperfections, the higher volatility of macroeconomic variables and the solvency problem of the government.

For instance, under this current framework and assuming that national supervisors do not impose further restrictions, banks would not need to back up credit to the Russian government denominated and funded in Rubel with own capital. Hence, under this regulation the default of the Russian government on a substantial part of its debt (as occurred in August/September 1998) consumes own capital of banks holding such debt. However, this own capital is needed as a buffer for other risks.

Secondly, although western prudential regulation would have limited banks' open foreign exchange positions, thus limiting banks' direct losses from the large currency depreciation shock, it may not have provided sufficient protection against

the decline of the quality of the loan portfolio of the banking sector that is likely to be associated with a large currency devaluation, i.e. against the rise of the aggregate share of non-performing loans: Under a large currency devaluation this decline may be substantial if the institutional infrastructure does not facilitate structural change on the enterprise level. It takes time for the economy to adjust to a devaluation and to benefit from it, so that initially adverse effects on production dominate. In addition, even those sectors of the economy that may instantaneously benefit from the devaluation are unlikely in an unstable situation to increase their deposits at banks. Rather they may join other economic agents in attempting to shift deposits out of banks to assets considered to be safe. Thus, the adverse effect on banks' aggregate balance sheet and profitability caused by those sectors of the economy that are initially hurt by the devaluation (and that face liquidity problems, become a higher risk and require more intense monitoring) is likely to dominate potential favorable effects on banks' balance sheets and profitability caused by sectors that benefit from the devaluation. As a result, initially after a large devaluation, increased losses on loans and deposit withdrawals are likely. If, under the assumption of enforced western prudential regulation, banks react to this with increased credit rationing, the credit crunch would intensify and production would even be more adversely affected. In sum, even under western prudential regulation and even under the new proposed Basel II capital adequacy framework, stability of the financial system in a situation of large currency depreciation can prove to be difficult to be maintained.

#### c) Adaptation of some western prudential rules

Concerning capital adequacy, several authors argued that capital-asset ratios in transition countries should be higher than in industrial countries (e.g. Goldstein, 1997). Others argued that it would be unrealistic to recommend a more demanding standard (e.g. Steinherr, 1994 and 1997) and that the additional costs of such higher capital requirement would put banks in transition countries at a disadvantage; it could dampen lending and restrict entry into banking.

There are reservations to the view that transition countries should not put themselves at a disadvantage to industrial countries by adopting stricter capital regulations. On the one hand and considering the short run, it may occur that higher capital requirements have a dampening effect on bank lending. With regard to industrial countries there is, however, little empirical evidence for this assumption (Jackson, 1999). On the other hand, and adopting a medium and long-term view, capital requirements contribute to financial stability and thus their effect on economic growth may be positive. Given the often still very low money demand regarding bank deposits in transition countries, particularly in Russia, deposit growth and thus more lending, not less, due to improved stability of banks may occur. The quality of lending could also be improved if excessive risk taking would be dampened through capital requirements. Given, however, that in Russia

particularly capital adequacy is likely to continue to be difficult to enforce<sup>36</sup>, if only due to the asset valuation problem in the absence of IAS, reserve requirements need to remain relatively high and unremunerated, so as to indirectly enforce capital adequacy through relatively high cost of deposits.

Unremuneration of reserve requirements appears also warranted as an insurance premium for implicit or explicit guarantees the central bank should extend (Steinherr and Gilibert, 1994). These guarantees should include the lender of last resort function, provision of liquidity, and provision of deposit insurance (capped and partial, and perhaps existing only as long as it takes to establish a private insurance with regulatory oversight).

Regarding the risk weights in the capital asset ratio, the default of the Russian government on a part of its debt made clear that the weight for government debt (even if denominated and funded in domestic currency) cannot remain low. Arguments that this weight may be lower than 100 percent for Russian government debt appear difficult to justify. Analogously, the risk weight for bank debt would have to be raised. A weight less than 100 percent appears warranted only for such bank debt that is short-term and incurred by a bank whose creditworthiness is proven, for instance, by quarterly publication of financial statements that meet western standards. A large increase in these weights would, of course, only increase pressure on banks to raise their own capital ratio.

Regarding the limitation of interest rate risk, the current BIS rules should be adapted so that capital requirements apply to all maturity weighted asset-liability imbalances. The BIS (1999, 2003) proposal to levy an interest rate risk capital charge only for banks where interest rate risk is significantly above average, appears not to be adequate for Russia, since interest rate volatility is large and management capacity scarce (Steinherr and Gilibert, 1994).

Also risk diversification rules need to be adjusted so that not only the risk increasing effects of on-balance and off-balance sheet transactions on the exposure of a bank to individual borrowers, group of borrowers, and sectors of the economy are considered and limited with regard to the own capital of the bank but also, to the extent possible, the risk diminishing effects of off-balance sheet transactions.

Explicit consideration of other risks in prudential regulation (such as operational, reputational, and legal risks) would, on the one hand, demonstrate how the legal, institutional and other imperfections burden financial intermediation while, on the other hand, it would provide a buffer for banks against these risks. Given their difficult quantification, supervisory authorities need to make a qualitative judgement in assessing them.

As to equity investments of banks in non-financial enterprises the difficulty to find qualified participants willing to exert effective corporate governance may argue for a liberal regulation enabling banks to hold substantial investments. For instance, such investments could be limited to 20 percent of the non-financial enterprise's

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<sup>36</sup> The current minimum capital requirement amounts to 8 to 9 percent, depending on the size of the bank.

own capital with an even larger share permitted if the holding is transitory.<sup>37</sup> When allowing banks to hold substantial investments in non-financial enterprises, governance of bank managements becomes an even more crucial issue than it already is. Steinherr and Gilibert (1994) proposed to reserve seats on a bank's supervisory board to the government, the central bank, a foreign auditing firm having no relationship with the bank, and to provide incentives to pension and investment funds to invest in banks and to acquire a board seat. In addition, they proposed that the government could retain a minority share in banks. The main disadvantages of this proposal are potential conflicts of interest on the part of the government and central bank. Solvency problems of the government may increase such conflicts so that particularly regarding Russia it may be preferable not to involve the government. Whether the proposal could make it more difficult to attract foreigners to invest in Russian banks -which appears to be a *sine qua non* for improving Russia's banking system- is not obvious, since foreign investors may not necessarily consider the presence of the government and central bank as a hindrance. Assuming that the participation of the government is dropped from the proposal its main advantage appears to be an almost certain increase in quality of the supervision of bank managements.

In sum, Russia should adapt the current western capital adequacy framework so as to narrow the definition of own capital of banks and improve the consideration of credit risk, interest rate risk, portfolio diversification, and liquidity and operational risks. On the other hand, relatively liberal rules regarding equity investments of banks could apply while at the same time improving banks' governance for instance through rules concerning the supervisory board of a bank.

d) Adoption of a bank restructuring approach that is comprehensive

But another major concern is that the Russian banking reform process so far was not comprehensive as in the described relatively successful Polish and Hungarian banking reform programs: Enforcement of an improved "bank restructuring law", where ambiguities are avoided and relatively rapid court conciliations promoted could contribute to an effective reduction of the stock and flow of bad debt. The probability for survival of a bank should not be dependent on either the funds provided by the government for recapitalization or the order in which banks are reviewed by supervisory authorities. Giving foreign banks and international auditing firms an explicit role in the restructuring process would also contribute to efficient restructuring. It should also be considered that not the central bank but the government should be at the forefront of bank restructuring. The postponement of the introduction of the IAS to an indefinite time in future is another serious problem. And finally, the postponement of a reform with regard to the monopoly-like state-owned Sberbank is an important hindrance to improving the healthiness of

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<sup>37</sup> If a bank claims the holding to be transitory, the latter would have to be sold within a certain period.

the banking system. Given Sberbank's size and regional importance, its liquidation and even its break-up may appear unreasonable. An alternative could be to try to use it as an institution promoting savings and, in particular, rural financial market development with initial subsidies and guidance from international organizations (World Bank, EBRD). For instance, an empirical study by the World Bank analyzed a policy change in a government program of providing rural financial services in Indonesia in the mid 1990s. It was found that with an initial subsidy and a major policy change in this program from disbursing credit to innovative incentives for loan recovery, and to mobilizing savings, broadening the clientele, maintaining a sufficient interest-rate spread to cover the high costs of servicing small loans and deposits, the program increased lending and deposit taking and became profitable (Yaron et al., 1998). This could mean that an initial investment by international institutions into Sberbank and following such lines of reforming the bank could not only improve Sberbank's function but also possibly counteract Russia's substantial regional financial development problem, where often financial intermediation has simply not developed (see, for instance, OECD, 1997).

Table 4  
Tests for unit roots of variables used in regressions

Variable	Description	Period: 1995:1-2003:2		Period 1999:1-2003:2	
		ADF (Levels)	ADF (First differences)	ADF (Levels)	ADF (First differences)
log (GDPRPC)	Log of real GDP per capita	-1.60 (4)	-4.41** (3)	-5.88*** (2)	-7.63*** (2)
log (I/GDP)	Log of the ratio of total investment to GDP	-3.21 (5)	-3.08** (5)	-3.75** (2)	-12.03*** (2)
FB/GDP	Ratio of the consolidated fiscal balance to GDP	-4.29** (3)	-8.29*** (2)	-3.26 (0)	-5.66*** (0)
log (REXR)	Log of the real exchange rate	-2.48 (1)	-3.57** (1)	-1.61 (1)	-10.91*** (1)
log (Oilp)	Log of the export price for crude oil in US-Dollar	-3.13 (1)	-3.50* (0)	-3.71** (1)	-3.22** (1)
CPI growth rate	CPI inflation	-3.44* (1)	-5.63*** (1)	-4.15** (2)	-3.55** (2)
log (XM/GDP)	Log of the ratio of exports plus imports to GDP (openness)	-2.75 (3)	-5.52*** (2)	-3.74** (3)	-5.24*** (2)
log (GX/GDP)	Log of the ratio of government expenditures to GDP	-1.68 (2)	-8.83*** (2)	-2.61 (3)	-4.01*** (3)
log (Ind/GDP)	Log of the share of industry in GDP	-1.34 (2)	-6.59*** (1)	-3.94** (1)	-4.35** (1)
Financial indicator 1	Ratio of broad money to GDP	-2.94 (8)	-2.76* (8)	-3.87** (1)	-8.68*** (1)
Financial indicator 2	Ratio of domestic assets of commercial banks to the sum of domestic assets of banks and of the central bank	-2.43 (3)	-2.97** (1)	-3.80** (5)	-7.69*** (3)
Financial indicator 3	Share of credit to nonfinancial private sector in total credit	-3.19 (1)	-2.21 (0)	-3.87** (4)	-4.04*** (4)
Financial indicator 4	Ratio of credit to nonfinancial private sector to GDP	-3.04 (8)	-3.30** (8)	-4.33** (5)	-4.96*** (1)
Composite index of financial indicators 1-4	Index of indicators 1-4 , each equally weighted	-3.03 (4)	-3.66** (5)	-3.74** (3)	-4.05*** (1)

Note: T-statistics in parentheses. Using MacKinnon critical values. \* indicates statistical significance at the 10 percent level;

\*\* indicates significance at the 5% percent level; \*\*\* indicates significance at the 1% percent level.

An intercept and time trend are included in the test equations for levels and an intercept is included in the test equations for first differences.

The lag length is shown in parantheses behind estimated t-statistic. Choice of the lag length for the test is based on Akaike Info criterion.

Source: Author's calculations.



Table 5

Real GDP and financial development regression results. Dependent variable: Log of real GDP per capita, log (GDPRPC).

Equation	Period	Constant	log (I/GDP)	log (Oilp)	log (REXR) <sub>t-2</sub> 1)	FB/GDP 2)	Dummy for structural break in 1998:3 3)	Financial Indicator 1 <sub>t-1</sub>	Financial Indicator 2 <sub>t-2</sub>	Financial Indicator 3 <sub>t-2</sub>	Financial Indicator 4 <sub>t-1</sub>	Composite index of financial indicators 1- 4 <sub>t-2</sub>	adj. R <sup>2</sup>	observ.	Correction for auto-correlation of the residuals 4)	S.E. of regression	D.W.	Ex-post forecast: RMS (root mean squared error)	Theil's inequality coefficient
Using <i>first differences</i> of all variables except FB/GDP and the dummy variable:																			
(1)	1995:1	-0.0648	0.1789	0.100	-0.3197	1.237	-0.0850						0.439	29	no	0.0772	1.63	0.0699	0.3985
	2003:1	(-1.819)*	(4.041)***	(1.030)	(-1.835)**	(3.533)***	(-1.989)*												
(2)	1995:1	0.1163	0.1180	0.299	-0.2590	1.319	-0.1495					0.5678	0.703	29	no	0.0554	2.03	0.0483	0.2572
	2003:1	(2.802)**	(2.620)**	(3.793)***	(-2.152)**	(3.322)***	(-3.391)***					(2.353)**							
Using <i>levels</i> of all variables:																			
(3)	1999:1	-5.2409	0.1409	0.4014									0.773	17	yes	0.0706	1.51	0.0907	0.0147
	2003:1	(-20.989)***	(2.316)**	(2.844)**															
(4)	1999:1	-4.6599	0.2128	0.2892				2.837					0.841	17	no	0.0591	1.66	0.0517	0.0083
	2003:1	(-14.109)***	(3.183)***	(5.331)***				(4.470)***											
(5)	1999:1	-4.7706	0.1529	0.2874					0.802				0.834	17	no	0.0604	1.65	0.0528	0.0085
	2003:1	(-13.976)***	(2.262)**	(5.176)***					(4.317)***										
(6)	1999:1	-4.3962	0.1530	0.2271						0.506			0.874	17	no	0.0526	1.87	0.0459	0.0074
	2003:1	(-15.047)***	(2.598)**	(5.564)***						(5.355)***									
(7)	1999:1	-4.4708	0.2134	0.2980							2.710		0.876	17	no	0.0521	2.01	0.0456	0.0073
	2003:1	(-15.455)***	(3.622)***	(6.289)***							(5.420)***								
(8)	1999:1	-4.7268	0.1243	0.2926								0.3336	0.914	17	no	0.0436	1.80	0.0380	0.0006
	2003:1	(-19.400)***	(2.534)**	(7.397)***								(6.929)***							

Note: Simple OLS method is used on the assumption that the explanatory variables are exogenous. A Hausman test rejected the null hypothesis for endogeneity of the lagged financial indicator variables.

T-statistics in parentheses. \* indicates statistical significance of the respective variable at the 10 percent level; \*\* indicates significance at the 5% percent level; \*\*\* indicates significance at the 1% percent level.

1) An increase denotes a real appreciaiton of the Russian ruble.

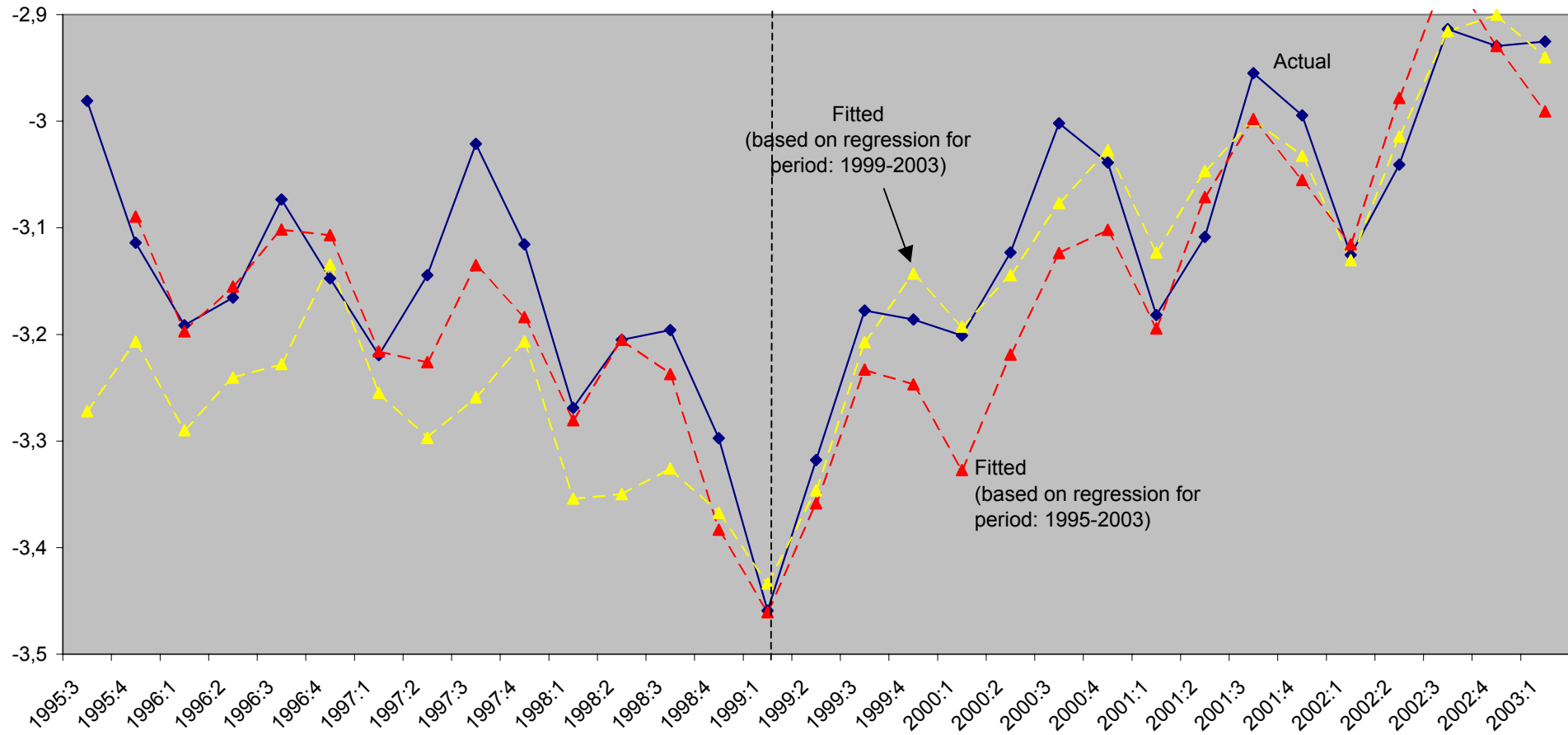
2) Ratio of the consolidated fiscal balance to GDP. An increase denotes an increase in the fiscal surplus.

3) The dummy variable takes the value of 1 starting third quarter 1998 and zero otherwise.

4) Cochrane-Orcutt method.

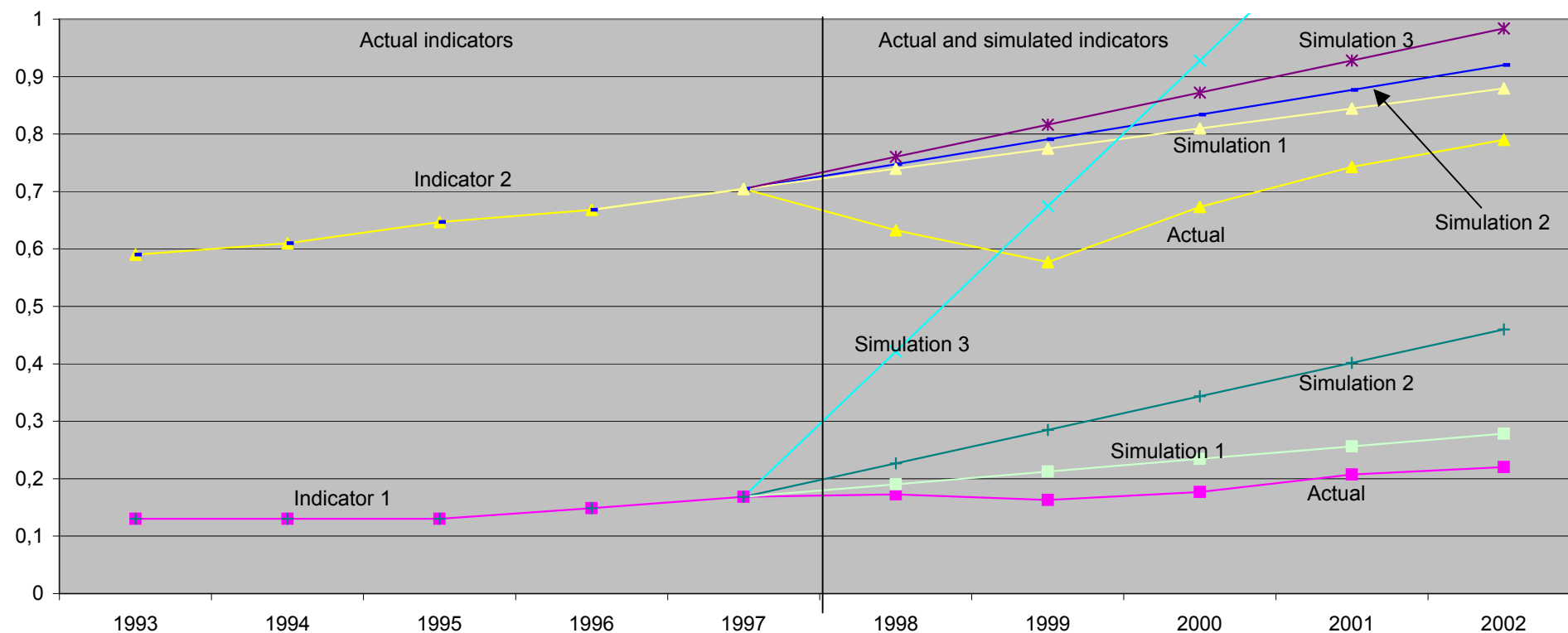
Source: Author's calculations.

**Figure 1**  
**Real GDP per capita: Actual and Fitted Values 1995-2003**  
**(in logs)**



Source: Author's calculations.

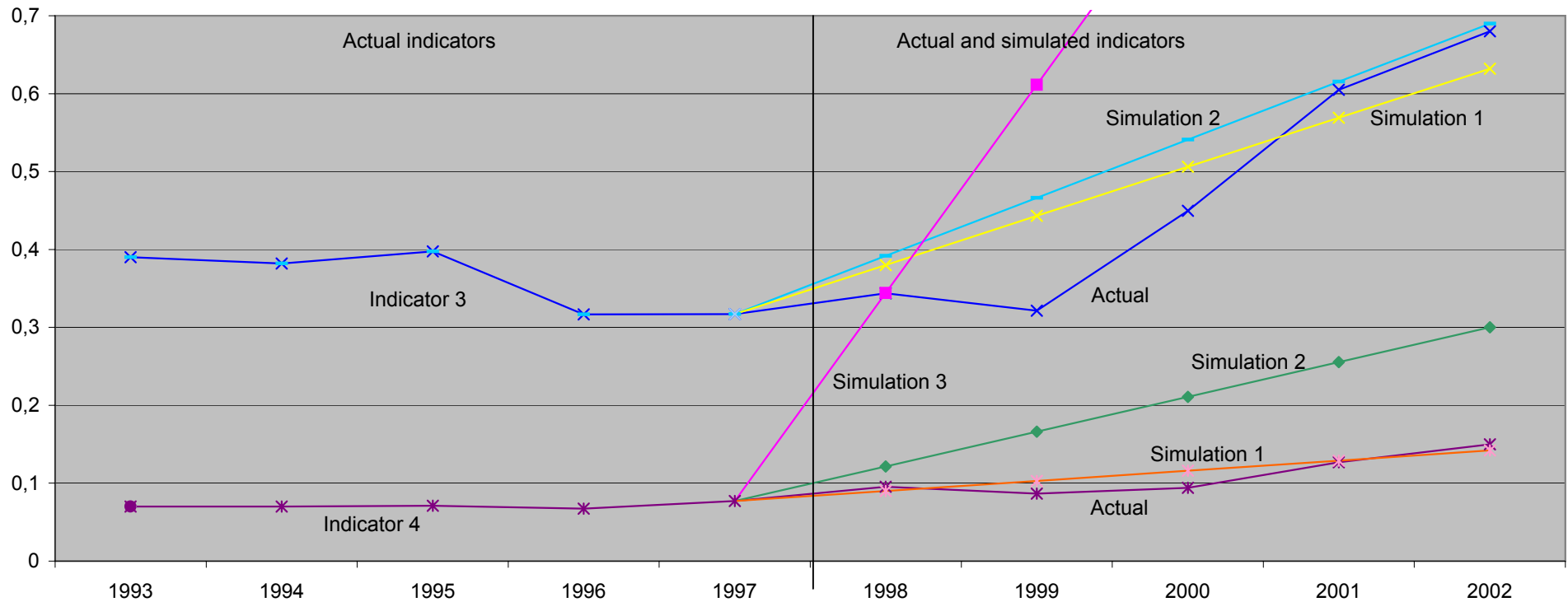
**Figure 2**  
**Russia: Actual and simulated evolution of financial indicators 1 and 2, 1993-2002**  
**(ratios in percent as explained in Table 2)**



Note: Simulation 1: Approximate continuation of improvements before the crisis in 1998. Simulation 2: Financial indicators increase linearly during 1998-2002 to the average level of each indicator reached in Hungary and Poland in 2002. Simulation 3: Indicators increase linearly during 1998:2-2002:4 to highest average levels found for a sample of 71 countries during 1960-95.

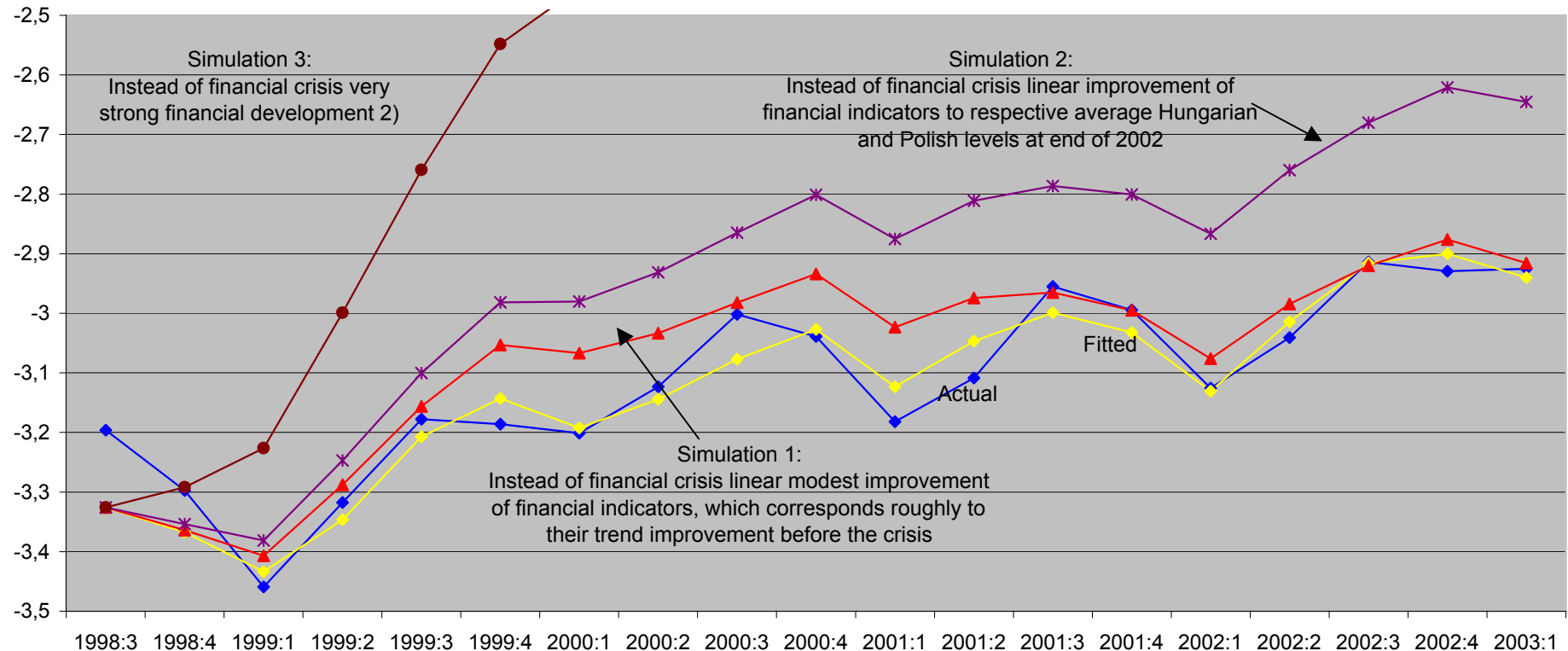
Source: Central Bank of Russia and author's calculations.

**Figure 2a**  
**Russia: Actual and simulated evolution of financial indicators 3 and 4, 1993-2002**  
**(ratios in percent as explained in Table 2)**



Note: Simulation 1: Approximate continuation of improvements before the crisis in 1998, except indicator 3 as explained in the text. Simulation 2: Financial indicators increase linearly during 1998:2-2002:4 to the average level of each indicator reached in Hungary and Poland in 2002. Simulation 3: Indicators increase linearly during 1998:2-2002:4 to highest average levels during 1960-95 found for a sample of 71 countries.  
 Source: Central Bank of Russia and author's calculations.

**Figure 3**  
**Evolution of real GDP per capita: Actual, fitted, and simulated 1998-2003 1)**  
**(in logs)**



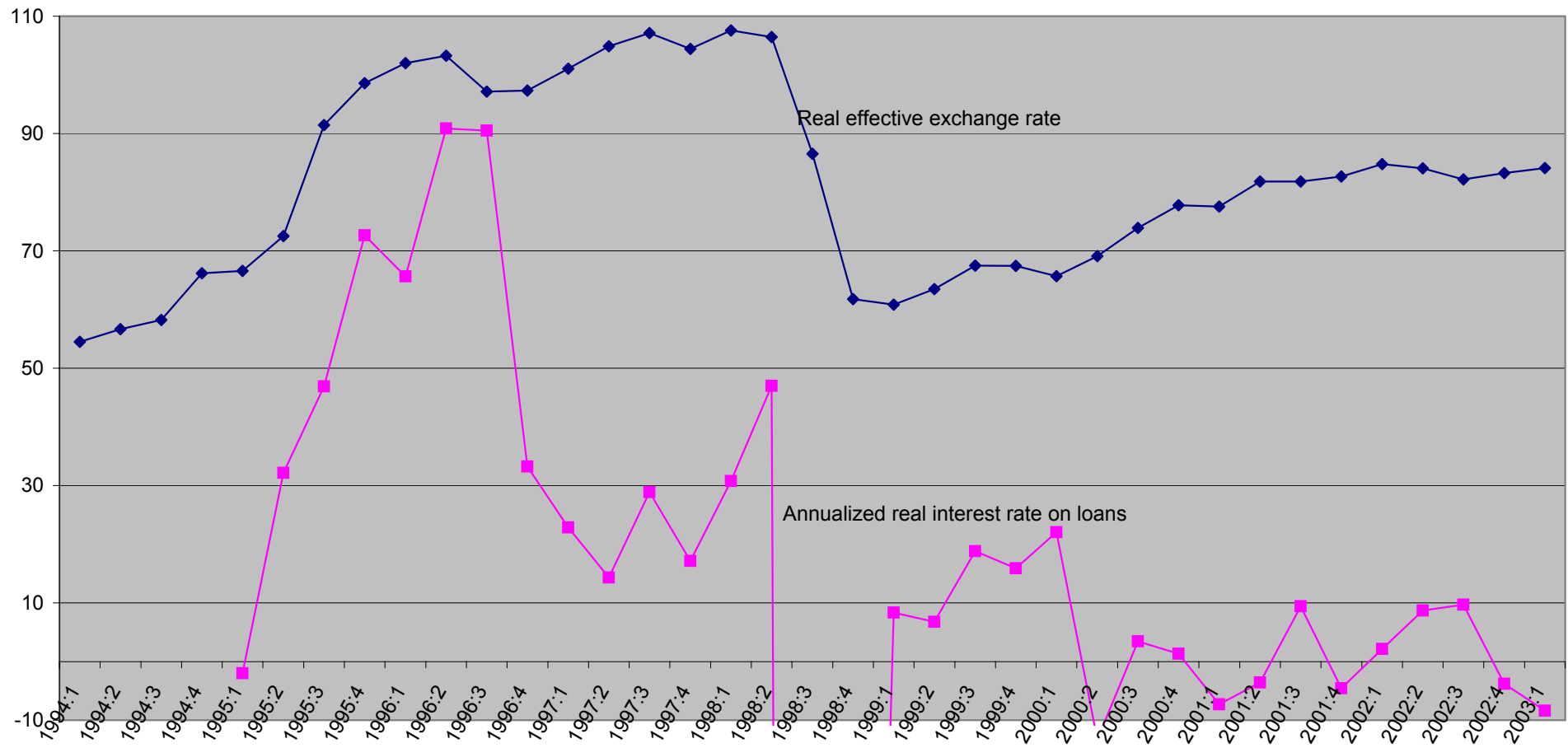
1) The fitted line and the simulations shown here are those that result from using the regression for the period 1999-2003 (equation 8 in table 5).

Assumptions underlying the simulations are shown in Figures 3 and 3a.

2) During 1998:2 - 2002:4 financial indicators 1, 2 and 4 would have increased linearly to reach the highest average levels of these indicators found for a group of 71 countries during 1960-1995 by Levine, Loayza, and Beck (2000). Indicator 3 was not considered in this study.

Source: Author's calculations.

**Figure A1**  
**Russia: Real effective exchange rate and real interest rate measure 1994-2003**



Source: Russian Economic Trends, Moscow.