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RUSSIAN FEDERATION

Selected Issues

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Approved by the European Department

August 15, 2005

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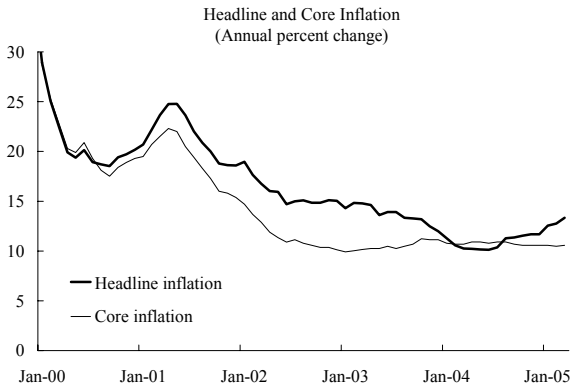
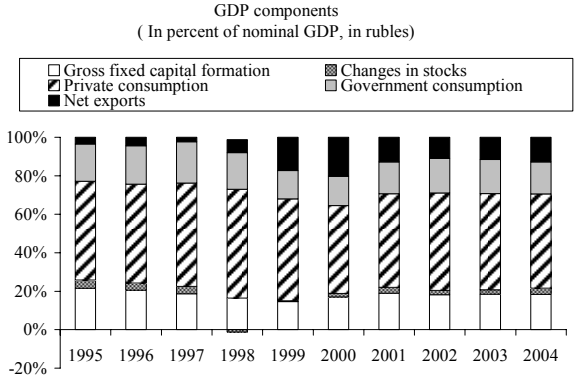
THE UTILIZATION-ADJUSTED OUTPUT GAP: IS THE RUSSIAN ECONOMY OVERHEATING? [1]

A. Introduction

1. **Inflation in Russia is entrenched at double-digit levels.** After falling from about 25 percent in mid-2001 to almost 10 percent in mid-2004, the year-on-year headline consumer price index (CPI) inflation rate has picked up since then. While this pickup in headline inflation has partly reflected temporary factors (unseasonably high food prices and administered price hikes), even core inflation—which excludes such factors—has been entrenched at around 10½ percent since mid-2002, and further disinflation appears difficult.



2. **A possible explanation for entrenched inflation is that the Russian economy is facing increasing supply-side constraints in goods and labor markets.** A possible reason for supply-side constraints in goods markets is that fixed investment in Russia has been quite low—a mere 18 percent of GDP, which is less than in most other transition countries.[2] As a result, the growth in aggregate demand for goods is likely to have outpaced the growth in aggregate supply, giving rise to inflationary pressures. An indication of supply-side constraints in labor markets is that unemployment rates vary considerably across regions, suggesting a lack of labor mobility. The resulting labor



[1] Prepared by Nienke Oomes and Oksana Dynnikova. For useful comments and suggestions on an earlier draft, the authors are grateful to the institutions responsible for the capacity utilization surveys discussed in this paper (Rosstat, REB, IET, and CEA), participants in seminars held at the IMF and the Ministry of Finance of the Russian Federation, and Andreas Billmeier, Lorenzo Figliuoli, Neven Mates, Antonio Spilimbergo, Emil Stavrev, Poul Thomsen, and Harm Zebregs. The authors alone are solely responsible for any errors.

[2] Between 2000 and 2004, the investment share was roughly 18 percent of GDP in Russia; increased from 17 to 23 percent in other CIS countries, and was broadly stable at 23 percent in Central and Eastern European economies. In 2004, the only transition countries with lower investment shares than Russia were Uzbekistan (10 percent), Tajikistan (14 percent), and Macedonia (17 percent), while at least 22 transition countries had higher investment shares. The transition countries with the highest investment shares were the Czech and Slovak Republics (27 percent), Estonia (28 percent), and Azerbaijan (55 percent).

shortages in certain sectors or regions could have been one factor behind rapid real wage growth.

3. **This paper finds evidence that supply-side constraints may be emerging, that is, capacity and labor utilization appear to be near or above their "natural" rates, above which they contribute to inflationary pressures.**[3] We arrive at this finding by estimating the nonaccelerating inflation rate of capacity utilization (NAICU) and the nonaccelerating inflation rate of labor utilization (NAILU), that is, the "natural" rates of capacity and labor utilization, above which inflation is expected to accelerate. Our estimate for the NAICU for Russia ranges from 57 percent to 75 percent, depending on which survey is used to estimate capacity utilization. For each given survey, however, the NAICU is quite precisely estimated and is robust to the inclusion of lags and other inflation determinants. While we were unable to obtain a significant regression estimate of the NAILU, available survey data suggest that labor utilization has been approximately at its natural rate since 2000.

4. **We combine our estimates of the NAICU and the NAILU into a utilization-adjusted measure of the "output gap," using a production function approach.** The output gap is defined as the difference between actual output and potential output, in percent of potential output, and is another commonly used measure of the state of the business cycle. We estimate the output gap using a production function approach with utilization-adjusted capital and labor inputs, and defining potential output as the level of output produced when labor and capital utilization, as well as total factor productivity, are at their natural rates. If the output gap is negative—that is, actual output is below potential and utilization rates are below their natural rates—an increase in demand can be accommodated by an increase in capacity and labor utilization and, therefore, is not inflationary. If the output gap is positive, however, this implies that, in the short run, an increase in demand can be met only by letting existing production factors work overtime. This increases the cost of production; hence, inflationary pressures will build up. In the long run, total capacity can be increased by hiring additional labor and capital, thus lowering utilization rates and easing inflationary pressures.

5. **We argue that our utilization-adjusted production function approach is preferable to traditional methods for estimating the output gap.** In our view, traditional trend-fitting and filtering methods are not appropriate for a transition economy like Russia, since these methods do not adjust for utilization and assume, by construction, that the output gap has been zero on average. While the latter is a reasonable assumption for very long samples, it need not hold in any given short sample. The advantage of our utilization-adjusted production function approach is that no such assumption needs to be made and, indeed, we find that the output gap has been negative for most of the sample period.

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[3] A similar conclusion was drawn by Gavrilenkov (2003), who argued that "the growth mechanism that emerged after the 1998 crisis and contributed to an economic upturn is largely exhausted…. [T]his mechanism was based on increased capacity utilization, but after a number of straight years of growth, most sectors now lack spare capacity."

6. **The utilization-adjusted production function approach suggests that the output gap in Russia has been closing rapidly since 1999 and may become positive in 2005 or shortly thereafter.** This implies that faster-than-potential growth can only be achieved at the cost of higher inflation. Our estimates thus suggest that, if the goals are to reduce inflation and increase growth, macroeconomic policies and reforms should not focus on stimulating demand but, rather, on raising potential output growth by alleviating supply-side constraints.

7. **Our results are subject to a number of caveats, and, therefore, should be interpreted with caution.** First, it is difficult to estimate cyclical demand pressures in a transition economy that has had only a limited experience with business cycles. Second, our assessment that the economy is close to overheating is based on capacity and labor utilization data for the manufacturing sector, while utilization in other sectors may have been different (however, utilization in the fuel and services sectors is likely to also have been high recently). Third, our Cobb-Douglas production function estimates depend on a number of assumptions that may be unrealistic. Fourth, several parameters used in this approach are imprecisely measured (notably, the capital stock, and capital and labor shares). Fifth, our finding that the output gap may become positive in 2005 depends on the estimate of potential output growth, the determination of which deserves further research.

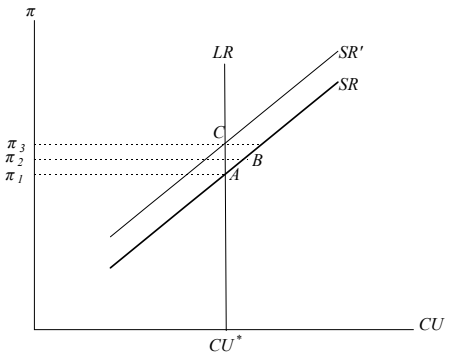
B. The Nonaccelerating Inflation Rate of Capacity Utilization

8. **We propose to measure supply-side constraints in Russia by using the concept of the nonaccelerating inflation rate of capacity utilization (NAICU).** The concept of the NAICU (sometimes called NAIRCU) was first introduced by McElhattan (1978) and is similar to that of the nonaccelerating inflation rate of unemployment (NAIRU), in that it is related to the notion of a vertical long-run Phillips curve.[4] While the NAIRU has proved to be a useful concept for measuring inflationary demand pressures in the United States, it has proven to be less useful for European countries, where labor markets are inflexible and unemployment rates are characterized by hysteresis (Franz and Gordon, 1993; Nahuis, 2003). The NAIRU is likely to be even less useful in transition economies like Russia, which, in addition to inflexible labor markets, typically have large underground economies, as a result of which official unemployment data are subject to significant measurement error. For this reason, we believe that the NAICU is a more useful concept of inflationary demand pressure than the NAIRU. In addition, we also consider the concept of a nonaccelerating inflation rate of labor utilization (NAILU).

9. **A capacity utilization rate above the NAICU, just as a labor utilization rate above the NAILU, is expected to generate inflationary pressures in the short run.** This is illustrated in the figure on the next page, which plots inflation (π) on the vertical axis against capacity utilization (*CU*) on the horizontal axis. We assume here that labor utilization is

[4] The Phillips curve derivation is given in Appendix II. For overviews of the NAIRU literature, see Gordon (1997) and Staiger, Stock, and Watson (1997).

The Nonaccelerating Inflation Rate of Capacity Utilization



fixed, but the analysis could easily be extended to the case of variable capacity and labor utilization, as described in Appendix II. The curve denoted by *SR* is a short-run aggregate supply curve, or "Phillips curve," along which inflation increases with capacity utilization.[5] Suppose the economy is originally in equilibrium, that is, capacity utilization rate (*CU*) is at its "natural" level CU^*, corresponding to an inflation rate π_1. Assuming that production factors are fixed in the short run, a positive demand shock will then cause suppliers to increase their capacity utilization rate. This implies a shift from point *A* to point *B*, that is, the increase in demand is met in part by an increase in capacity utilization, and in part by an increase in the inflation rate from π_1 to π_2.

10. **In the long run, however, there will likely not be a relation between capacity utilization and inflation.** The reason for this is that, if capacity utilization exceeds its natural rate and inflation increases, inflation expectations will also increase. As a result, workers will demand higher wages and lenders will demand higher interest rates, i.e., factor costs increase. This causes the short-run Phillips curve to shift upward, from *SR* to *SR'*, so that, for a given rate of actual inflation, suppliers will now produce less. As a result, the economy moves from point *B* to point *C*, that is, capacity utilization falls back to its natural rate, and inflation increases further, from π_2 to π_3. Under the assumption of money neutrality, therefore, any increase in demand that would bring capacity utilization above its natural rate will only lead to inflation in the long run—that is, the long-run Phillips curve (*LR*) is vertical.[6]

11. **For advanced economies, estimates of the NAICU range from 75 percent to 85 percent, but the NAICU for transition economies may be somewhat lower.** For the United States, the NAICU has been consistently estimated at around 82 percent,[7] and for Western European economies at 75 to 85 percent.[8] Generally, the NAICU is expected to be

[5] A commonly accepted justification for this is that the rate of capital depreciation depends on the rate of capacity utilization (e.g., Greenwood and others (1988) and Burnside and Eichenbaum (1996).

[6] For a formal version of this argument, which goes back to Friedman (1968), see Appendix II.

[7] The NAICU estimate of 82 percent for the United States is surprisingly robust (e.g., McElhattan, 1985; Garner, 1994; Corrado and Mattey, 1997; and Emery and Chang, 1997) and is generally used as an indicator of inflationary pressure, by U.S. Federal Reserve banks and private investors alike.

[8] Franz and Gordon (1993) estimate the NAICU for Germany at 84.7 percent. Nahuis (2003) finds NAICUs at around 84 percent for France, Germany, the Netherlands, and the United Kingdom; around 78 percent for

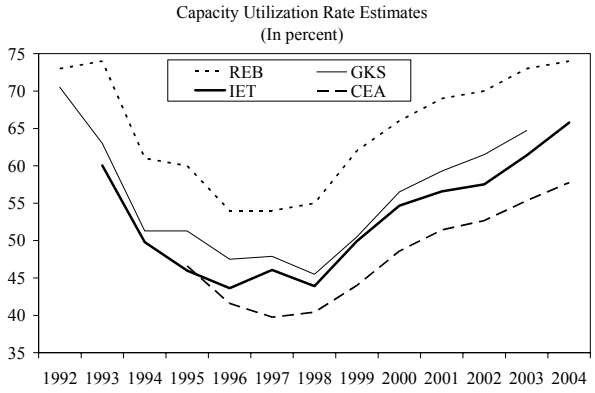
(continued…)

higher in countries with more competition, better management techniques, and more flexible product and labor markets (Nahuis, 2003). Nevertheless, the NAICU is likely to be always below 100 percent.[9]

C. Capacity Utilization Estimates

12. **At least four different institutions produce surveys that estimate capacity utilization in Russia: Rosstat (GKS), the Institute for the Economy in Transition (IET), the Russian Economic Barometer (REB), and the Center for Economic Analysis (CEA)**.[10] The methodology and characteristics of these surveys are described in more detail in Appendix I. Most sources provide data for industry only, as data on other sectors are fragmentary. Hence, we will restrict ourselves to capacity utilization in industry.

13. **All surveys suggest that capacity utilization in industry has increased strongly since 1998, but the estimated capacity utilization rates vary widely.** All capacity utilization series display a "U-shaped" pattern, with capacity utilization falling until 1996 or 1997, and rising from 1998 or 1999 onward. However, the estimated rate of capacity utilization varies widely between the surveys, with the 2004 rate ranging between 58 percent (CEA survey) and 74 percent (REB survey). The reasons for these large differences are explained in Appendix I, and relate to differences in survey questions, sample design, and possible sample biases owing to differences in the size and age distributions of enterprises.



14. **Consistent with the increase in capacity utilization, the share of enterprises with excess capacity has declined since 1998, while the share of enterprises with insufficient capacity has increased.** This information is summarized by the "balance of capacity assessments," which is defined as the share of respondents who consider their

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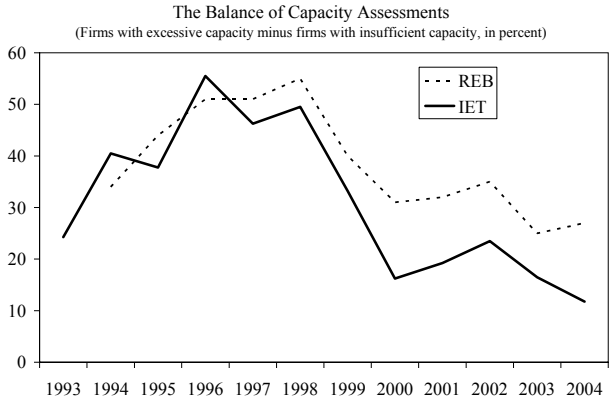
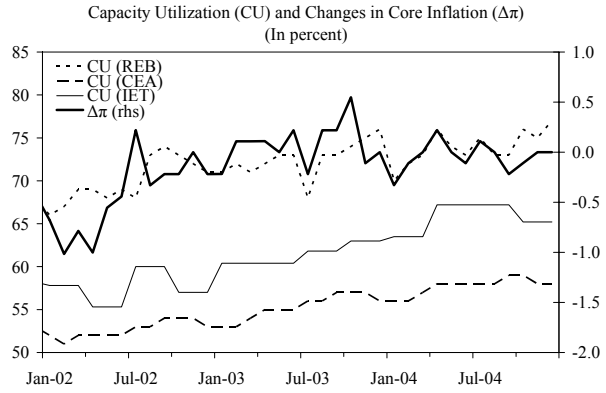
Belgium, Greece, and Ireland (with no significant effects for Greece and Ireland); and around 75 percent for Italy. We are not aware of any NAICU estimates for transition or developing economies.

[9] Burnside and Eichenbaum (1996) present a model in which it is optimal for firms to set their capacity utilization rate below 100 percent, because this allows them to immediately increase the effective stock of capital in response to shocks that raise the marginal product of capital.

[10] In addition to these four institutions, Moscow Narodny Bank publishes an additional survey (conducted by NTC Research) that contains indirect estimates of capacity utilization, such as backlogs and supplier delivery times. We do not discuss these estimates here, as they are somewhat difficult to compare with the direct estimates of capacity utilization.



capacity excessive, minus the share of respondents who consider their capacity insufficient. The balance increased slightly during 2001–02, possibly reflecting strong investment growth during 1999−2001, combined with a slowdown in GDP growth in 2001. From 2002 onward, however, excess capacity declined again, although, according to the REB survey, it increased slightly in 2004.[11]



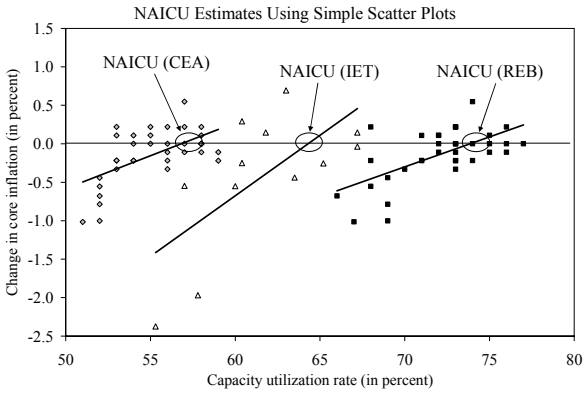
15. **In spite of their differences in levels, all capacity utilization estimates seem to be positively correlated with changes in inflation, which is what matters for our analysis.** This is suggested by a simple graphical analysis that compares the evolution of capacity utilization with the monthly changes in the annual rate of core inflation for the past few years.[12] The correlation between the change in core inflation and the REB estimate of the capacity utilization rate is especially striking, but the other two estimates also appear to have a high correlation. We cannot assess the correlation with the GKS estimate, because the latter is available only at an annual frequency, while the annual change in core inflation can only be computed from 2000, leaving us with far too few (4) datapoints to determine the correlation.

16. **A simple way to estimate the NAICU is to plot the difference in core inflation against the capacity utilization rate, and see for which capacity utilization rate the change in core inflation is zero.** The resulting scatter plot confirms that, for all capacity utilization measures (CEA, IET, and REB), there is, indeed, a positive correlation between

[11] Compared with the IET survey, the REB survey reports a larger share of respondents with "excess" capacity, an approximately equal share of respondents with "insufficient" capacity, and a smaller share of respondents with "sufficient" capacity.

[12] We use core inflation rather than headline inflation in order to eliminate the effects of seasonal food items and administered price adjustments, which are unrelated to underlying inflation. Following Nahuis (2003), we consider monthly changes in the annual (12-month) rate of core inflation in order to eliminate seasonal effects. Since the core CPI index is available only from January 1999, the monthly change in annual core inflation can be computed only from February 2000. We do not plot the changes in core inflation for 2000 and 2001 because these were largely determined by other factors, which we control for in our econometric analysis.

the change in core inflation and the capacity utilization rate. Not surprisingly, the NAICU estimates are different for each survey, for the same reasons why their capacity utilization estimates are different. Thus, the CEA survey data generate the lowest NAICU estimate (around 57 percent), and the REB survey data generate the highest NAICU estimate (around 74 percent), while the IET survey data generate a NAICU estimate that is somewhere in between (around 64 percent).



17. **Using more formal econometric tests, we show that the NAICU estimates based on scatter plots are robust to the inclusion of lagged changes in inflation and other variables.** The econometric methodology and results are reported in Appendix II. Among the regressors we include a number of lags, to take into account inflation persistence, plus a number of other inflation determinants, including broad money growth, changes in the nominal effective exchange rate, and changes in the oil price. The best-fitting models, defined as those that minimize a number of information criteria, are presented in the last columns of Tables B1, B2, and B3 in Appendix II. They show that, even when accounting for all these other variables, the estimated NAICUs are still very similar to the simple NAICU estimates obtained using scatter plots.

18. **All estimates suggest that the capacity utilization rate was above its natural rate at end-2004, although this difference is not significant for the IET data.** As Table 1 shows, the end-2004 capacity utilization rate is above the estimated 95 percent confidence interval for the NAICU (point estimate $\pm$ 1.96*standard error) for the REB and CEA measures of capacity utilization and falls within the confidence interval for the IET estimate.

Table 1. Estimated Natural and Actual Capacity Utilization Rates
(In percent)

	NAICU (point estimate)	NAICU (95 percent confidence interval)	*CU* at end-2004
REB	74.6	73.3–75.8	77.0
IET	65.0	64.3–65.6	65.2
CEA	56.9	56.2–57.5	58.0

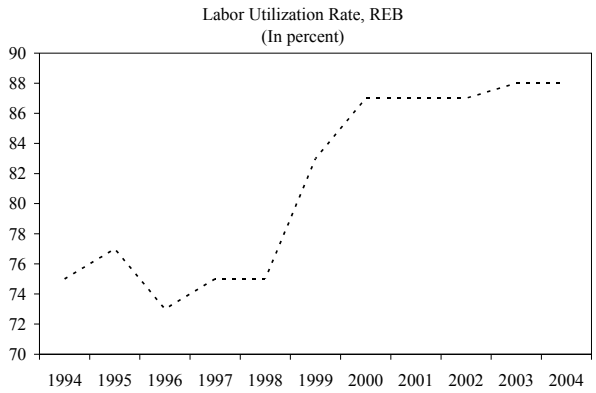
D. Labor Utilization Estimates

19. **Russia, as well as other former centrally planned economies, is likely to have witnessed a large increase in labor utilization during transition**. While unemployment officially did not exist under central planning, these economies typically had a substantial

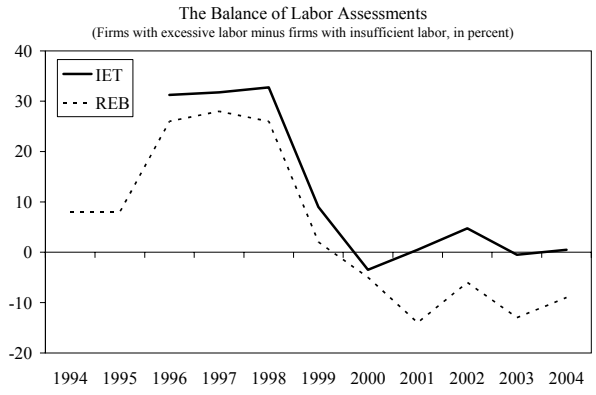
amount of "hidden" or "disguised" unemployment—defined by Eatwell (1997) as employment in very low productivity occupations. Some of this disguised unemployment continued to exist during transition in the form of formally employed workers who were put on shortened working days or on compulsory leave (Dolinskaya, 2001, p. 11).

20. **Indicators of labor utilization rates are available from both the REB and the IET.** While the surveys do not clearly define the concept of labor utilization, it is likely interpreted by respondents as the ratio of actual hours worked to potential hours worked, given the number of employees. The REB survey is the only one that estimates an overall labor utilization rate for industry. In addition, both the REB and the IET publish so-called labor assessments, in which enterprises are asked whether the amount of labor they have is insufficient, sufficient, or excessive given the expected demand. IET also publishes this information separately for each industry.

21. **The labor utilization rate appears to have been stable at around 87 percent since 2000.** According to the REB survey, labor utilization increased from about 75 percent during 1994–98 to around 87 percent during 2000–04. Virtually all of the increase occurred during 1999, when labor utilization increased from 75 percent to 85 percent. A possible explanation for this is the increase in domestic demand resulting from the substantial real ruble depreciation that followed the August 1998 financial crisis, combined with higher oil prices. Apparently, manufacturing enterprises satisfied this increase in domestic demand by raising their historically low labor utilization rate, rather than by hiring new labor.



22. **While we are unable to estimate the NAILU econometrically, data on the balance of labor assessments suggest that labor utilization may have been at its natural rate since 2000.** As Appendix II describes, identification problems prevent us from estimating the NAILU and the NAICU simultaneously, and we found the impact of labor utilization on the change in inflation to be insignificant. However, some information on the NAILU can be obtained from the balance of labor assessments, which is defined as the share of respondents who consider the amount of labor excessive, minus the share of respondents who consider their labor



insufficient, relative to expected demand. Starting in 2000, the balance has been close to zero for the IET survey and has even been negative for the REB survey.[13] This suggests that the labor utilization rate registered during those years (around 87 percent) may correspond to the natural rate of labor utilization.[14]

E. Output Gap Estimates

23. **The output gap, which measures the extent to which GDP is above or below its potential, is the most general indicator of the cyclical position of an economy.** It is a more general indicator than either capacity utilization or labor utilization, since it takes into account both—because output is a function of both capital and labor. If output is above potential, supply-side constraints imply that producers cannot easily meet an increase in demand with an increase in supply; hence, inflationary pressures will build up. If output is below potential, an increase in demand can easily be met with an increase in supply, and therefore will not result in inflationary pressures.

24. **There are three main methods for estimating the output gap.**[15] The first and simplest method is arithmetic trend fitting, which comes down to the assumption that potential output follows a linear, quadratic, or exponential trend. The second method is the use of univariate statistical filters, in particular, the Hodrick-Prescott (HP) filter and the Christiano-Fitzgerald (CF) filter. Finally, the third method we use is the so-called production function approach, which involves estimating a production function for the Russian

[13] It is somewhat surprising that the REB labor assessments are consistently below the IET labor assessments, while the REB capacity assessments are mostly above the IET capacity assessments. Since the REB survey seems biased toward smaller enterprises and the IET survey appears biased toward larger enterprises (see Appendix I), this suggests that smaller enterprises are more constrained in terms of labor, and less constrained in terms of capital, compared to larger enterprises. Another surprising fact is that the REB's labor assessment is very low in 1994–95, suggesting that there was not much spare labor in this period, which appears to be inconsistent with the low labor utilization rate reported by the REB for those years. A possible explanation for this is that the REB assesses available labor relative to expected demand during the next 12 months; hence, the reported lack of spare labor may simply reflect overly optimistic expectations regarding overall demand during the following 12 months.

[14] While there is no one-to-one relationship between the NAILU and the NAIRU, it is interesting to note that another study (Bragin and Osakovsky, 2004) estimates that, from 2000 to 2003, the unemployment rate in Russia was also approximately equal to its natural rate. This finding is not based on the labor utilization estimates discussed above, but on an error-correction-type model in which changes in employment are a function of changes in output, changes in inflation, and the difference between actual and natural employment, where the latter is an unobserved variable.

[15] A fourth popular method for estimating the output gap, which we do not discuss here, is to identify structural demand and supply shocks in a vector autoregression (VAR), using a Blanchard-Quah type variance decomposition approach. We believe this method is difficult to apply to Russia, given the short time series available, the existence of structural breaks, and the difficulty involved in disentangling demand shocks from supply shocks, given that oil prices are correlated with both.

economy, and which incorporates the capacity and labor utilization estimates discussed above. The technical details behind the first two approaches are described in Appendix III, and the third approach is described in detail in the text.[16]

25. **All methods have advantages and disadvantages.** The first method, arithmetic trend fitting, has the advantage of being simple, but its disadvantages are that it is a purely statistical method, and that it tends to generate unrealistic swings in the output gap if the actual trend is different from its assumed shape (e.g., linear, quadratic, or exponential). The second method, univariate statistical filtering, has the advantage of producing smoother estimates of the output gap (in particular, the CF filter); however, it is also a purely statistical method without any economic foundations. In addition, it has the disadvantage of being subject to so-called end-of-sample bias (see Appendix III). The advantages of the third method, the production function approach, are that it is based on economic theory, allows us to use and combine our capacity and labor utilization estimates, and does not necessarily assume that output gaps are zero on average. The disadvantage of this approach, however, is that it is based on several assumptions that may be unrealistic for Russia (e.g., profit maximization, perfect competition, and constant returns to scale), and requires us to estimate several parameters that are imprecisely measured (the capital stock, capital and labor shares, capital and labor utilization, and the NAICU and NAILU).

26. **We use all three methods to estimate the output gap in Russia for the period 1999–2004.** While earlier data are available, we decided not to use these, as all output gap estimation methods implicitly assume that the structure of the economy remains constant over time. Clearly, this was not the case in the early transition years, and certainly not in the crisis year 1998. While one could argue that the structure of the Russian economy has continued to change even since 1998, we believe that it has been sufficiently stable to allow estimation of the output gap. For the statistical approaches (the first two methods), we use seasonally adjusted quarterly GDP data. However, since quarterly data are not available for the capital stock, we use annual data for the production function approach.

Trend fitting and statistical filtering

27. **When potential output is estimated using arithmetic trends, the results suggest that the output gap was positive during 2000–01:H1, and possibly again during 2004.** As Figure 1 shows, the results do not depend much on the assumed trend for GDP: linear, quadratic, and exponential trends all give a similar pattern. All estimates suggest that output was above potential from 2000 through mid-2001, then fell below potential as GDP growth slowed, and started exceeding potential again around 2003:Q4.

[16] For a useful discussion and comparison of these output gap estimation methods, see Billmeier (2004a and 2004b).

28. **When potential output is estimated using statistical filters, the results are very similar.** We first de-trend the seasonally adjusted GDP data by using several different HP filters, each of which smooth the output series to a different extent (see Appendix II for details). The resulting trend is typically interpreted as potential output. Since the HP filter is sensitive to the "end point problem," it is necessary to extend the actual GDP series with projections for 2005. As the bottom panel of Figure 1 illustrates, smoothing the GDP data by using a CF filter, which uses a different methodology than the HP filter (see Appendix III), results in a significantly smoother estimate of the output gap. Judged from these estimates, there is less evidence that output was above potential in 2004. However, the de-trended version of the CF filter, which is probably the most appropriate one, does result in a slightly positive output gap in the last quarter of 2004.

Production function approach

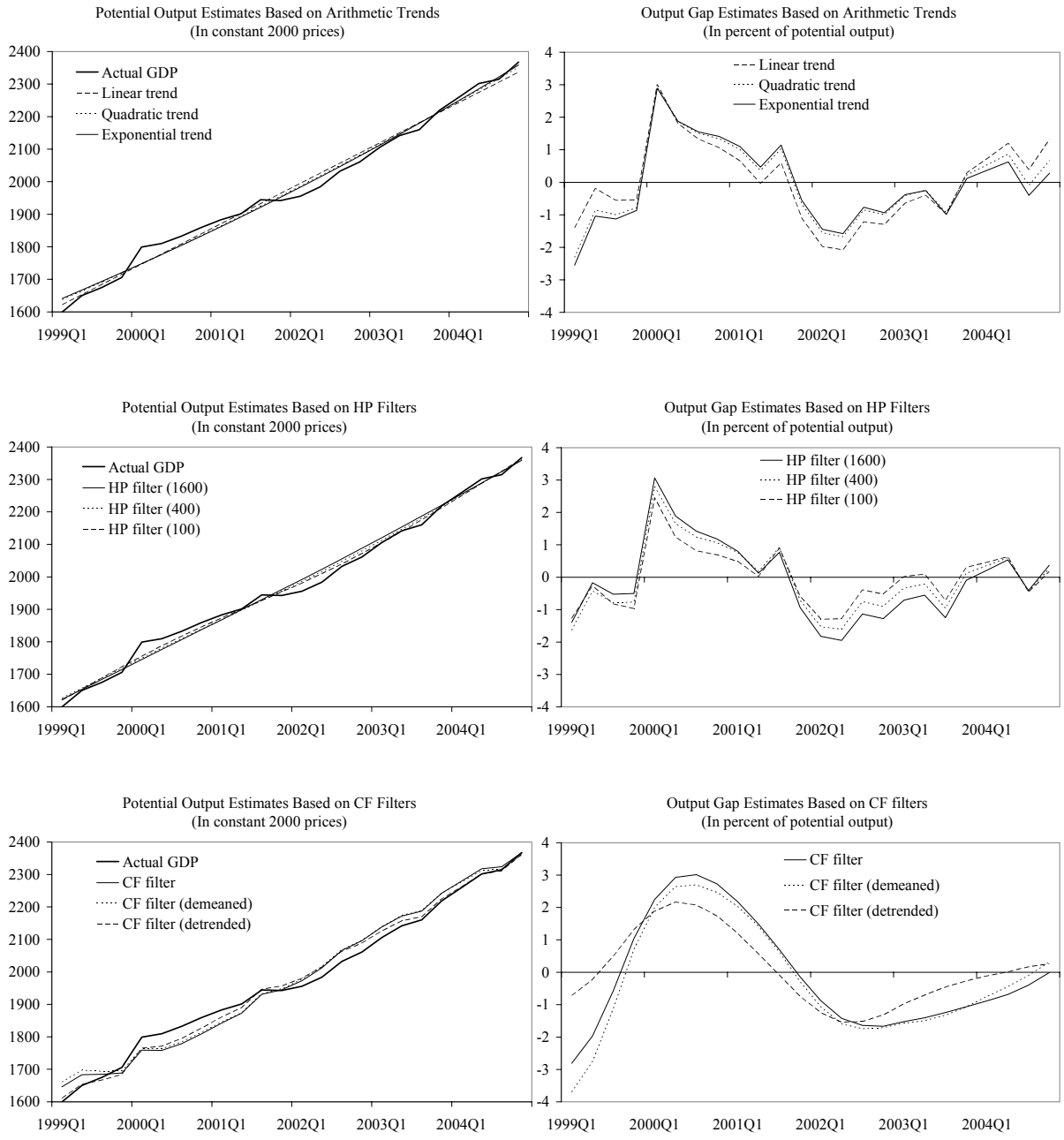
29. **The traditional trend-fitting and statistical-filtering approaches to output gap estimation may not be appropriate for a transition economy like Russia, since they implicitly assume that the output gap is zero on average.** Both types of approaches decompose actual growth in trend and cyclical components and, therefore, implicitly assume that "average" growth corresponds to potential growth. This is most obvious in the case of a linear trend, which is estimated by minimizing squared deviations. By construction, this implies that deviations from the trend are zero on average, that is, there must be periods with both positive and negative output gaps. While this assumption seems reasonable over long periods of time for relatively stable economies, it does not seem appropriate for transition economies like Russia, which have experienced large structural changes over short periods of time.[17]

30. **Most problems inherent in trend fitting and filtering can be avoided by using a production function approach.** Most important, this approach does not assume that output gaps are zero on average for a given sample. This is because, under the production function approach, potential output is defined as the level of output that is produced when both capacity and labor utilization (and total factor productivity) are at their natural rates. Thus, whether or not the output gap will be zero on average depends on whether the factors of production are, on average, at their natural rates. Another advantage of the production function approach is that it does not necessarily assume that the structure of the economy is

[17] In fact, the evolution of real GDP in almost all transition economies displays a "V"-shape, with negative real GDP growth rates through the mid-1990s (for Central and Eastern European economies) or even until the end-1990s (for most CIS countries), and positive growth rates after that. If one were to estimate the output gap for the entire 1990s using trending methods, the output gap would by construction be positive both at the beginning of the sample and at the end of the sample.

stable over time; for example, it is possible to have time-varying labor and capital shares (although for Russia, these shares have been rather stable, as shown below).[18]

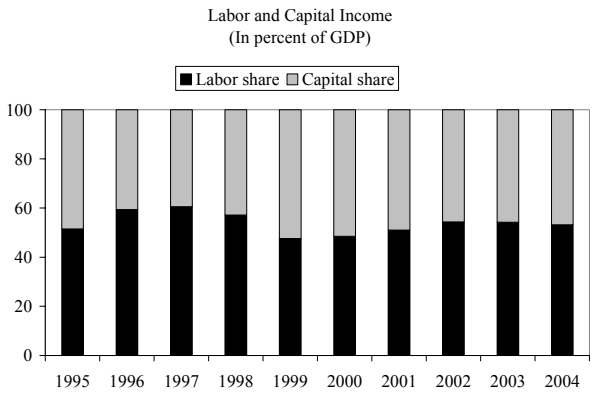
Figure 1. Output Gap Estimates Using Arithmetic Trends and Statistical Filters



[18] Moreover, we assume that the NAICU and the NAILU have been constant over time. While it would be interesting to test this assumption, we currently do not have a sufficient number of observations to do this.

31. **The production function approach assumes that firms maximize profits and that production is constant returns to scale.** We estimate a standard Cobb-Douglas production function of the form $Y = AL^{\alpha}K^{\beta}$, where Y denotes real output, A denotes total factor productivity (TFP), L is total employment, K is the capital stock, α denotes the labor elasticity of output, and β denotes the capital elasticity of output. Under the assumption of profit maximization, the labor elasticity equals the labor share of income, and the capital elasticity equals the capital share of income.[19] Under the assumption that production is constant returns to scale ($\alpha+\beta=1$), the labor share and the capital share of income sum to one.

32. **Capital and labor shares in Russia are estimated to have been roughly equal.** Using national accounts data on GDP by income source, labor income can be estimated as the category "average earnings of employees" (which includes income taxes, social insurance payments, and so-called "hidden wages") and capital income as the category "gross profits and gross mixed income."[20] Using these estimates, we find that, during the period 1995–2004, the labor share was roughly 50 percent. The labor share slightly decreased during 1999 and 2000, suggesting that wages, rather than profits, took the biggest hit following the 1998 financial crisis.



33. **We estimate labor and capital inputs by adjusting official data on the capital stock and employment for capacity and labor utilization.** That is, we estimate a production function of the form

$$Y = A(u_L L)^{\alpha}(u_K K)^{1-\alpha},$$

[19] To see this, consider the following profit maximization problem:

$$\max \Pi = PY - WL - RK$$

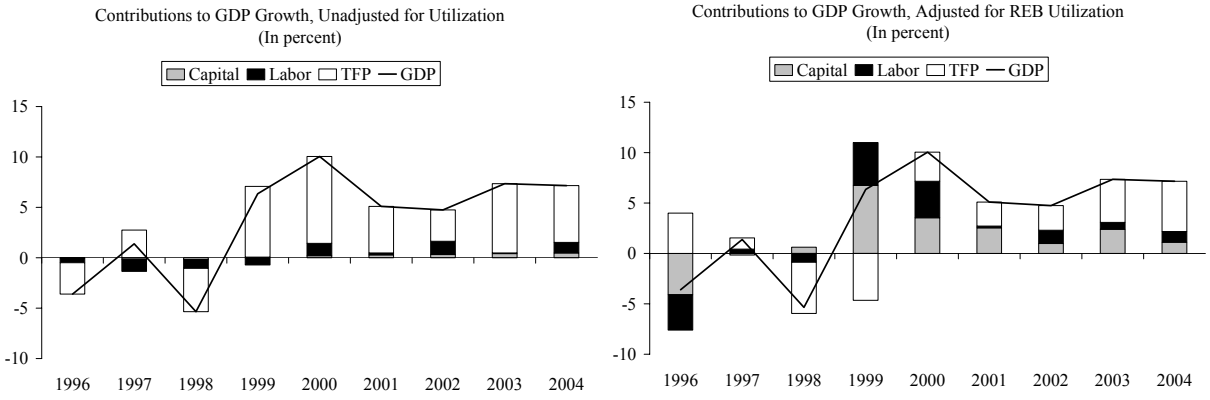
$$\text{s.t. } Y = AL^{\alpha}K^{\beta},$$

where P is the GDP deflator (i.e., PY=nominal GDP), W is the average nominal wage, and R is the average cost of renting capital. It is straightforward to show that the first-order conditions to this problem are $\alpha=WL/PY$ and $\beta=RK/PY$.

[20] The category "gross profits and gross mixed incomes" is equal to that part of the value-added component that remains with producers after deducting expenditures related to the compensation of employees and net taxes on production and imports. Since net taxes on production and imports do not accrue to either capital or labor, we exclude them from the definition of total income, so as to ensure that the labor share and capital share sum to one.

where u_L denotes labor utilization and u_K denotes capital utilization. We take the capacity utilization measures estimated for industry as proxies for the economy wide u_K and calculate the output gap separately for each measure. Since we have only one (REB) measure of u_L, we use this measure in all our estimates of the output gap. As argued above, our estimates of u_L and u_K suggest that one would overestimate actual capital and labor input by using official statistics on employment and the capital stock. Nevertheless, researchers who use the production function approach to estimate the output gap typically do not adjust for utilization. Moreover, they generally assume that capital is always at its potential—which, as we have seen, is a bad assumption, at least for Russia.

34. **Without adjusting for utilization, the contribution of total factor productivity (TFP) growth to GDP growth is seriously overestimated.**[21] This is illustrated in the figures below, which show the decomposition of GDP growth into capital, labor, and TFP growth, using the REB estimates of capacity utilization and labor utilization. The first figure shows that, without adjusting for utilization, the contribution of capital and labor to total GDP growth is almost negligible. This is natural, given that, according to official Rosstat data, the capital stock grew by only 0.1 to 1 percent per year throughout 1999–2004,[22] while employment grew by -1.5 to 2.5 percent per year. The second figure shows that, when we adjust for capacity utilization, the contributions of capital and labor are much larger. In fact, the increase in capacity utilization appears to have been an important factor behind GDP growth in all years since 1998, while the increase in labor utilization was an important factor in the years 1999 and 2000.



[21] Similar observations for Russia have been made by Dolinskaya (2001), Bessonov (2004), and Lissovolik (2004). The same observation applies to U.S. data as well. A number of papers have found that, when variable capital and labor utilization rates are introduced into real business cycle models, the assumed volatility in TFP needed to explain the observed variability in U.S. output is significantly reduced: by 20 percent in Bils and Cho (1994); by 33 percent in Burnside and Eichenbaum (1996); and by 20–40 percent in Baxter and Farr (2005).

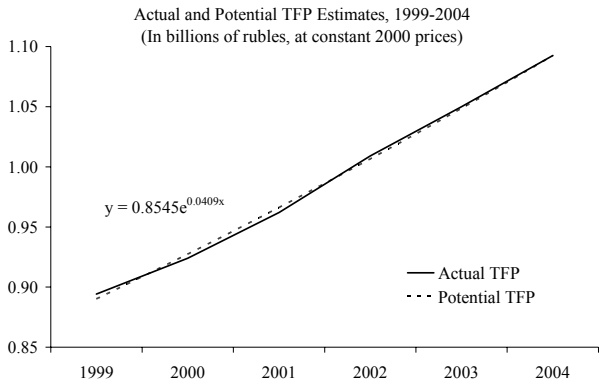
[22] Because 2004 data were not yet available during the time of this exercise, the estimate for 2004 is obtained by extrapolation.

35. **We estimate potential output by evaluating the estimated Cobb-Douglas production function at potential employment, potential capital, and potential TFP.** That is, we estimate the following production function:

$$Y = A^*(u_L^* L)^{\alpha}(u_K^* K)^{1-\alpha},$$

where A^* denotes potential TFP, u_L^* is the NAILU, and u_K^* is the NAICU. Thus, potential employment and the potential capital stock are estimated by assuming that they are at their natural rates. We assume the natural rate of labor utilization to be 87 percent, as the data on labor assessments suggest, and we set the u_K^* equal to our various estimates of the NAICU. For each capacity utilization survey, we also compute a lower and upper bound for potential output, based on the estimated 95 percent confidence interval for the NAICU.

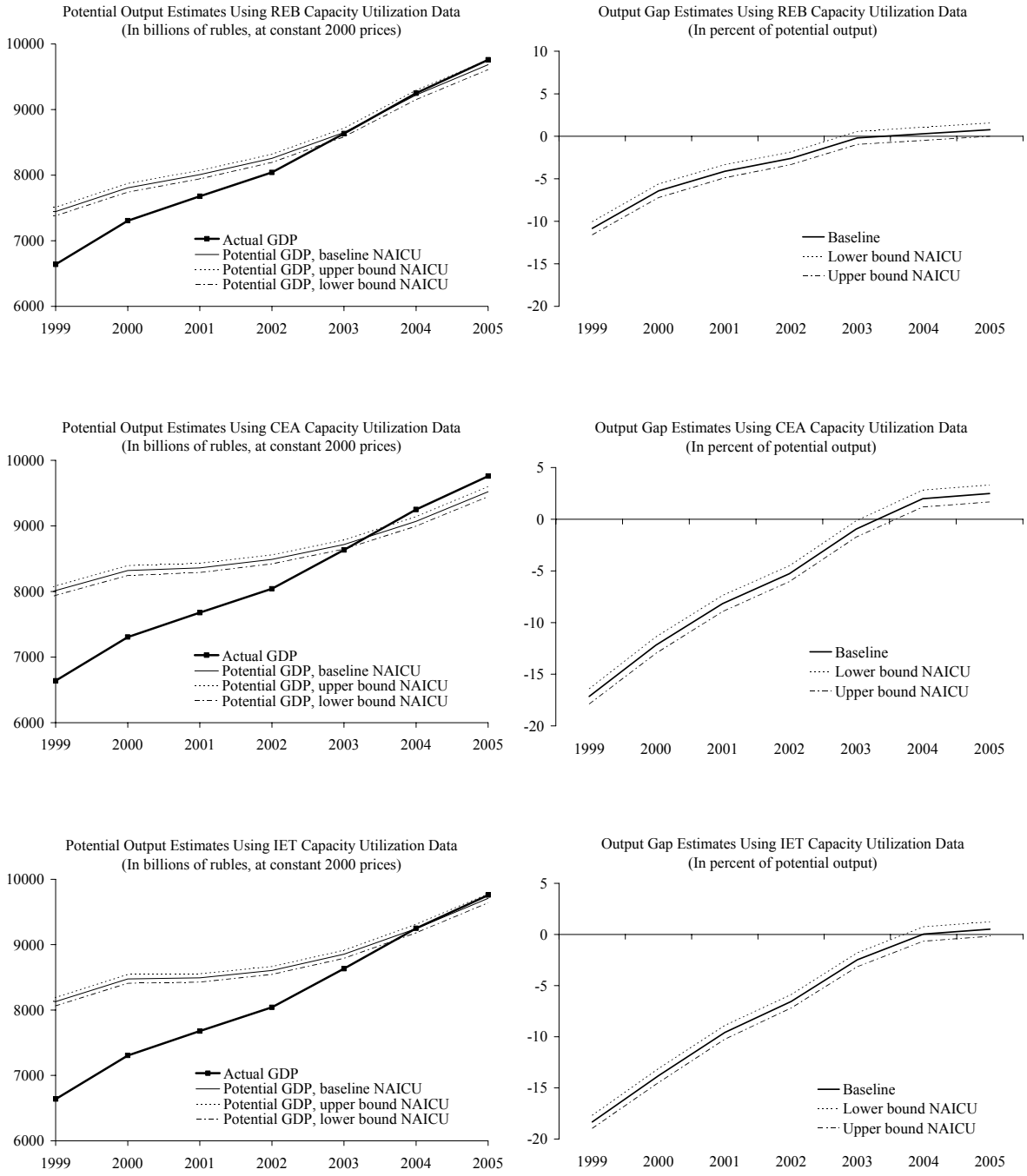
36. **Using the REB survey data, we estimate the growth rate of potential TFP at around 4 percent.** Potential TFP (A^*) is estimated using exponential trend fitting, which implicitly assumes that the growth rate of potential TFP has been constant during the period 1999–2004. The estimated exponential trend suggests that TFP has grown on average by 4.1 percent a year between 1999 and 2004.[23] The assumption of a constant growth rate turns out to be a reasonable assumption, as the deviations between actual and potential TFP are quite small.



37. **All production function estimates suggest that output was below potential until recently, with the output gap narrowing from between −10 and −20 percent in 1999 to around zero percent in 2003–04.** The finding of a negative output gap is natural given that, until recently, capacity utilization was below its natural rate, while labor utilization and TFP were near their potential. Similarly, the finding that the output gap has narrowed over time follows from our earlier finding that capacity utilization has approached its natural rate. Note that a negative output gap does not mean that GDP *growth* has been below potential. On the contrary, as Figure 2 shows, a negative but narrowing output gap implies that, even though the *level* of actual GDP remained below potential, the *growth* of actual GDP consistently exceeded potential GDP growth.

[23] This estimate is close to Lissovolik's (2004) TFP growth estimate of 3.7 percent during 1999–2002.

Figure 2. Output Gap Estimates Based on the Production Function Approach



38. **The estimates also suggest that the output gap may become positive in 2005.** Interestingly, this result is very similar to the results based on arithmetic-trending and statistical-filtering methods, which also suggest that the output gap has been gradually closing since 2002, and is currently near or possibly above potential. However, we should emphasize that the estimate for 2005 based on the production function approach is somewhat uncertain, as it depends on the assumed actual and potential growth rates. The estimates presented here assume that actual GDP will grow by 5.5 percent in 2005, while potential GDP is projected to grow somewhat slower, at 5 percent, thus implying a slight increase in the output gap.[24] However, if actual GDP will turn out to grow more slowly than potential GDP during 2005, the output gap could decrease and may become negative again.

F. Conclusions

39. **In this paper, we have tried to answer the question of whether the entrenchment of core inflation in Russia can be explained by the existence of supply-side constraints.** We have done so by estimating the nonaccelerating inflation rate of capacity utilization (NAICU) and the nonaccelerating inflation rate of labor utilization (NAILU), and by employing several approaches for estimating the output gap.

40. **While estimates of the Russian NAICU vary across surveys, all surveys agree that capacity utilization has increased substantially since 1999 and may currently be above its natural rate, thus contributing to inflationary pressures.** The NAICU estimates differ across surveys because of different survey definitions and different degrees of sample bias in terms of firm size and age distributions (see Appendix I). However, we show econometrically that each capacity utilization measure has a significant effect on inflation, and that our NAICU estimates are robust to controlling for inflation persistence and other inflation determinants. While we were not able to obtain significant regression estimates for the NAILU, available survey data suggest that labor utilization has been around its natural rate since 2000—a situation that may have contributed to inflationary pressures as well.

41. **Statistical methods for estimating the output gap suggest that the output gap was positive during 2000–01, which seems inconsistent with utilization data.** However, this finding appears to be a statistical artifact, in that trend fitting and filtering methods assume, by construction, that the output gap is zero on average, even in a short sample.

42. **A production function approach, which takes into account the capacity and labor utilization estimates, suggests that the output gap has been negative until recently.** This approach incorporates utilization-adjusted capital and labor inputs, and estimates

[24] In its draft medium-term socioeconomic development program for 2005–08, the Russian government itself argues that within the framework of the current exported raw material structure of the economy, the low quality of state administration, and the fading of institutional transformations, the Russian economy will not be able to arrive at sustainable rates of GDP growth higher than 4 to 5 percent per year even with high global prices.

potential output at the NAICU and the NAILU. The results suggest that the output gap was negative but gradually declining between 1999 and 2003, and closed in 2003 or 2004.

43. **All output gap methods suggest that the output gap is currently close to zero and may become positive in 2005 or shortly thereafter.** While this does not necessarily mean that growth will slow immediately—as it depends on the rate of potential growth—it implies that faster-than-potential growth can be achieved only at the cost of higher inflation.

Characteristics and Methodology of Capacity Utilization Surveys

1. **This Appendix describes the main characteristics and methodologies behind the four capacity utilization surveys discussed in the paper, with a focus on assessing their representativeness.** The four surveys discussed are those by Rosstat (Section A), the Institute for the Economy in Transition (Section B), the Russian Economic Barometer (Section C), and the Center for Economic Analysis (Section D). The main characteristics of the surveys are summarized in Tables A1 and A2 below.

Table A1. Capacity Utilization Survey Characteristics

	GKS	**IET**	**REB**	**CEA**
Indicators	Capacity utilization	Capacity and labor utilization	Capacity and labor utilization	Capacity utilization
Sample size (number of firms)	7,000	1,200	500	1,400
Response rate (in percent)	. . .	65-70	30-40	85
Weighting	Yes	Yes	No	No
Frequency	Annual	Quarterly	Monthly	Monthly
First observation	1992	Q1 1993	Dec 1991	May 1995

Table A2. Population and sample size distribution of Russian industrial enterprises, 2003 1/
(In percent)

		Population 2/	IET	REB	CEA 3/
Small	(<500 employees)	38	9	58	33
Medium	(500–1,000 employees)	18	17	20	23
Large	(>1,000 employees)	44	74	22	44
Total		100	100	100	100

1/ For the population and the IET, the shares in terms of number of enterprises are weighted by the average number of employees.
2/ Total set of registered industrial enterprises used by Rosstat for calculating official industry statistics (e.g., industrial production, producer price index).
3/ CEA data are based on the December 2004 distribution.

2. **One main reason for the systematic differences in capacity utilization estimates is that the four surveys ask slightly different questions**. Perhaps most important, Rosstat defines "capacity utilization" as the ratio of actual output to the *maximum* possible output, given a normal operating cycle,[25] while the REB defines the capacity utilization rate as the

[25] This is similar to the U.S. Federal Reserve Board's definition of potential capacity as "sustainable maximum output," that is, "the greatest level of output a plant can maintain within the framework of a realistic work schedule after factoring in normal downtime and assuming sufficient availability of labor and material inputs to operate the capital in place" (Morin and Stevens, 2004a, p. 3; see also Morin and Stevens, 2004b). Morin and Stevens (2004a) argue that it is important that potential capacity be defined as a "sustainable maximum" rather

(continued…)

level of used capacity in percent of the *normal* monthly level.[26] Since the "normal" level is likely to be less than the "maximum" level, this likely explains why the REB capacity utilization rate estimates are the highest.[27] Another, related reason why REB estimates are the highest, and those of CEA the lowest, is that the maximum capacity utilization rate that respondents can report is "higher than 120 percent" in the REB survey, and "91–100 percent" in the CEA survey. Until July 2001, the IET used to have "higher than 90 percent" as its highest possible capacity utilization rate, but since that time it is no longer restricting the possible answers respondents can give. Rosstat also does not seem to give any restrictions. Finally, the differences between the REB and IET balance of capacity assessments can in part be explained by the fact that the REB asks its respondents to assess capacity relative to expected demand during the next 12 months, while the IET refers to "expected demand" over an unspecified period, which is likely interpreted as the near future.

3. **A second reason for the systematic differences in capacity utilization estimates across the four surveys is that they have different degrees of sample bias in terms of size distribution.** To obtain a representative (unbiased) estimate of average capacity utilization, one needs to either (1) take a random sample and weight responses by capacity shares (proxied by output or employment shares); or (2) construct a sample with a capacity distribution similar to that of the population, and not weight responses. As argued below, most surveys (except the CEA) do not satisfy either one of these two conditions, as a result of which most samples appear to suffer from selection bias.[28]

4. **A third reason why the surveys differ is that they have different degrees of sample bias in terms of age distribution and, therefore, different degrees of sensitivity to the problem of incorrectly including obsolete capital in the estimate of potential capacity.** The CEA designed its sample more than a decade ago, and has not updated it since, thereby generating a clear sample bias toward old enterprises. While GKS does update its sample every year, its choice of 43 representative goods and the share of these goods in total output have not been updated. The industry register from which the REB sample is drawn is

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than some higher unsustainable short-run maximum that can be achieved only by postponing routine maintenance or temporarily boosting overtime to produce above capacity, because the latter will be inflationary.

[26] This is similar to the U.S. Institute of Supply Management's definition of capacity utilization as the ratio of current output to "normal capacity," where the definition of normal capacity is left to the respondent (Morin and Stevens, 2004a, p. 4).

[27] The IET and CEA surveys do not clearly define the concept of capacity utilization to respondents. In the absence of any other information, their respondents may be likely to use a definition similar to Rosstat's, especially if they are also part of the Rosstat survey. This is particularly likely for CEA, since the CEA questionnaires are sent as part of a package with Rosstat statistical forms.

[28] Another problem is that none of the surveys appear to include "small businesses," which are defined as enterprises with less than 100 employees that are not owned by other medium-sized or large enterprises, state, public or religious organizations, charities, or other funds.

updated only every five–seven years and, therefore, has some bias toward old enterprises as well. The IET sample is the only one that is updated monthly and, therefore, does not seem to have an age bias. The age bias is likely to matter because older enterprises are more likely to have technically or economically obsolete capital. To the extent that some capital is *technically* obsolete, that is, it can no longer produce output, survey respondents likely do not consider this capital as part of their capacity; hence, this should not affect the reported capacity utilization rate. However, it is also likely that part of the capital stock is *economically* obsolete, which means that it can be used only to produce output for which there is no longer any demand (for example, because it is out of fashion or constitutes an input for another good that is no longer produced, or because it is simply much less efficient in producing a good for which there is still demand).[29] In this case, survey respondents may incorrectly take this economically obsolete capital into account in estimating the potential, maximum, or "normal" output they can produce, which would lead to an underestimation of the capacity utilization rate. Such underestimation is likely to be stronger the less frequently the sample is updated, which could provide another explanation why the CEA estimates are the lowest.

A. Rosstat (GKS)

Sample frequency and size

5. Rosstat (previously called Goskomstat; hence, the abbreviation GKS) publishes annual information on average capacity utilization rates for a limited number (43) of consumer, investment, and intermediate goods.[30] Questionnaires are sent to all registered industrial enterprises in Russia (except small businesses and a few other exceptions), which are obliged to provide information on the production capacity for every good produced. The number of questionnaires used to calculate the published capacity utilization rates is estimated at roughly 7,000.[31] At the time of this study, annual data for each of the 43 goods

[29] Real appreciation or an increase in disposable income can also lead to a fall in demand for low-quality, domestically produced goods, with consumers switching to higher-quality, imported substitutes. However, to the extent that this switch in demand may be temporary, the capital used to produce domestic, low-quality goods may not necessarily be considered economically obsolete. Enterprises should write off their economically obsolete capital, and no longer consider it part of their capacity, only if the switch in demand appears to be permanent.

[30] The 43 goods are the ones for which Rosstat has published capacity utilization estimates since 1990; however, the sample has grown over time, and capacity utilization estimates are currently available for about 70-75 goods in the Rosstat publication "Russia in Figures." In fact, Rosstat appears to have capacity utilization estimates for as many as 600 goods, but it does not publish these estimates.

[31] This is only a rough estimate, and is obtained by multiplying the share of the sampled goods in total industrial output, as estimated by Bessonov, by the total number of industrial enterprises (except small businesses), as reported by Rosstat. Note that there could be some double counting, in that some enterprises may be producing more than 1 out of the group of 43 goods.

were available for the period 1992–2003; the data for 2004 will only be released at end-2005 or the beginning of 2006.

6. While Rosstat itself does not publish an overall capacity utilization estimate for industry as a whole, such an estimate is provided by Vladimir Bessonov of the Higher School of Economics (e.g., Bessonov, 2004).

Representativeness of the sample

7. The representativeness of Rosstat's sample depends on how representative the selected 43 goods are of the Russian economy, that is, whether the enterprises producing these goods have, on average, the same degree of capacity utilization as industry as a whole. Rosstat could not provide any information in this regard, other than to indicate that the 43 goods were selected in agreement with the Ministry of Economic Development and Trade on the basis of their "economic importance." Most likely, this means that the 43 goods were the ones that had the largest shares in nominal industrial output at the time they were selected. If this is the case, then there is no guarantee that the enterprises producing these goods are representative in terms of their capacity utilization rate. While GKS does update its sample every year, its choice of 43 representative goods and the share of these goods in total output have not been updated.

8. For each of the 43 goods, Rosstat calculates the capacity utilization rate by dividing aggregate actual output by aggregate production capacity, where the aggregates are taken over all surveyed enterprises that produce a given good. Bessonov further aggregates Rosstat's capacity utilization estimates to obtain an overall capacity utilization estimate for industry as a whole. The aggregation is done by weighting the capacity utilization estimate for each good by the share of each good in actual industrial output in 1995. Since the shares of 6 goods in total industrial output were negligible in 1995, Bessonov included only 37 out of 43 goods in his aggregation. While the inclusion or exclusion of goods with negligible shares is unlikely to affect the representativeness of the results, the fact that weights from 1995 are used could create some bias to the extent that the share of certain goods may have fallen or risen over time. For example, it is possible that certain goods have become obsolete (e.g., because superior substitutes have become available) in which case the output share of these goods has declined over time. Most likely, this also means that the capacity utilization rate of the enterprises producing these goods has fallen (since capacity typically does not decline as rapidly as actual output). By nevertheless applying the historically larger output share of these goods, the corresponding enterprises are overrepresented in the sample, and therefore the overall capacity utilization rate may be underestimated. [32]

[32] While it would be preferable to weight each good by its share in current output, Bessonov refrained from doing so because the output shares estimated for 1998 and 1999, around the time of the financial crisis, seemed unreliable.

Survey questions

9. Enterprises are asked to fill out a statistical form in which, for every good produced, the following indicators should be reported for a given year:

- **actual output produced during the year**;
- **production capacity at the beginning of the year** (as a rule, equal to the production capacity at the end of the previous year, as reported a year earlier);
- **production capacity at the end of the year**, calculated as the production capacity at the beginning of the year plus total net increase in production capacity;
- **increases in production capacity by cause**: expansion, reconstruction, renovation, equipment rental, change in the type of good produced (decrease in labor intensity), other factors;
- **decreases in production capacity by cause**: change in the type of good produced (increase in labor intensity), depreciation, equipment rental, and other factors;
- **average production capacity during the year,** calculated as the production capacity at the beginning of the year plus the average annual increase in production capacity minus the average annual decrease in production capacity;[33] and
- **utilization of average production capacity during the year** (in percent), calculated as the ratio of average actual output to average production capacity.

The terms "capacity utilization rate" and "production capacity" are defined as follows:

- **Capacity utilization rate.** The capacity utilization rate for a given good is defined as the ratio of actual annual output to the average annual "production capacity" of the enterprises that produce this good, where the latter is defined below.

- **Production capacity.** Production capacity is defined as the maximum possible level of output (per year, day, or shift). It is determined on the basis of the maximum utilization of capacity and production space, given a normal operating cycle (e.g., excluding overtime). Industry-specific instructions are given to define production capacity more specifically for each industry.

Relevant indicators

10. As mentioned earlier, Rosstat publishes its estimate of the average capacity utilization rate for each of the 43 goods, according to the definition above, while Bessonov publishes an aggregate capacity utilization estimate for industry as a whole.

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[33] The average annual increase (or decrease) in production capacity is calculated by aggregating annual increases (or decreases) by cause, weighted by the period of time (in percent of the year) during which this cause was effective. As an exception, increases or decreases due to changes in labor intensity are added without weighting.

B. The Institute for the Economy in Transition (IET)

Sample frequency and size

11. The Institute for the Economy in Transition has conducted surveys since March 1992 on the basis of European-harmonized questionnaires. Questions related to capacity and labor utilization are asked on a quarterly basis, and the results are published in the *Russian Bulletin of Business Cycle Surveys* (see, e.g., IET, 2004).

12. The sample comprises approximately 1,200 industrial enterprises (of which currently 9 enterprises are in the fuel sector). The response rate amounts to 65–70 percent, implying that approximately 800 enterprises participate in each round.

Representativeness of the sample

13. The IET's starting point is the Industrial Enterprises Register. The enterprises from this list are divided into 16 industrial sectors, according to the official industrial classification system (ОКОНХ) that was in force until December 31, 2004.[34] The IET sample takes 14 out of these 16 industrial sectors, eliminating the microbiological industry and the category "other industries." The IET has somewhat fewer subsectors than the official classification system, as it merges some of them into a common category (e.g., ferrous and nonferrous metallurgy). The resulting IET sample contains 14 industrial sectors and 61 subsectors.

14. By taking into account size distribution both in the sample design and in the averaging of responses, the IET sample appears to put too much weight on large enterprises. For each of the 61 subsectors, the IET sample includes all[35] large enterprises (with more than 500 employees), half of all medium-sized enterprises (100–500 employees), and one-third of all smaller enterprises (those with less than 100 employees, but not including so-called small businesses). If this sample distribution were to correspond to the population distribution (in terms of capacity), which is presumably the goal, then an unbiased estimate could be obtained by taking an unweighted average of enterprise responses. However, the IET computes a weighted average of enterprise responses, using enterprise employment as weights, as a result of which large enterprises are overrepresented in the calculation of the average capacity utilization rate (see Table A2).

15. Unlike the other surveys, the IET sample is not biased toward old enterprises. The sample is updated monthly to replace up to 50 nonresponding and closed enterprises with new ones.

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[34] On January 1, 2005, Rosstat switched to a new industrial classification system (ОКВЭД), and the statistics based on this new system have been revised back to 2003.

[35] Except Gazprom.

Survey questions

16. The IET questionnaire contains three questions related to capacity and labor utilization:

- What is the current capacity utilization rate of your enterprise (in percent)? [36]
- How would you assess, relative to expected demand,
  - (a) your available production capacity (*excessive, sufficient, insufficient*)?
  - (b) your current number of employees (*excessive, sufficient, insufficient*)?
- What currently is the main obstacle for production growth at your enterprise?

  Any number of the following answers can be chosen:

  (a) nothing; (b) domestic demand; (c) low export demand; (d) competition with imports; (e) nonpayments of buyers; (f) lack of working capital; (g) lack of qualified workers; (h) lack of equipment; (i) lack of raw materials and semi manufactures; (j) lack of energy resources; and (k) other.

The questionnaire does not define the term "capacity utilization rate," nor does it define any other technical terms.

Relevant indicators

17. Based on the answers to the three questions above, the IET constructs several indicators related to capacity and labor utilization. It publishes these indicators both for industry as a whole and for seven separate industries.[37] The indicators are the following:

- **capacity utilization rate**: the average answer to the first question, weighted by employment;

[36] Until July 2001, this question had been formulated in a more restrictive way, by asking respondents to choose from eight categories (<30; 30-40; 41-50; 51-60; 61-70; 71-80; 81-90; and >90). The formulations of the other questions have remained unchanged since 1996.

[37] The seven industries are (1) ferrous and nonferrous metals; (2) chemical and petrochemical; (3) machinery and metalwork; (4) forestry, woodworking, pulp and paper; (5) construction materials; (6) light industry; and (7) the food industry. Estimates of capacity utilization are published only for six industries (the ones mentioned above, excluding ferrous and nonferrous metals). The main other industries for which estimates are not available are the electricity industry and the fuel industry.

- **the share of enterprises with excessive capacity/labor**: the share of respondents who answered "excessive" to the second question (parts a and b, respectively);

- **the share of enterprises with insufficient capacity/labor:** the share of respondents who answered "insufficient" to the second question (parts a and b, respectively);

- **the balance of capacity/labor assessments**: the share of enterprises with excessive capacity/labor minus the share of enterprises with insufficient capacity/labor; and

- **the frequency of mentioning lack of equipment/qualified workers as a main obstacle to growth:** the share of respondents who chose either "lack of equipment" or "lack of qualified workers" as an answer to the third question.

C. Russian Economic Barometer (REB)

Sample frequency and size

18. Since December 1991, the Institute of World Economy and International Relations of the Russian Academy of Science has been conducting panel surveys of Russian enterprise managers, which are published in the bulletin *Russian Economic Barometer*. The surveys are conducted on a monthly basis, although some questions are asked only on a quarterly basis. Capacity utilization estimates are available from December 1991 onward, while labor utilization estimates are available from January 1994 onward.

19. The REB sample consists of around 500 enterprises that respond regularly, of which 150–220 enterprises respond in any given month. The response rate is thus estimated at 30-40 percent (REB, 2004).

Representativeness of the sample

20. The REB sample is constructed as the set of 500 enterprises that regularly respond to questionnaires that are sent out at random to 1,000 out of a long list of registered enterprises. The sample of 500 enterprises is continuously updated, as those enterprises that respond are sent a questionnaire again the next month, while those that do not respond the first time they receive a questionnaire are not sent any further questionnaires. However, the list of 30,000–40,000 enterprises from which random drawings are made is updated only once every five–seven years, when REB purchases a new version of the register. As a result, the REB sample may somewhat overrepresent older enterprises.

21. While the sample is essentially random, some selection bias may be present if the probability that an enterprise responds is correlated with its capacity utilization rate. For example, enterprises with lower capacity utilization rates may be more likely to respond because they have more time available to respond to surveys. According to REB's Program Director, Sergei Aukutsionek, there is some evidence of such a selection bias, as the response rate of the REB survey was significantly higher during the crisis period, when capacity

utilization rates were low. If such a selection bias is indeed present, then capacity utilization may be underestimated. However, this cannot explain the systematic differences between surveys, because a similar selection bias would be present in the other surveys as well.

22. Even if the REB sample were truly random, its small sample size implies that it underestimates the share of large enterprises, and overestimates the share of small enterprises, relative to the population of all registered industrial enterprises. As Table A2 shows, the share of small (defined here as those enterprises with less than 500 employees) is almost 60 percent in the REB sample, while this same share is only around 40 percent in the "population" of all registered industrial enterprises.[38] Similarly, the share of large enterprises (with more than 1,000 employees) is only 22 percent in the REB sample—half of that in the population.[39] The most likely explanation for this is that, even though large enterprises constitute a large share of the distribution in terms of the number of employees, the number of large enterprises is much lower than the number of small enterprises. Therefore, a sample with a small sample size, such as the REB, is less likely to include such large enterprises in any given "drawing."[40] If the sample size were to be increased, this small-sample bias would gradually disappear, and, as long as sampling remained random, the sample distribution would approach the population distribution.

23. An additional reason why the REB sample overrepresents small enterprises is that it averages enterprise responses without weighting them by size. As noted, random sampling requires that responses be weighted by capacity shares (which can be proxied by output or employment shares) when calculating the sample average. By not doing so, the REB implicitly assumes that each enterprise has an equal impact on average capacity utilization, while in reality those enterprises with a larger share in total capacity have a larger effect on capacity utilization in industry as a whole. As a result, smaller enterprises are overrepresented in the REB capacity utilization estimate, and larger enterprises are underrepresented.

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[38] The population of all registered enterprises is the set of enterprises on the basis of which Rosstat calculates official industrial statistics for the Russian economy. This is by no means the same as the Rosstat sample that is used for capacity utilization estimates, discussed in Section A above.

[39] Nevertheless, the REB sample does contain a number of reasonably large enterprises, given that, among the 20 percent of enterprises with more than 1,000 employees, one-fourth has more than 2,000 employees, and the average number of employees in this group is roughly 3,000 (REB, 2004, Table 2).

[40] To see this, assume for simplicity that the population consists of 999 small enterprises, employing 50 percent of all employees, and 1 very large enterprise, employing the other 50 percent of employees. Taking a random sample with a very small sample size—say, a sample size of one—would imply that, on average, once every 1,000 times the sample is conducted, the sample will include the large enterprise. Thus, while the sample will be unbiased (in the sense that the expected enterprise size in the sample equals the average enterprise size in the population), 999 out of 1,000 times the sample will underestimate the share of large enterprises.

Survey questions

24. The questions on capacity and labor utilization are formulated as follows:

> Please assess the following indicators, relative to the normal level for the current season, assuming that the normal level is equal to 100 percent: (1) capacity utilization rate; (2) labor utilization rate.

25. The respondents are asked to choose from several possible answers, including "more than 120 percent." No further definition of the terms "capacity utilization" and "labor utilization" are given.

Relevant indicators

26. REB reports several survey-based indicators that are related to factor utilization:

- **capacity utilization rate** (in percent of the "normal monthly level");
- **labor utilization rate** (in percent of the "normal monthly level");
- **capacity/labor redundancy:** share of enterprises that consider their production capacity/labor "redundant" relative to expected demand during the next 12 months;
- **capacity/labor insufficiency:** share of enterprises that consider their production capacity/labor "insufficient" relative to expected demand during the next 12 months;
- **balance of capacity/labor assessments:** share of enterprises with redundant capacity/labor minus the share of enterprises with insufficient capacity/labor; and
- **limits to production:** shortage of labor or equipment (share of enterprises that mention this factor as one of the three most important ones out of ten-twelve factors).[41]

27. The indicators of capacity and labor utilization are reported for industry as a whole, as well as for seven industries: ferrous and nonferrous metals, forestry, chemical and petrochemical, machinery and metalwork, construction materials, light industry, and food industry. While indicators for the fuel and electricity industries are not published, these industries are included in the calculation of the overall capacity utilization rate.

[41] Including, among other factors, insufficient demand; a shortage of raw materials and semifinished products; and a shortage of financial resources.

D. The Center for Economic Analysis (CEA)

Sample frequency and size

28. The Center for Economic Analysis of the Government of the Russian Federation (Центр Экономической Конъюнктуры при Правительстве Российской Федерации) has been publishing monthly estimates of capacity utilization since 1993. The sample comprises 1,400 industrial enterprises from all industrial sectors, including the fuel sector. The response rate is quite high, at 85 percent, with approximately 1,200 enterprises responding every month. This high response rate is likely because the CEA questionnaires are sent as part of a package of Rosstat statistical forms, which enterprises are obliged to fill out.

Representativeness of the sample

29. At first sight, the CEA sample appears representative in that its enterprise size distribution constitutes a very good approximation to the population size distribution (Table A2). Enterprise responses are aggregated without weighting them by size, which, indeed, is appropriate if the distribution of capacity in the sample corresponds to the distribution of capacity in the population.

30. Due to insufficient updating, however, the CEA sample is likely to overrepresent old enterprises. This bias toward old enterprises occurs because the CEA sample (panel) consists of those enterprises that produced, back in 1993–94, the largest share of output in a given industry (60–70 percent of output for most industries, and 40–50 percent of output for some other industries). This panel has basically remained unchanged since the time of its construction, as less than 1 percent of the originally selected enterprises are estimated to have disappeared from the sample, while no new enterprises have been added.42 Moreover, it is likely that, with increased competition, the market shares of enterprises that used to produce the majority of output in the early 1990s have declined over time, in which case these enterprises are particularly overrepresented.

31. The bias toward old enterprises implies that the capacity utilization rate is likely underestimated, which seems to be confirmed by the fact that the CEA has the lowest utilization rate estimates of all surveys. One reason for this underestimation is that old enterprises whose market shares have declined over time, and which are therefore overrepresented, are likely to have lower-than-average capacity utilization rates, because their utilized capacity may have fallen at a faster rate than their total capacity. A second reason is that older enterprises are likely to have accumulated more technically or

[42] However, following Rosstat's switch to a new industrial classification system in January 2005, the CEA has started expanding its current sample of 1,200 enterprises (those that respond), adding 3,300 to construct a new sample of 4,500 enterprises. The 1,200 old enterprises will remain part of the new sample only for a transition period.

economically obsolete capital.[43] While enterprises should not count such obsolete capital as part of their "productive capacity," according to the CEA it is likely that they nevertheless do so, in which case they underestimate their true capacity utilization rate.

Survey questions

32. The CEA questionnaire contains four questions related to capacity and labor utilization:

1. Utilization rate of productive capacity in the current month (<30 percent; 31–40 percent; 41–50 percent; 51–60 percent; 61–70 percent; 71–80 percent; 81–90 percent; or 91–100 percent.);

2. Sufficiency of productive capacities relative to expected demand in the nearest 12 months (excessive, sufficient, or insufficient).

3. Assessment of the number of employed in the current month relative to actual production volume (excessive, sufficient, or insufficient).

4. Obstacles to production growth. Any number of the following answers can be chosen:

   (a) insufficient domestic demand for goods produced by the enterprise;

   (b) insufficient external demand for goods produced by the enterprise;

   (c) competing imports;

   (d) high level of taxation;

   (e) deterioration and lack of equipment;

   (f) uncertain economic situation;

   (g) high commercial credit interest rates;

   (h) lack of financial resources;

   (i) lack of qualified workers;

   (j) lack or imperfectness of legislation; and

   (k) no obstacles.

[43] Some evidence for this is provided by CEA estimates that the average service life of equipment is 20.7 years, while the share of new equipment (purchased in the last five-six years) is only 15 percent.

Relevant indicators

33. The CEA reports capacity utilization rates for industry as a whole, as well as for the following industries: electricity, fuel, ferrous metals, nonferrous metals, forestry, chemical and petrochemical, machinery and metalwork, construction materials, light industry, and food industry. In addition, the CEA also publishes enterprises' assessments of the sufficiency of labor, the sufficiency of production capacity, and the obstacles to growth.

NAICU Derivation and Estimation

This Appendix describes our derivation and estimation of the nonaccelerating inflation rate of capacity utilization (NAICU) for Russia. We first describe the theoretical framework (Section A), then the estimation procedure (Section B) and, finally, the results (Section C).

A. Theoretical framework

We start by assuming that prices in the economy are set by a simple mark-up equation:

$$\pi_t = \varphi(\Delta w_t - \Delta a_{L,t}) + (1-\varphi)(\Delta r_t - \Delta a_{K,t}), \quad (1)$$

where π_t indicates the rate of core inflation, Δw_t is the growth in the average wage level, Δr_t is the rate of change in the cost of capital, $\Delta a_{L,t}$ and $\Delta a_{K,t}$ denote the rates of change in labor productivity and capital productivity, respectively, so that $\Delta w_t - \Delta a_{L,t}$ measures the growth in unit labor costs, and $\Delta r_t - \Delta a_{K,t}$ measures the growth in unit capital costs. The parameter $\varphi \in [0,1]$ measures the relative contribution of unit labor costs to inflation.[44]

Wages and the cost of capital are assumed to be set as follows:

$$\Delta w_t = \pi_t^* + \lambda_1 LU_t \quad (2)$$

$$\Delta r_t = \pi_t^* + \lambda_2 CU_t, \quad (3)$$

where π_t^* indicates expected inflation, *LU* denotes labor utilization, and *CU* denotes capacity utilization, with $\lambda_1, \lambda_2 \geq 0$. This is a slight modification from traditional expectations-augmented Phillips curve specifications in which factor costs (typically, wage costs) rise with the expected rate of inflation, and increase with output or decrease with unemployment.[45]

Substituting (2) and (3) into (1) gives the following short-run Phillips curve:

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[44] We assume that the inflation equation is homogeneous of degree one, so that a doubling in the growth rates of unit labor costs and in unit capital costs leads to a doubling in the inflation rate.

[45] For summaries of the expectations-augmented Phillips curve literature, which goes back to Friedman (1968), see Blanchard and Fischer (1989, chapter 10), or Romer (2001, section 5.4). While we treat utilization rates as exogenous here, it is also possible to make them endogenous, e.g., along the lines of Bils and Cho (1994) or Burnside and Eichenbaum (1996).

$$\pi_t = \pi_t^* - \alpha_t + \beta_1 LU_t + \beta_2 CU_t, \tag{4}$$

where

$$\begin{aligned} \alpha_t &\equiv \varphi \Delta a_{L,t} + (1-\varphi)\Delta a_{K,t} \\ \beta_1 &\equiv \varphi \lambda_1 \\ \beta_2 &\equiv (1-\varphi)\lambda_2 \ . \end{aligned} \tag{5}$$

To close the model, we assume that inflation expectations are formed adaptively:

$$\pi_t^* = \sum_{i=1}^{\infty} \rho_i \pi_{t-i}\ , \tag{6}$$

with $\sum_{i=1}^{\infty} \rho_i = 1$.

This implies the following short-run Phillips curve:

$$\pi_t = \sum_{i=1}^{\infty} \rho_i \pi_{t-i} - \alpha_t + \beta_1 LU_t + \beta_2 CU_t\ , \tag{7}$$

or, equivalently,

$$\Delta\pi_t = \sum_{i=1}^{\infty} \theta_i \Delta\pi_{t-i} - \alpha_t + \beta_1 LU_t + \beta_2 CU_t\ , \tag{8}$$

where

$$\theta_i = \sum_{j=1}^{i} \rho_j - 1\ . \tag{9}$$

The nonaccelerating inflation rates of capacity and labor utilization are defined as the utilization rates LU^* and CU^* for which there is no change in inflation, i.e., $\pi_t = \pi_{t-i}$ for all i or $\Delta\pi_t = 0$ for all t. For simplicity, we assume constant productivity growth ($\alpha_t = \alpha$), so that the natural rates of factor utilization are constant over time.[46] This gives the following long-run Phillips curve:

$$\alpha\ = \beta_1 LU^* + \beta_2 CU^*\ . \tag{10}$$

[46] Alternatively, we could allow the natural rates to increase with productivity growth.

This long-run Phillips curve is vertical (or more accurately, it is a vertical plane in three-dimensional space with inflation on the vertical axis), implying that there exists no long-run trade-off between inflation and factor utilization.[47]

Substituting (10) into (8) gives

$$\Delta\pi_t = \sum_{i=1}^{\infty} \theta_i \Delta\pi_{t-i} + \beta_1 (LU_t - LU^*) + \beta_2 (CU_t - CU^*), \qquad (11)$$

which implies that, for a given rate of capacity utilization, inflation accelerates when labor utilization is above its natural rate ($LU_t > LU^*$); or vice versa, for a given rate of labor utilization, inflation accelerates when capacity utilization is above its natural rate ($CU_t > CU^*$).

B. Estimation

Unit root tests and economic intuition suggest that all variables are stationary,[48] so that we can estimate equation (8) by OLS. However, we are not able to impose condition (9) and solve for CU^* and LU^* in equation (10). This is because equation (10) has three known variables ($\Delta\pi_t$, CU_t, and LU_t) and four unknown parameters (β_1, β_2,CU^*, and LU^*) which, therefore, are not identified. Nevertheless, we are able to estimate β_1 and β_2 in equation (8), the results of which suggest that β_1 is not significantly different from zero.[49] The most likely explanation for this finding is that, from 2000 onward, the labor utilization rate for Russia was roughly constant; hence, there is insufficient variation in the data to explain the variation in inflation during this period.[50]

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[47] Note that, given the dependence of factor costs on inflation expectations, we would obtain the same vertical Phillips-curve under the extreme assumption of perfect foresight (inflation expectations are equal to actual inflation). However, in that case any inflation path, as long as it was predictable, would be consistent with equation (10).

[48] Oomes and Ohnsorge (2005) conduct unit root tests for a similar inflation model for Russia, and find that the changes in Russian headline inflation, unit labor costs, and the nominal effective exchange rate are stationary for the period 1996-2004. We do not have sufficient observations to run the same unit root tests for core inflation, because data for the core CPI index are available only from January 1999; hence, the monthly change in annual core inflation can be computed only from February 2000. Economic intuition suggests that *CU* and *LU* are stationary because they are bounded.

[49] These results are available from the authors upon request.

[50] Another problem that could complicate the estimation of β_1 and β_2 is potential multicollinearity between capacity and labor utilization, which may lead to biased estimates. A similar point is made by McElhattan (1978, p. 23) concerning the multicollinearity between the NAICU and the NAIRU for the United States. However, multicollinearity was not a problem in our case because of the relative constancy of *LU* during the sample period.

Setting $\beta_1 = 0$ (and defining $\beta = \beta_2$) allows us to identify the NAICU, by estimating the equation

$$\Delta\pi_t = \sum_{i=1}^{\infty} \theta_i \Delta\pi_{t-i} + \beta(CU_t - CU^*) + \varepsilon_t, \tag{12}$$

while imposing the restriction

$$CU^* = \frac{\alpha}{\beta}, \tag{13}$$

which is equivalent to running the regression

$$\Delta\pi_t = \sum_{i=1}^{\infty} \theta_i \Delta\pi_{t-i} - \alpha + \beta CU_t + \varepsilon_t. \tag{14}$$

C. Results

Tables B1 through B3 report the regression results for equation (11), using the REB, IET, and CEA estimates of capacity utilization, respectively. The first column of each table reports the results for the regression where $\theta_i = 0$ for all *i*, which corresponds to the estimates based on trend lines for simple scatter plots. These results suggest that capacity utilization has a significant effect on inflation, with the NAICU estimated at around 74 percent for the REB estimate of capacity utilization, 56 percent for the CEA estimate, and 65 percent for the IET estimate.[51] However, as the residual tests show, these regressions are generally not valid because the residuals are not well behaved: they do not have a normal distribution and are significantly autocorrelated (i.e., the null hypotheses of no normality and no autocorrelation are rejected).

The second and third groups of columns in Tables B1 through B3 show that allowing for lags and other inflation determinants improves the validity and fit of the regressions, but does not significantly change the NAICU estimates. In addition to allowing for lags (non-zero θ_i's), we also control for other possible inflation determinants, including the growth in broad money (M2 plus foreign currency deposits), the nominal effective exchange rate (as a proxy for import prices), and the Urals oil price. The number of lags were chosen in order to minimize the information criteria, using a general-to-specific estimation methodology. The results show that the resulting equations are well-behaved, the effect of capacity utilization

[51] These estimates are slightly different from those presented in the scatter plots because of the longer sample period. To obtain comparable results and lengthen the sample period for the IET data, we interpolated the quarterly IET estimates by assuming identical capacity utilization rates for the three months within each quarter.

on inflation is still significant, and the NAICU estimates are very similar even after controlling for all other variables.

Table B1. NAICU Estimates based on REB Capacity Utilization Survey 1/
(Dependent variable: monthly change in core inflation)

	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.
Constant	-5.70	2.17	0.01	-3.91	1.09	0.00	-3.94	0.61	0.00
CU	0.08	0.03	0.02	0.05	0.02	0.00	0.05	0.01	0.00
NAICU	**74.38**	**1.24**	**0.00**	**75.24**	**1.27**	**0.00**	**74.56**	**0.63**	**0.00**
$\Delta\pi_{t-1}$				0.67	0.09	0.00	0.58	0.05	0.00
$\Delta\pi_{t-3}$				-0.24	0.12	0.06	-0.16	0.08	0.06
$\Delta\pi_{t-4}$				0.30	0.12	0.02	0.37	0.08	0.00
$\Delta\pi_{t-5}$				-0.34	0.10	0.00	-0.52	0.06	0.00
$\Delta\pi_{t-7}$							0.26	0.05	0.00
$\Delta\pi_{t-11}$							0.15	0.04	0.00
$\Delta\pi_{t-12}$				-0.25	0.05	0.00	-0.38	0.04	0.00
$\Delta\Delta m_{t-4}$							-0.02	0.01	0.03
$\Delta\Delta m_{t-5}$							-0.07	0.01	0.00
$\Delta\Delta m_{t-7}$							0.05	0.01	0.00
$\Delta\Delta m_{t-10}$							-0.03	0.01	0.03
$\Delta\Delta e_{t-1}$							0.10	0.01	0.00
$\Delta\Delta e_{t-3}$							0.04	0.01	0.02
$\Delta\Delta e_{t-4}$							0.05	0.01	0.00
$\Delta\Delta e_{t-9}$							-0.06	0.01	0.00
$\Delta\Delta oil_{t-2}$							-0.01	0.00	0.02
$\Delta\Delta oil_{t-5}$							0.01	0.01	0.02
Sample period	2000:2–2005:4			2001:2–2005:4			2001:2–2004:12		
No. of observations	63			51			47		
R-squared	0.09			0.74			0.97		
Adjusted R-squared	0.08			0.71			0.94		
S.E. of regression	0.78			0.28			0.13		
Log likelihood	16.70			68.40			108.74		
Akaike info criterion	-0.47			-2.41			-3.82		
HQ info criterion	-0.44			-2.31			-3.54		
Schwartz info criterion	-0.40			-2.14			-3.07		
F-stat	6.24		0.02	21.37		0.00	43.95		0.00
AR 1-4 test	7.71		0.00	0.94		0.45	0.65		0.63
ARCH 1-4 test	16.74		0.00	0.21		0.93	0.27		0.89
Normality test	10.87		0.00	7.26		0.03	1.83		0.40

1/ The explanatory variables include year-on-year core inflation (π), broad money (m), the nominal effective exchange rate (e, where an increase is an appreciation), and the Urals oil price (oil). The symbol Δ indicates the monthly change in a variable, while the symbol $\Delta\Delta$ indicates the monthly change in the 12-month rate.

Table B2. NAICU Estimates based on CEA Capacity Utilization Survey 1/
(Dependent variable: monthly change in core inflation)

	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.
Constant	-5.42	1.66	0.00	-5.38	0.98	0.00	-5.05	0.64	0.00
CU	0.10	0.03	0.00	0.09	0.02	0.00	0.09	0.01	0.00
NAICU	**56.47**	**1.48**	**0.00**	**57.50**	**0.63**	**0.00**	**56.85**	**0.34**	**0.00**
$\Delta\pi_{t-1}$				0.46	0.08	0.00	0.41	0.06	0.00
$\Delta\pi_{t-2}$							0.44	0.09	0.00
$\Delta\pi_{t-3}$							-0.14	0.08	0.09
$\Delta\pi_{t-5}$				-0.28	0.07	0.00	-0.31	0.05	0.00
$\Delta\pi_{t-7}$							0.33	0.06	0.00
$\Delta\pi_{t-12}$				-0.38	0.05	0.00	-0.39	0.03	0.00
$\Delta\Delta m_{t-4}$							-0.04	0.01	0.00
$\Delta\Delta m_{t-5}$							-0.06	0.01	0.00
$\Delta\Delta m_{t-7}$							0.05	0.01	0.00
$\Delta\Delta m_{t-9}$							-0.04	0.01	0.01
$\Delta\Delta m_{t-10}$							-0.05	0.01	0.00
$\Delta\Delta e_{t-1}$							0.10	0.02	0.00
$\Delta\Delta e_{t-4}$							0.03	0.01	0.02
$\Delta\Delta e_{t-9}$							-0.08	0.01	0.00
$\Delta\Delta oil_{t-1}$							0.02	0.01	0.00
$\Delta\Delta oil_{t-2}$							-0.02	0.01	0.00
$\Delta\Delta oil_{t-5}$							0.01	0.01	0.07
Sample period	2000:2–2004:12			2001:2–2004:12			2001:2–2004:12		
No. of observations	59			47			47		
R-squared	0.14			0.79			0.97		
Adjusted R-squared	0.13			0.77			0.95		
S.E. of regression	0.78			0.26			0.13		
Log likelihood	-68.00			65.99			111.04		
Akaike info criterion	-0.47			-2.60			-3.83		
HQ info criterion	-0.44			-2.52			-3.52		
Schwartz info criterion	-0.39			-2.40			-3.00		
F-stat	9.53		0.00	39.31		0.00	40.64		0.00
AR 1-4 test	7.32		0.00	1.35		0.27	1.63		0.20
ARCH 1-4 test	16.39		0.00	1.18		0.34	0.56		0.70
Normality test	10.77		0.00	0.84		0.66	0.97		0.61

1/ The explanatory variables include year-on-year core inflation (π), broad money (m), the nominal effective exchange rate (e, where an increase is an appreciation), and the Urals oil price (oil). The symbol Δ indicates the monthly change in a variable, while the symbol $\Delta\Delta$ indicates the monthly change in the 12-month rate.

Table B3. NAICU Estimates based on IET Capacity Utilization Survey 1/
(Dependent variable: monthly change in core inflation) 2/

	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.	Coeff.	S.E.	Prob.
Constant	-3.70	1.48	0.02	-3.51	0.72	0.00	-2.52	0.63	0.00
CU	0.06	0.02	0.03	0.05	0.01	0.00	0.04	0.01	0.00
NAICU	**64.62**	**2.98**	**0.00**	**65.29**	**1.20**	**0.00**	**64.95**	**1.04**	**0.00**
$\Delta\pi_{t-1}$				0.50	0.08	0.00	0.53	0.09	0.00
$\Delta\pi_{t-2}$							0.25	0.09	0.01
$\Delta\pi_{t-3}$							-0.26	0.10	0.02
$\Delta\pi_{t-5}$				-0.25	0.07	0.00			
$\Delta\pi_{t-7}$							0.27	0.08	0.00
$\Delta\pi_{t-8}$							0.27	0.06	0.00
$\Delta\pi_{t-12}$				-0.34	0.05	0.00	-0.46	0.05	0.00
$\Delta\Delta m_{t-2}$							-0.05	0.02	0.01
$\Delta\Delta m_{t-4}$							-0.06	0.01	0.00
$\Delta\Delta m_{t-5}$							-0.06	0.02	0.00
$\Delta\Delta m_{t-7}$							0.05	0.01	0.00
$\Delta\Delta m_{t-10}$							-0.04	0.01	0.01
$\Delta\Delta m_{t-12}$							-0.04	0.01	0.01
$\Delta\Delta e_{t-1}$							0.11	0.02	0.00
$\Delta\Delta e_{t-2}$							0.06	0.02	0.00
$\Delta\Delta e_{t-3}$							0.06	0.02	0.00
$\Delta\Delta e_{t-4}$							0.04	0.02	0.03
$\Delta\Delta e_{t-6}$							-0.04	0.02	0.04
$\Delta\Delta e_{t-7}$							-0.03	0.01	0.03
$\Delta\Delta e_{t-9}$							-0.05	0.02	0.00
$\Delta\Delta e_{t-11}$							-0.04	0.02	0.03
$\Delta\Delta e_{t-12}$							-0.03	0.02	0.07
$\Delta\Delta oil_{t-3}$							0.02	0.01	0.01
$\Delta\Delta oil_{t-4}$							0.02	0.01	0.05
$\Delta\Delta oil_{t-5}$							0.02	0.01	0.01
Sample period	2000:2–2004:12			2001:2–2004:12			2001:2–2004:12		
No. of observations	59			47			47		
R-squared	0.08			0.77			0.97		
Adjusted R-squared	0.07			0.74			0.93		
S.E. of regression	0.81			0.27			0.15		
Log likelihood	-69.96			63.51			108.74		
Akaike info criterion	-0.40			-2.49			-3.52		
HQ info criterion	-0.37			-2.42			-3.14		
Schwartz info criterion	-0.33			-2.29			-2.50		
F-stat	5.24		0.03	34.32		0.00	23.73		0.00
AR 1-4 test	7.14		0.00	1.71		0.17	0.63		0.65
ARCH 1-4 test	14.91		0.00	0.35		0.84	0.41		0.80
Normality test	12.42		0.00	1.14		0.56	1.00		0.61

1/ The explanatory variables include year-on-year core inflation (π), broad money (m), the nominal effective exchange rate (e, where an increase is an appreciation), and the Urals oil price (oil). The symbol Δ indicates the monthly change in a variable, while the symbol $\Delta\Delta$ indicates the monthly change in the 12-month rate.

2/ The quarterly IET estimates of capacity utilization were interpolated to obtain monthly estimates, by assuming that capacity utilization within each quarter was unchanged.

Statistical Methods for Estimating the Output Gap

1. This Appendix discusses the technical details behind the construction of our statistical output gap measures, and describes the advantages and disadvantages of each method.

A. Arithmetic Trend Fitting

2. Perhaps the easiest way to measure the output gap is define it as the deviation between actual output and its trend, where the trend is then interpreted as the path for potential output. It seems most natural to assume an exponential trend, because this implies a constant growth rate. However, we also estimate linear and quadratic trends in order to allow for possible changes in the growth rate over time.

The trends are defined as follows:

- linear trend: $y^*=a+bx$;
- quadratic trend: $y^*=a+bx+cx^2$; and
- exponential trend: $y^*=a*exp(bx)$.

B. Univariate Statistical Filtering

3. In this paper, we use two univariate statistical filters: the Hodrick-Prescott filter and the Christiano-Fitzgerald filter.

4. **The Hodrick-Prescott (HP) filter** is a popular smoothing method that is widely used in macroeconomics to obtain a smooth estimate of the long-term trend component of a series. The method was first used in a working paper (circulated in the early 1980s and published in 1997) by Hodrick and Prescott to analyze postwar U.S. business cycles.

5. The Hodrick-Prescott (HP) filter is a two-sided linear filter that minimizes the squared distance between actual output (y) and potential output (y^*), subject to a penalty that constrains the variation of potential output over time. That is, the HP filter sets y^* so as to minimize

$$\sum_{t=1}^{T}(y_t - y_t^*)^2 + \lambda\sum_{t=2}^{T-1}((y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*))^2 .$$

6. The "penalty parameter" λ can be varied so that the larger λ, the less variation in y^*, that is, the smoother the potential output series. As $\lambda \rightarrow \infty$, the HP-filtered series approaches a linear trend.

7. Following Hodrick and Prescott (1997), it is standard practice to set λ =1,600 for quarterly data (and λ =100 for annual data, and λ=14,400 for monthly data). However, we also estimated the HP filter for lower values of λ (400 and 100) since in Russia some part of output fluctuations may be structural rather than cyclical, and therefore should not necessarily be smoothed to the same extent as they are for advanced economies.

8. An important drawback of the HP filter is that it is subject to end-sample bias, owing to the symmetric treatment of the trending across the sample and the different constraints that apply within the sample and at its ends. In the equation above, the summation bounds are different for the first and second term, because the second difference of the trend is not defined around the first and the final observation. One way to deal with this bias in practice is to extend the observation period by adding a number of forecasts.

9. **The Christiano-Fitzgerald (CF) filter** is a band-pass frequency filter that is used to isolate the cyclical component of a time series by specifying a range for its duration. Roughly speaking, the band-pass filter is a linear filter that takes a two-sided weighted moving average of the data where cycles in a "band," given by a specified lower and upper bound, are "passed" through, or extracted, and the remaining cycles are filtered out (Christiano and Fitzgerald, 2003).

10. Using the CF filter requires us to specify the range of durations (periodicities) to pass through. Assuming that the business cycle in Russia can last from 1.5 to 8 years, we use 6 quarters for the lower duration, and 32 quarters for the upper duration.

11. We use the full sample asymmetric form of the CF filter, which is the most general form. It is time varying, in that the weights on leads and lags change for each observation, depending on the data. The alternative, using a fixed-length filter (such as the Baxter-King filter) would require that we use same number of lead and lag terms for every weighted moving average. This would imply that we would lose observations from both the beginning and the end of the original sample. The asymmetric filter, however, does not have this requirement and can be computed to the ends of the original sample.

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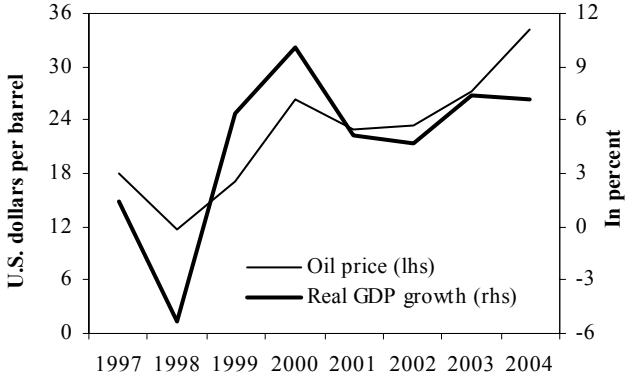
II. Measuring the Performance of Fiscal Policy in Russia[52]

A. Introduction

1. **The Russian economy has made impressive progress since the 1998 crisis**. This rebound has clearly been facilitated by a high oil price (see Figure 1) but it has also been supported by improved economic policies, not least fiscal policy. After the crisis, fiscal policy increasingly became a tool for promoting macroeconomic stabilization and long-term growth. This paper examines how the fiscal policy stance has contributed to the management of aggregate demand since 1998.

Figure 1. GDP Growth and Oil Prices



Sources: Authorities; and Fund staff estimates.

2. **Several measures are available to evaluate the performance of fiscal policy, depending on the purpose of the analysis.** The *debt-stabilizing primary surplus* is the most appropriate measure to evaluate the long-term sustainability of public debt.[53] The *constant oil price balance* is the appropriate measure to evaluate how fiscal policy responds to the oil cycle. The *non-oil fiscal balance* is the appropriate measure to evaluate how the fiscal position is affected by oil revenue and to indicate how actual fiscal policy differs from optimal fiscal policy in the presence of exhaustible resources. The standard *fiscal stance* and *fiscal impulse* are the appropriate measures to evaluate how much fiscal policy has contributed to changes in aggregate demand. In this paper, we will deal mainly with the last fiscal indicators, the fiscal stance and impulse. The other measures are also discussed below because they are widely used in the policy debate and because they provide useful benchmarks for other fiscal issues. Finally, we consider how the fiscal authorities have reacted to "unexpected" oil windfalls.

B. Debt-Stabilizing Primary Surplus

3. **The debt-stabilizing primary surplus is defined as the level of primary surplus that stabilizes debt as a share of GDP.** The dynamics of the debt stock are described by the following equation:

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[52] Prepared by Antonio Spilimbergo

[53] The debt sustainability exercise also presents this measure and simulates the future debt-to-GDP ratio under various shocks, including an increase in interest rate, slowdown in economic growth, and fall in the terms of trade.

$$D_t = r_t D_{t-1} - PS_t ,$$

where D_t is the debt level at time *t*, r_t is the interest rate at time *t*, and PS_t is the primary surplus at time *t*. Debt as a share of GDP is constant if and only if

$$\frac{D_t}{GDP_t} = \frac{D_{t-1}}{GDP_{t-1}}, \text{ for all } t.$$

Substituting the definition of constant debt in the equation for debt dynamics, it is possible to obtain the debt-stabilizing primary surplus:

$$PS^*{}_t = \left(r_t - \frac{GDP_t}{GDP_{t-1}} \right) D_{t-1} .$$

In terms of a share of GDP, this can be expressed as:

$$\frac{PS^*{}_t}{GDP_t} = \left(\frac{r_t}{GDP\ growth_t} - 1 \right) \frac{D_{t-1}}{GDP_{t-1}} .$$

Note that GDP growth, as well as interest rates, is expressed in nominal terms.

4. **Table 1 presents the debt-stabilizing primary surplus calculated using the formula above**.[54]

Table 1. Debt-Stabilizing Primary Surplus for Enlarged Government

	1998	1999	2000	2001	2002	2003	2004
Public sector debt	75.4	96.1	55.8	42.2	34.8	27.5	20.2
Real GDP growth	-5.3	6.3	10.0	5.1	4.7	7.3	7.1
Real interest rate 1/	-8.7	-58.0	-30.8	-10.6	-9.7	-7.5	-13.0
Actual primary surplus	-3.6	2.9	7.5	5.4	2.7	2.6	4.7
Debt-stabilizing primary surplus 2/	0.3	-7.6	-3.9	-1.7	-1.3	-0.7	-0.8

Notes: All variables excluding real interest rate are expressed as a share of GDP. A negative sign means that a primary deficit would have stabilized the debt.
1/ Average real interest rate (nominal rate minus change in GDP deflator; in percent).
2/ The debt-stabilizing primary surplus is calculated using the formula in the text.

5. **Because the actual primary surplus has always been above the debt-stabilizing primary surplus since 1998, public debt as a share of GDP has gradually declined.** The real interest rates (calculated as the implicit effective nominal rates on public debt minus the GDP deflator) have been negative over this period, so even a small *deficit* would have

[54] All the ratios, including, *r / GDP growth*, have the same values if both the numerator and denominator are expressed in nominal or in real terms. To make cross-time comparison easier, we present the table in real terms.

stabilized public debt. Given that substantial primary surpluses were generated in this period, the debt-to-GDP ratio decreased quite dramatically starting in 1999.[55]

C. Constant Oil Price Balance

6. **The constant oil price fiscal balance is an alternative measure of fiscal sustainability that takes, as a benchmark, the oil price rather than debt**. The implicit assumption underlying the constant oil price balance is that, because the price of oil tends to revert to this long-term benchmark, an "optimal" fiscal policy should aim at balancing the fiscal position around it. This measure has two main advantages:

- ***The constant oil price balance can be calculated relatively easily and objectively*** because it depends on the tax legislation, which is known ex ante.

- ***The price of oil is exogenous, so changes in the fiscal balance reflect only discretionary policy***, including increases in expenditure or changes in oil taxation.

7. **Despite its simplicity and widespread use, the constant oil price balance must be interpreted with caution**:

- ***The constant oil price balance does not reflect taxation of the total oil windfall to the economy***, which is the most obvious instrument to control the impact of the windfall itself on aggregate demand.

- ***The constant oil price balance is also affected by changes in tax legislation that have no fiscal impact on budget revenues at current oil prices***. For instance, the changes in oil taxation in 2005, which made oil revenues more sensitive to oil prices, would have worsened the 2004 constant oil price balance by 0.2 percent, ceteris paribus, even if total oil revenues had remained unchanged. These "notional" changes, while important to understand oil taxation, may be misleading if used in macroeconomic analysis.

- ***The constant oil price balance is typically calculated using an oil price that is not the best predictor of future prices as a benchmark***. For instance, the oil stabilization fund has used the "arbitrary" price of US$20 per barrel, which is not the best approximation for future prices (futures prices themselves may be used instead). In this view, the constant oil price balance is not a "true" sustainability index. For illustrative purposes and somewhat paradoxically, note that, according to some studies, the best predictor of next year's price is the current price level (see Cashin, Liang, and McDermott (2002)).

[55] The debt sustainability exercise shows that the debt will continue to decline in the next few years, barring exceptional falls in oil prices to well below US$20 per barrel and/or a dramatic increase in public expenditure.

- ***The constant oil price balance is usually calculated by keeping constant the quantity of oil and gas produced***. However, large price movements could also have an impact on production volume. Therefore, a fall in the oil price could generate a larger decline in fiscal revenues than the coefficients in Table 2 imply, if production in some marginal oil fields is discontinued.

8. **Despite these shortcomings, the constant oil price balance has, because of its simplicity and intuitive appeal, been widely used in policy debates to measure the long-term sustainability of a given fiscal position.** For these reasons, it is commonly used in the discussions concerning the oil stabilization fund.

9. **Kwon (2003) has calculated the impact of a change in the price of oil on federal revenues** (see Table 2, which updates the original numbers in Kwon (2003)).[56] Over the past years, the sensitivity of revenues with respect to changes in the oil prices has increased, especially for prices above US$24 per barrel. Moreover, since 2005 the sensitivity of revenues to oil prices below US$24 has decreased substantially.[57]

Table 2. Sensitivity of Federal Revenues to One-Dollar Increase in Price of Urals 1/

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Within range of $12-$16 /barrel	0.10	0.06	0.08	0.14	0.12	0.16	0.23	0.21	0.26	0.23
Within range of $16-$20 /barrel	0.10	0.06	0.08	0.24	0.17	0.27	0.31	0.35	0.35	0.29
Within range of $20-$24 /barrel	0.10	0.06	0.08	0.24	0.17	0.27	0.31	0.35	0.35	0.33
Higher than $24 per barrel	0.10	0.06	0.08	0.24	0.17	0.27	0.31	0.35	0.37	0.40
Memorandum item:										
Urals price, c.i.f. ($/barrel)	20.1	18.1	11.8	17.1	26.4	23.0	23.5	27.3	34.3	47.3

1/ The table is adapted and extended from Kwon (2003). Sensitivities are expressed in terms of GDP percentage points.

Using the values of Table 2, it is possible to examine the counterfactual evolution of the fiscal accounts if the price of oil had been constant at US$20 per barrel in different years. Table 3 presents the results.

Table 3. Constant Oil Price Balance 1/
(In percent of GDP)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Actual Federal Balance (commitment base)	-8.9	-7.7	-6.0	-4.2	0.8	2.7	1.3	1.6	4.4	7.5
Federal Surplus at constant US$20/barrel	-9.0	-7.6	-5.4	-3.5	-0.2	1.9	0.2	-1.0	-0.8	-2.6

1/ The table is calculated using the numbers in Table 2.

[56] The main taxes included in the calculations are oil export tariff and mineral extraction tax (since January 2002), oil export tax, dividends from state oil companies, profit tax from oil and gas companies, oil product excises, oil product export tariff (until December 2002), and oil and gas export tariff (in 1996). Keeping constant the volume of production, the statutory rates are used to calculate the sensitivity of revenues to changes in oil prices. The analogous numbers for the general government are slightly higher because they include taxes that go to local authorities.

[57] Starting in 2005, oil taxation has become much more sensitive to the level of oil prices.

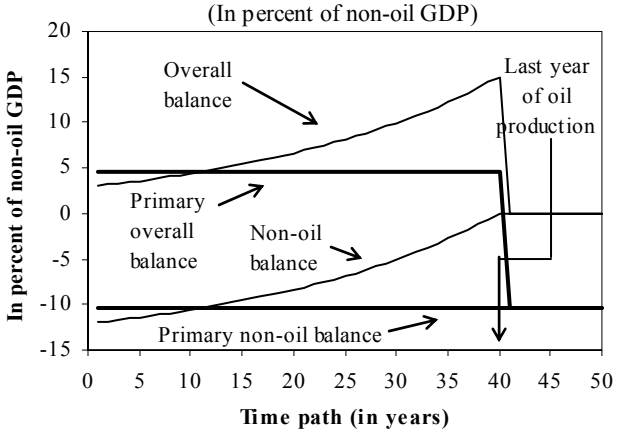
10. **With the dramatic improvements since 1996, the federal fiscal balance at constant oil price has slowly but continuously worsened after 2001.** This trend is likely to continue in 2005; using the assumptions of the 2005 budget, the constant oil price federal balance will be below -1.5 percent of GDP this year, even excluding possible amendments that would further increase expenditure.

D. Non-Oil Fiscal Balance

11. **An alternative measure of long-term fiscal sustainability and optimal fiscal policy in a country endowed with exhaustible resources is the non-oil fiscal balance.** This measure, discussed by Barnett and Ossowski (2003), has the appeal that it is based on a clearly specified optimization problem. In order to maximize welfare over the long term, a country endowed with a known amount of exhaustible resources should smooth consumption and nonexhaustible resource taxation; revenues coming from oil should first be partly accumulated and used after the depletion of the natural resources.[58] The implication of this optimal policy is that the non-oil primary balance should be constant over time. Note that the non-oil primary balance should always be constant even though the specific level of the optimal primary balance depends on many variables, including the amount of exhaustible resources in the ground and the social discount rate. This fact provides a relatively assumption-free benchmark to gauge the optimality of fiscal policy: the more variable is the non-oil primary balance, the less optimal is fiscal policy.[59]

12. **The optimal path for fiscal policy can be summarized in Figure 2.** Figure 2 is drawn using the ideal situation of knowing exactly the amount of reserves available. Furthermore, the optimality of invariant non-oil primary balance is valid only under a set of technical assumptions regarding, inter alia, the discount rate, and the rate of growth in the non-oil sector of the economy. Because this set of

Figure 2. Optimal Path of Fiscal Variables in Presence of Exhaustible Resources
(In percent of non-oil GDP)



Source: Barnett and Ossowski, 2003.

[58] The basic argument was exposed by Hotelling (1931).

[59] These conclusions are valid if the fiscal authorities do not have other discretionary reasons, including the standard stabilization role of Keynesian policy, to change the fiscal stance.

assumptions is probably not satisfied, the conclusions of this exercise should be taken only as a theoretical benchmark.[60]

13. **Both the non-oil overall and primary balances display similar behavior: they improved dramatically between 1996 and 2000 and they have worsened steadily in the following years, with the exception of 2004**. Table 4 presents a set of overall and non-oil balances since 1996. As is common in the literature, we report the non-oil balances in terms of non-oil GDP. However, because there is large uncertainty about the relative sizes of the oil and non-oil economies, we also report the non-oil balance as a share of total GDP.

Table 4. Non-Oil Balance (General Government) 1/

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Oil-related revenues	5.4	4.5	2.8	3.9	7.5	7.5	7.5	8.7	11.1	15.9
Non-oil revenues	30.4	34.8	31.5	29.6	29.4	29.8	30.1	28.0	27.5	27.4
Share of oil revenues over total revenues	15.0	11.3	8.1	11.7	20.2	20.1	20.0	23.6	28.7	36.7
Overall balance	-8.9	-7.7	-6.0	-4.2	0.8	2.7	1.3	1.6	4.4	7.5
Primary balance	-2.6	-2.6	-1.4	1.7	5.2	5.4	3.4	3.3	5.6	8.6
Non-oil overall balance	-12.2	-10.0	-7.5	-6.4	-3.9	-2.9	-4.4	-4.7	-3.9	-4.8
Non-oil primary balance	-5.9	-5.0	-2.8	-0.4	0.4	-0.2	-2.3	-3.0	-2.7	-3.7
Non-oil GDP 2/	84.1	84.1	84.1	79.0	73.7	78.8	80.4	78.6	77.0	75.0
Non-oil overall balance (in terms of non-oil GDP)	-14.5	-11.9	-8.9	-8.0	-5.3	-3.7	-5.5	-6.0	-5.0	-6.4
Non-oil primary balance (in terms of non-oil GDP)	-7.0	-5.9	-3.4	-0.5	0.6	-0.2	-2.9	-3.9	-3.5	-4.9

1/ The oil-related revenues are the revenues from excises and export taxes on oil, gas, oil products, and the mineral resource tax and part of the profit and income taxes. They also include revenues of the road fund before 2003. All variables are in terms of share of total GDP, unless otherwise indicated.

2/ There are not reliable data for non-oil GDP before 1998. We use the ratio in 1998 to calculate the non-oil balance for years before 1998.

14. **Optimal fiscal policy under the conditions discussed above has two implications: (i) the non-oil primary fiscal balance should be constant, and (ii) there should be no correlation between the non-oil balance and oil-related revenues.** On both accounts, the record of Russian fiscal policy is mixed. The standard deviation of the non-oil primary balance is different from zero, even excluding the years of fiscal crisis, indicating that the fiscal authorities did not follow strictly the optimal fiscal policy (Table 5). At the same time, the correlation between oil-related revenues and the non-oil primary balance was negative, because the authorities were financing the non-oil primary deficit with oil revenues.

[60] Changes to the set of assumptions can lead to quite different policy implications. For instance, Takizawa, Gardner, and Ueda (2004) show that it is optimal for a country that starts with a low level of capital, and in the presence of positive externalities of public spending on productivity and consumption, to invest oil revenues in physical capital rather than in financial assets.

Table 5. Volatility of Non-Oil Balance (General Government) 1/

	Standard Deviation		Correlation with Oil Revenues	
	1996-2004	1999-2004	1996-2004	1999-2004
Oil related revenues	2.6	2.3	1.0	1.0
Non-oil revenues	2.1	1.1	-0.7	-0.7
Overall balance	4.9	2.9	0.8	0.9
Primary balance	3.4	1.5	0.8	0.7
Non-oil overall balance	3.6	1.4	0.6	0.6
Non-oil primary balance	2.6	1.9	0.1	-0.6

1/ The standard deviations are calculated using the values of Table 4. The non-oil balances are calculated as a share of non-oil GDP. All other variables are calculated as a share of GDP.

E. Fiscal Stance and Impulse

15. **The simple headline fiscal balance is not an accurate measure of the impulse that fiscal policy imparts to the economy for several reasons: (**i) tax revenues are to a certain extent endogenous; (ii) different sources of financing may have different impacts on aggregate demand; and (iii) similarly, different tax and expenditure categories may also have different impacts on aggregate demand. To address these issues, fiscal impulse measures have been used for a long time to evaluate the impact of the fiscal budget on aggregate demand (Blejer and Cheasty, 1993). While the current measures of fiscal stance deal with the issue of endogeneity of fiscal revenues, reasons (ii) and (iii) are typically not taken into consideration because the estimations of differential effects of financing sources and expenditure categories are generally not sufficiently reliable.[61]

16. **The simplest and most common way to address the endogeneity of fiscal revenues is to assume that revenues have unitary elasticity with respect to income**; under this assumption, the revenue stance is defined as[62]

$$RS_t = \frac{R_o}{Y_o} Y_t - R_t ,$$

where R_t are revenues in year t, Y_t is GDP in year t, R_o are revenues in the base year, and Y_0 is actual GDP in the base year.

[61] The standard measures of fiscal impulse may underestimate the effect of fiscal policy—for example, when the increase in public expenditure is concentrated on raising minimum wages and pensions, which, in principle, have a large fiscal multiplier. In the past, when it was possible to estimate different multipliers with sufficient precision, measures of the fiscal stance also took into consideration other factors, including the composition of expenditure.

[62] Under a more sophisticated methodology, one could calculate the elasticities of every tax. While this methodology could deliver a more accurate number for a stable tax system, the Russian tax system has changed considerably in the past few years, and a disaggregated methodology is not easily applicable.

17. **Given the dependency of Russia on the energy sector, which accounts for about one fourth of GDP, a possible alternative is to correct the measure above for oil revenues**:

$$RS^*_t = \frac{R_o}{Y_o} Y_t - R_t + OR_t - OR_o ,$$

where OR_t and R_t are respectively oil and non-oil revenues at time *t*. This "enhanced" measure of revenue stance follows the same logic of correcting for the business cycle while also controlling for the oil cycle. The year 2001, during which the average price for Urals was US$23 per barrel, is taken as the base year.

18. **The expenditure stance is usually defined with reference to potential output, under the assumption that outlays have unitary elasticity with respect to potential output**:

$$ES_t = E_t - \frac{E_o}{PY_o} PY_t ,$$

where E_t is expenditure in year *t*, PY_t is potential output in year *t*, E_o is expenditure in the base year, and PY_0 is potential output in the base year. However, the level and the growth rate of potential output are extremely difficult to estimate, which makes the estimation of fiscally neutral expenditure problematic. Table 6 shows two output gaps: the baseline output gap, which is calculated in Oomes and Dynnikova (2005), and an alternative output gap, which is calculated using two simple hypotheses: potential output grows at 6 percent a year and the output gap is closing in 2005. This alternative measure of output gap, which is quite simplistic, provides a useful benchmark to assess how much the measure of the fiscal stance depends on the calculation of potential output.

Table 6. Measures of the Output Gap 1/
(In percent of GDP)

	1999	2000	2001	2002	2003	2004	2005
Output gap baseline	-12.6	-9.2	-5.5	-3.3	-0.4	0.6	1.4
Output gap (alternative)	1.3	0.7	3.5	1.7	-0.5	-0.1	0.0

1/ The estimation of the output gap is done in Chapter I.

19. **The fiscal stance, which is defined as the sum of the expenditure and the revenue stances ($FS_t = RS_t + ES_t$), is a synthetic indicator of the contribution of the fiscal account to aggregate demand**. Table 7 gives a summary of three fiscal stances, calculated using different assumptions on potential output and including or excluding the energy sector.[63] The

[63] The stance for 2005 is calculated using the baseline staff projections and includes exceptional revenues linked to Yukos. Without the "Yukos effect" the revenue stance would be less restrictive.

three measures of total fiscal stance differ because they are based on different assumptions on the potential output of the economy and on the treatment of the energy sector.

20. **However, despite these differences, these measures show a similar qualitative pattern. After a phase of positive fiscal stance between 1999 and 2003, the fiscal stance has turned negative**. Note that the slowdown of public expenditure in 2004 is captured by both measures of the expenditure stance.[64]

Table 7. Fiscal Stance (General Government)
(In percent of GDP)

	1999	2000	2001	2002	2003	2004	2005
Revenue stance	3.8	0.5	0.0	-0.3	0.6	-1.3	-5.9
Revenue stance (w/o oil)	-0.2	-0.4	0.0	0.3	-1.8	-2.3	-2.5
Expenditure stance (benchmark)	6.4	2.3	1.9	3.6	1.1	-1.2	0.5
Expenditure stance (alternative) 1/	1.6	-1.1	-1.2	1.9	1.2	-0.9	1.0
Total stance (benchmark)	10.2	2.8	1.9	3.3	1.8	-2.5	-5.4
Total stance (alternative) 1/	5.4	-0.6	-1.2	1.6	1.8	-2.2	-4.9
Total stance (benchmark w/o oil)	6.2	1.9	1.9	3.9	-0.7	-3.5	-2.0

1/ The alternative measure of fiscal stance in constructed using the alternative measure of potential output described above.

21. **The fiscal impulse is defined as the yearly change of the fiscal stance** (**$FI_t = \Delta FS_t = \Delta RS_t + \Delta ES_t$**). By construction, the fiscal impulse, as opposed to the fiscal stance, does not depend on a base year, which is very useful in the case of Russia given the uncertainty surrounding the estimates of potential output. Table 8 reports the fiscal impulses calculated using the different assumptions we used for the fiscal stance in paragraph 18.

Table 8. Fiscal Impulse (General Government)
(In percent of GDP)

	1999	2000	2001	2002	2003	2004	2005
Revenue impulse	0.8	-3.3	-0.5	-0.3	1.0	-1.9	-4.6
Revenue impulse (w/o oil)	-1.9	-0.2	0.4	0.3	-2.1	-0.5	-0.2
Expenditure impulse (benchmark)	6.4	-4.1	-0.4	1.7	-2.5	-2.3	1.7
Expenditure impulse (alternative)	1.6	-2.7	-0.1	3.1	-0.7	-2.1	1.9
Total impulse (benchmark)	7.2	-7.4	-0.9	1.4	-1.5	-4.2	-2.9
Total impulse (alternative)	5.4	-6.0	-0.6	2.8	0.2	-4.0	-2.7
Total impulse (w/o oil)	4.5	-4.3	0.0	2.0	-4.6	-2.8	1.5

The calculation of the fiscal impulses shows that, after a sizable positive impulse in 2002, the fiscal impulse has been negative since 2003. Three caveats are in order for a proper interpretation of this result:

[64] We also tried other measures of the fiscal stance, based on alternative assumptions of potential output. Within reasonable parameters of constant annual growth in potential output of 3-8 percent, the fiscal stance has the same qualitative behavior. For the year 2005, we use the Fund staff's baseline forecasts to calculate the fiscal stance.

- ***The fiscal impulse is meant to measure the contribution of the public sector to the economy and is not to be confused with the fiscal position that guarantees a nonaccelerating inflation***. In particular, the Russian economy during the past three years has benefited from large oil windfall gains; if the public sector had had to sterilize the entire amount of oil windfall accruing to the economy, the fiscal position would have been tighter.

- ***The data for 2005 are based on projections*** and may eventually turn out to be substantially different, especially if public expenditure is increased through an amendment to the budget in the second half of the year.

- ***The revenue impulse is very negative in 2005 also because of the effect of the exceptional revenues from Yukos***.

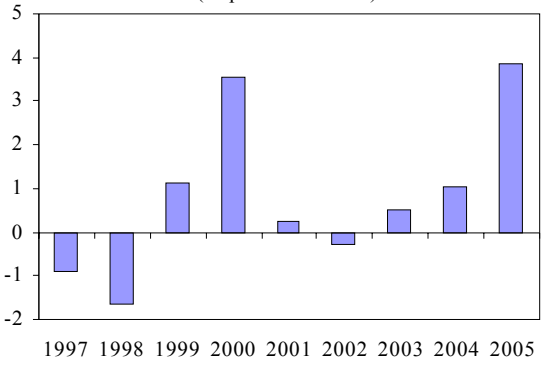
22. **As a complement to the standard fiscal impulse, therefore, we propose another rough measure of the fiscal stance to evaluate how much of the oil windfall to the *entire* economy was sterilized by fiscal policy**. The standard fiscal impulse calculated above evaluates the impact of fiscal policy by taking into account only the share of oil revenue that goes to the budget, not how much accrues to the economy overall and should be absorbed by the budget. Table 9 shows how fiscal policy has sterilized (or neutralized) total oil windfalls.

Table 9: Oil Revenue Windfalls and Fiscal Policy, 2002-05

	2002	2003	2004	2005
		(In percent of GDP)		
A. Change in energy exports	1.1	4.2	4.6	5.8
B. Change in overall balance	-2.1	0.5	3.9	2.7
A-B (- indicates fiscal tightening exceeding windfall)	3.2	3.7	0.7	3.2
		(In billions of rubles)		
C. Change in net international reserves	496	804	1,241	1,879
D. Change in net credit to government	87	-172	-679	-1,227
D/C (-indicates fiscal sterilization of windfall)	0.18	-0.21	-0.55	-0.65

23. **Fiscal policy has "taken away steam" only in a limited way because the overall fiscal balance has cumulatively improved only by 3.5 percent of GDP since 2001; while, during the same period, the increase in oil windfalls has contributed more than 18 percent to the economy.** This means that, in the last four years, aggregate demand has increased more than 15 percent thanks to the energy boom net of an insufficiently restrictive fiscal policy.

Figure 3. Size of Oil Fiscal Shocks
(In percent of GDP)



Sources: Authorities; and Fund staff estimates.

F. How the "Unexpected Oil Windfalls" Were Used

24. **Beyond the standard issue of the appropriateness of the fiscal stance, it is interesting to examine how the fiscal authorities reacted to unexpected oil revenues**. Raising this issue begs the question of what are "unexpected oil revenues." Using as a benchmark assumption the finding that oil prices are generally believed to follow a random walk (Cashin, Liang, and McDermott, 2002), the best predictor of oil revenues next year is the amount of oil revenues this year. Therefore, we can use the year-to-year changes in the oil balance as a proxy for unexpected oil revenues.[65] Figure 3 shows the size of the oil windfall shocks defined in such a way. Starting in 2003, the oil windfall shocks have been increasingly positive. In 2005, at the current level of oil prices, the oil-related revenues will be almost 5 percent larger than in the previous year.

25. **In response to a fall in oil revenues, fiscal authorities may respond in three ways: i) increase non-oil revenues; ii) decrease expenditure; or iii) increase the public deficit.** These possible responses are all constrained by the following identity:

$$\Delta(Budget\ balance) = \Delta(oil\ revenues) + \Delta(non-oil\ revenues) - \Delta(expenditure).$$

Rearranging, we obtain:

$$\Delta(oil\ revenues) = -\Delta(non-oil\ revenues) + \Delta(expenditure) + \Delta(Budget\ balance).$$

Table 10 shows the responses of the fiscal variables in each year from 1999 to 2005 using the decomposition above. The data for 2005 are based on staff's projections.

Table 10. Fiscal Response to Oil Revenue Shocks
(In percent of GDP)

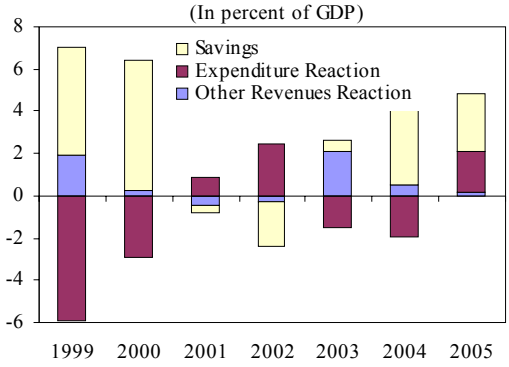
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Oil shock 1/	-0.9	-1.7	1.1	3.5	0.0	0.0	1.1	2.4	4.8
Non-oil revenue reaction 2/	-4.4	3.3	1.9	0.2	-0.4	-0.3	2.1	0.5	0.2
Expenditure reaction	2.5	-5.2	-5.9	-2.9	0.9	2.5	-1.5	-2.0	2.0
Savings 3/	1.0	0.3	5.1	6.2	-0.4	-2.1	0.5	3.9	2.7

1/ An oil shock is defined as a variation in oil related revenues.
2/ Non-oil revenue reaction is defined as a decrease in non-oil related revenues (a positive number means a decrease in non-oil taxation).
3/ Savings are defined as a change in the overall fiscal balance.

[65] Oil revenues can also change because of the legislation concerning oil taxation and because of changes in the quantity produced.

The use of oil windfall is best evident in Figure 4.

Figure 4. Fiscal Response to Oil Fiscal Shocks
(In percent of GDP)



Sources: Authorities; and Fund staff estimates.

26. **The increase in oil windfalls has been mostly used to add to fiscal savings, while the decrease in non-oil revenues has played a smaller role, with the exception of 2003 and, to a lesser extent, 2005.** A possible explanation for this behavior is that changes in taxation or expenditure, which are typically decided the previous year, are implemented with a lag, so that fiscal authorities cannot respond to an unexpected increase of oil fiscal revenues by immediately decreasing taxation or raising expenditure. This may explain why large changes in oil fiscal windfalls are saved. This mechanism was institutionalized with the introduction of the oil stabilization fund (OSF) in 2004. In this context, it is useful to compare the year 2003, when a large increase in oil windfall was largely offset by a decrease in non-oil taxation, with 2004, when most of the increase in windfall was saved in the OSF. As the fund reached the statutory cap of Rub 500 billion, below which all oil-related revenue above the reference price is earmarked for the OSF, this automatic saving mechanism could well be weakened and increases in expenditure and/or decreases in non-oil taxation may play a larger role.

G. Conclusions

27. **Fiscal policy played a fundamental role in the stabilization of the Russian economy after the 1998 crisis.** The oil price boom in recent years has helped the authorities reach a sustainable fiscal equilibrium but has also posed new challenges. In particular, the exceptional oil revenues that Russia has received starting in 2003 have raised the question of whether the non-oil sectors of the economy are developed enough to absorb the new expenditure capabilities. This paper has evaluated how fiscal policy performed after the 1998 crisis. It has used a variety of indicators to answer a number of questions.

28. **Russia has progressed greatly in recent years on public debt sustainability, largely because the real interest rates on the public debt have been negative and growth has been sustained.** However, the fiscal authorities have also been able to save a consistent part of the oil windfall and generate a large primary surplus.

29. **Regarding sustainability with respect to the oil price, the constant oil price balance worsened progressively starting in 2001 but showed a modest reversal in 2004.** This reversal was partly due to the oil legislation, which made oil revenues more sensitive to the oil price, and to the decrease in non-oil revenues and slight increase in expenditure relative to GDP. While fiscal accounts will show a surplus within a reasonable range of oil prices, this tendency could be dangerous, especially if proposals to increase aggressively public expenditure, as well as to decrease non-oil taxation, are implemented.

30. **As to optimal fiscal policy in a country endowed with exhaustible resources, the analysis of the non-oil fiscal balance shows that Russian fiscal policy has had a mixed record.** Although Russia has spent a large part of the oil revenue windfalls in the past; since the establishment of the OSF, it has saved most of the oil revenues in 2004 and is expected to save additional oil revenues in 2005. However, the automatic saving mechanism provided by the OSF will be weakened by the approved increase in the reference oil price and this poses important challenges for the future.

31. **In evaluating how the fiscal balance has interacted with aggregate demand, the fiscal impulse shows that budget policy has not contributed to the increase in aggregate demand since 2003.** However, the fiscal position has not been tight enough to contain the inflationary impact from the exceptional oil windfalls for the economy as a whole.

32. **Even though it has not contributed to aggregate demand in the traditional sense, fiscal policy has not been restrictive enough in the past four years to sterilize the impact of the oil windfall on the entire economy.** Since 2002, the economy-wide oil windfall has cumulatively been more than 18 percent of GDP, while the fiscal stance has tightened only by 3.5 percent of GDP.

33. **Finally, our analysis of the effectiveness of fiscal policy in dealing with the unexpected oil fiscal windfalls** confirms that the OSF has been effective in offsetting exceptional increases in the oil revenue windfalls in 2004. At the same time, it raises the question of how oil revenues will be offset without an appropriate automatic saving mechanism.

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III. Corporate Sector in Russia: Capital Structures and Vulnerabilities[66]

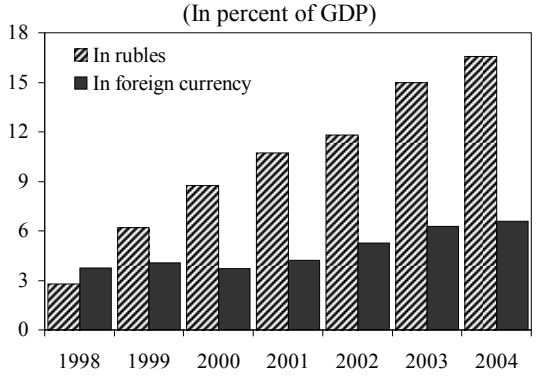
A. Introduction

1. **This paper analyzes balance sheet developments in the Russian non-financial corporate sector, with the objective of bringing out the key "stylized facts" and assessing potential vulnerabilities associated with the level and composition of external finance**.[67] Given the lack of diversified sources of funding, emerging market corporates often have to rely heavily on foreign currency and short-term debt instruments, which exposes them to exchange rate, interest rate, and debt rollover risks and may ultimately increase the likelihood of bankruptcy (credit risk). This paper also attempts to assess the sensitivity of the Russian international capital market participants to a number of adverse shocks affecting the availability and/or the cost of external funding, including sharp increases in interest and exchange rates, and a decline in the rollover ratio of short-term debt.

2. **The focus on the nonfinancial corporate sector is motivated by the following developments:**

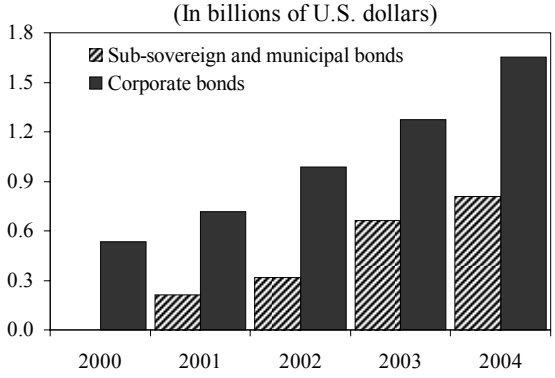
- Domestic banks, many of which remain weak and undercapitalized, continued to increase their exposure to the corporate sector either through direct lending or participation in the fast-growing domestic corporate bond market.[68] Encouragingly, the share of nonperforming loans in total gross loans has so far remained broadly stable.

Domestic Bank Credit to Enterprises and Non-banking Financial Institutions
(In percent of GDP)



Source: CBR.

Domestic Bond Market in Russia: Amounts Outstanding
(In billions of U.S. dollars)



Source: MICEX and Cbonds.

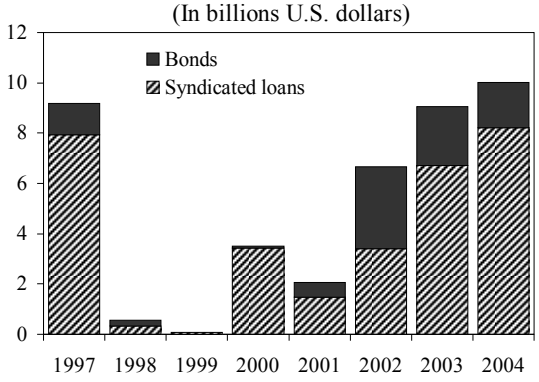
[66] Prepared by Anna Ilyina.

[67] The term "external funds" here refers to "funds from outside sources."

[68] The total amount of outstanding ruble corporate bonds reached Rub 267 billion ($9.6 billion) at end-2004, increasing further to Rub 310 billion ($11 billion) during the first five months of 2005.

- After re-gaining access to international capital markets around 2000, Russian firms significantly increased their foreign currency liabilities, albeit from a relatively low base. The external debt of the nonfinancial corporate sector reached $74 billion by the end of 2004, compared with $55 billion at end-2003.[69]

Gross International Debt Issuance by the Russian Nonfinancial Sector Firms
(In billions U.S. dollars)



Source: Dealogic.

3. **The structure of the paper is as follows.** Section B discusses the key structural features of the Russian nonfinancial corporate sector, including production and market concentration, ownership structure and financing sources. Section C identifies the main stylized facts with regard to balance sheet developments of the large nonfinancial firms in Russia between 2000 and 2003, based on the sample of around 200 companies. The analysis focuses on the key balance sheet and profitability indicators, including leverage ratios, maturity and currency composition of debt, liquidity, profitability and credit risk indicators. Section D presents the results of solvency and liquidity stress tests for a subset of firms that have been active participants in the international debt markets since 2000. The main conclusions are presented in Section E.

B. Key Structural Features

Sectoral composition and concentration

4. **The common belief that industry continues to play a dominant role in the Russian economy, though challenged by official statistics, appears to be robust**. According to Rosstat, the production of goods accounted for only 40 percent of GDP in 2003, while 60 percent of GDP was attributed to the production of services. This appears to be inconsistent with the fact that revenues from the oil and gas sector alone stood at roughly 20 percent of GDP. The key to this puzzle is in the widespread use of "transfer pricing." According to analysts, a large part of the profits and value added generated in the industrial sector is shifted to the trade sector in order to minimize taxes, thereby, "inflating" the proportion of services in GDP. Controlling for transfer pricing, the actual contribution of industry to GDP is estimated to have been over 50 percent (World Bank, 2004). Furthermore, based on consolidated accounting data for the 400 largest companies in Russia, the leading

[69] By end-2004, Russia's corporate sector had become a small net debtor, in contrast to the sovereign, which had achieved a net creditor position.

Russian rating agency Expert RA estimates that the share of industry in total sales exceeded 70 percent in 2003 (Expert RA , 2004).[70]

5. **Production and market concentration in Russia are fairly high, especially in the natural resource sector.** The level of production concentration at the enterprise level in Russia's industry was always high, for historical reasons. However, because most enterprises were privatized as single firms, the average size of a (single-enterprise) Russian firm in the early 1990s was smaller than an average size of a (multiplant) firm in other countries (World Bank, 2004). Over the past ten years, however, horizontal and vertical integration intensified, leading, in some cases, to the creation and expansion of large financial-industrial groups. As a result, market concentration rose as well, most notably in the natural resource sector.

Ownership, control and corporate governance

6. **Ownership and control in the Russian industry are highly concentrated** as well. A recent survey of a representative sample of about 1000 Russian industrial enterprises suggests that the average management's stake in a company is around 19 percent, the average stake of the single largest outside owner is 24 percent, and that of the largest blockholder is 40 percent (Guriev and others, 2003). Another study that looks at a sample of large industrial firms (which account for 62 percent of total industrial output) finds that the largest blockholder controls, on average, about 80 percent of the firm (Guriev and Rachinsky, 2004). This survey finding implies that control in Russia's industry is even more concentrated than ownership.

7. **The widely held view that the largest private owners (the so-called oligarchs) have significant control over the Russian economy is supported by empirical evidence** (Guriev and Rachinsky, 2004). In particular, the authors find that the 23 largest private owners control at least 36–38 percent of output and employment of the firms in their sample, which, in turn, account for roughly two-thirds of total industrial output.[71] Most of the companies controlled by oligarchs operate in the natural resource and energy sectors. In addition, most industries controlled by the largest private owners tend to have concentrated (monopolistic or oligopolistic) market structure.

8. **Interestingly, higher ownership concentration is associated with better corporate governance and higher investment**, although the latter holds true only if the largest blockholder's stake in the company does not exceed 50 percent (Guriev and others, 2003).[72]

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[70] Expert RA conducts annual surveys of the largest firms in Russia, receiving accounting information directly from participating firms. However, in many cases, the publicly available financial statements are based on *unconsolidated* accounting information and, therefore, are likely to differ from the ones provided to Expert RA.

[71] Managers of large government-owned monopolies were not classified as oligarchs.

[72] The effect of ownership concentration on governance has been found to be positive and statistically significant even when one controls for corporate governance (Guriev and others, 2003).

However, the variation in the level of corporate governance across industrial firms is substantial, with many medium and smaller-sized firms reportedly still unfamiliar with, or unaware of, the Code of Corporate Governance (Guriev and others, 2003).

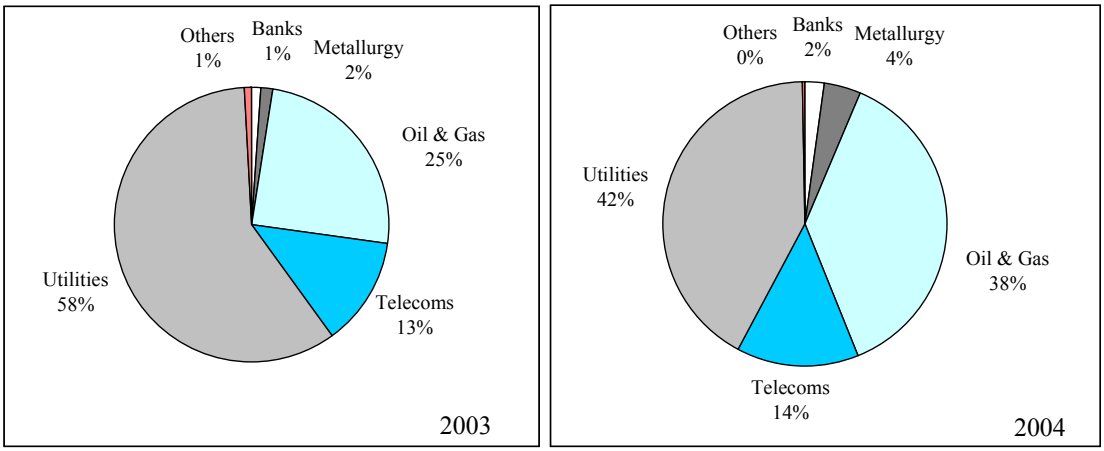
Financing sources

9. **The relative underdevelopment of the domestic financial system and the lingering weaknesses in the banking sector limit the external funding sources available to local firms**. Despite a pickup in commercial bank lending, only a small part of total fixed investment in Russia is financed through bank credits (around 5.3 percent in 2003). The primary users of bank credit are large and medium-sized firms, while the vast majority of smaller firms continue to rely on internal funds. For instance, the 2003 survey of a representative sample of industrial firms revealed that only 21 percent of them had used bank credit to finance investment in the previous year (Guriev and others, 2003).

10. **The issuance of securities (stocks and bonds) in the domestic capital market has not yet become a significant source of funding for most Russian firms.** Even though turnover in corporate stocks (83 percent of the total) and bonds (17 percent of the total) doubled in 2003 from 2002, reaching $113 billion, the number of issuers remains limited (less than 170 firms). Most of the firms listed on the exchanges in Moscow and St. Petersburg are from the energy and utilities sectors (see figure below). In addition, most traded shares are fairly illiquid, with the "free float" rarely exceeding 10 percent of the total number of shares outstanding. The benchmark Russian Trading System (RTS) index (50 firms) is highly concentrated, with four names accounting for 65 percent of the total index capitalization.

11. **An increase in the issuance of international debt by the nonfinancial corporate sector during 2000–04 raised risk exposures to exchange and interest rates**. Given the relatively low level of financial intermediation in Russia, many domestic firms can finance large-scale investment projects only if they are able to raise funds abroad. Following the 1998 sovereign default, Russian firms were effectively shut out of the international capital markets. Foreign debt issuance resumed in earnest only in 2000, with gross issuance by nonfinancial firms quickly outpacing that of financial and public sector entities. The bulk of international

Turnover in the Russian Domestic Market for Shares and Bonds: Sectoral Composition

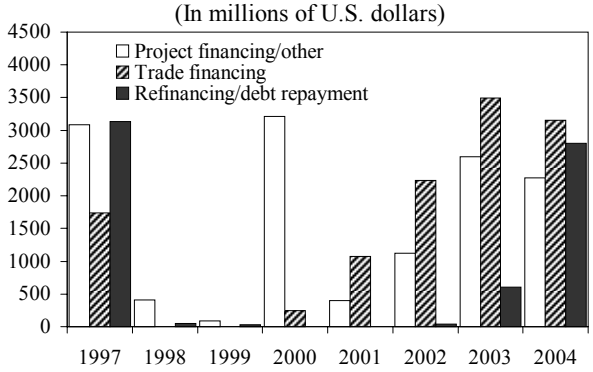


Source: Expert RA (2004)

debt issuance was in the form of syndicated loans, mainly for trade financing (see figure). Unlike Eurobonds issued by the Russian companies, which are predominantly dollar-denominated fixed-rate obligations, syndicated loans are typically floating rate instruments, with interest payments tied to the London interbank offered rate (LIBOR). This raises concerns that some issuers may have increased their exposure to (foreign) interest rate risk, in addition to exchange rate risk.

Gross Issuance of Syndicated Loans by the Russian Nonfinancial Sector: by Loan Purpose

(In millions of U.S. dollars)

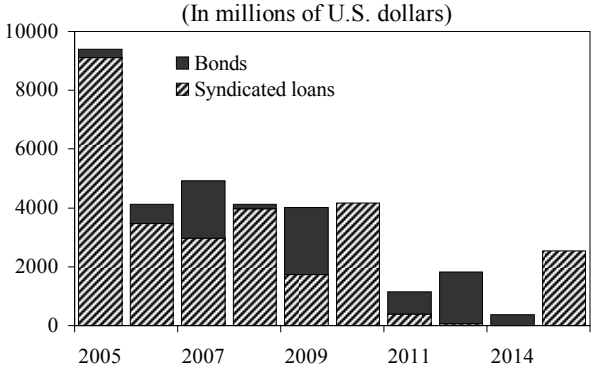


Source: Dealogic.

12. **A significant part of outstanding foreign debt obligations (mainly syndicated loans) matures in 2005**. This, in principle, could be used as an opportunity to swap at least part of the maturing floating-rate obligations into fixed-rate instruments. However, most refinancing operations have so far been done through the syndicated loan market as well (e.g., in 2004, two firms issued close to $3 billion in loans for the

International Bonds and Syndicated Loans Outstanding: by Remaining Maturity, end-2004

(In millions of U.S. dollars)



Source: Dealogic; and staff estimates.

purposes of debt refinancing or debt repayment).[73]

C. Balance Sheet and Profitability Indicators

13. **This section aims at identifying the key stylized facts with regard to balance sheet developments of the large nonfinancial firms in Russia between 2000 and 2003**. The data set used in the analysis contains about 200 companies, many of which are also included in the Expert RA top 200 list and, therefore, clearly fall into the category of "big business." Since these firms are the main users of external funds, the focus on big business is consistent with the objective of the paper, which is to analyze changes in the capital structures of Russian nonfinancial firms and associated (potential) vulnerabilities. The main characteristics used to analyze cross-sectional differences in the firms' financial ratios include sector, size, participation in the local corporate bond market, and participation in the international debt market.

14. **The sample includes publicly traded and nontraded firms from a broad cross-section of industries** grouped into six sectors: basic materials, energy, manufacturing, communications, utilities, and consumer goods.[74] The balance sheet and income statement information for two fiscal years, 2000 and 2003, is pooled from two sources: CapitalLogica and Bloomberg. [75] For most companies in the sample, financial statements are based on the Russian accounting standards (RAS); for some firms, only unconsolidated statements are available. For those companies that prepare financial statements in accordance with the international accounting standards (U.S. generally accepted accounting principles (GAAP) or international accounting standards (IAS)), the latter are used in the analysis instead of the RAS-based statements.

Leverage

15. **Debt-to-equity ratios indicate that large nonfinancial firms in Russia have become more leveraged**. The average debt-to-equity ratio (D/E ratio) of the firms in the sample, which is a commonly used measure of leverage, rose to 71 percent in 2003 from 34 percent in 2000 (Table 1). The distribution of leverage shifted to the right: the share of firms with leverage of more than 100 percent doubled, while the share of firms employing very little leverage shrunk proportionately. Firms in the basic materials and communications

[73] Gazprom ($2.2 billion, maturing in 2010) and Mobile TeleSystems ($600 million, maturing in 2007).

[74] See, Appendix II.

[75] By comparison, the Worldscope database contains less than 30 publicly traded companies, most of which are from the energy sector.

Table 1. The Distribution of Leverage (D/E) 1/
(In percent)

2003				
	0<D/E<50	50<D/E<100	D/E>100	ALL
Mean	17	73	278	71
Median	13	71	236	29
Maximum	48	94	586	586
Minimum	0	52	119	0
Standard deviation	15	13	142	114
Share of firms	63	19	18	100
2000				
	0<D/E<50	50<D/E<100	D/E>100	ALL
Mean	12	72	206	34
Median	8	69	148	10
Maximum	48	94	518	518
Minimum	0	52	103	0
Standard deviation	13	15	129	68
Share of firms	78	12	9	100

Sources: CapitalLogica; Bloomberg; and staff estimates.

1/ D/E is defined as total debt (sum of short-term and long-term borrowing) divided by the book value of shareholders' equity; reported D/E ratios of less than 0 (negative equity) or greater than 1,000 were not used in computations.

sectors remained among the least leveraged. In contrast, the average D/E ratio in the energy, consumer and manufacturing sectors increased two-to-threefold between 2000 and 2003 (Appendix II, Figure 1). The average D/E ratio of the local bond market participants more than doubled between 2000 and 2003, while that of nonparticipants increased only modestly (Appendix II, Figure 1). Interestingly, the most leveraged companies seem to be at the extremes of the size distribution.

16. **Also, comparison of the median leverage ratios across developed and emerging-market countries suggests that large industrial firms in Russia in 2003 were not as "underleveraged" as they had been in 2000** (Appendix II, Table 1).[76] In fact, several emerging-market countries (e.g., in Central and Eastern Europe) have much lower median leverage ratios than Russia. However, for those firms that are exposed to debt-rollover risk

[76] The median D/E ratios in some mature market countries may seem too low because of the large proportion of small firms in the Worldscope sample. For example, in 2003, the median D/E ratios for the United Kingdom and the United States were 20 and 10 percent; meanwhile, the average D/E ratios were 43 and 48 percent and the weighted average D/E ratios, were 85 and 72 percent, respectively.

(because of a high proportion of short-term debt) or to exchange rate risk (because of a large share of unhedged foreign currency debt), it may be desirable to maintain relatively low D/E ratios. The next subsection takes a closer look at debt structures.

Debt structures and liquidity indicators

17. **On average, debt structures of the firms in the sample appear to have improved**, **which decreased their vulnerability to debt-rollover risk**. The average proportions of short-term debt and bank credit in total debt of the firms in the sample fell, while the average proportion of foreign debt in total debt (based on the sample of issuers) increased only modestly (Table 2). The improvement in the maturity structure of corporate debt, while evident across all sectors, is particularly striking in the consumer goods sector, where the average share of short-term debt fell from around 80 percent in 2000 to only 44 percent in 2003 (Appendix II, Figure 2). The decline in the firms' reliance on bank credit can be seen across almost all sectors as well and appears to have been driven by the substitution of bank loans for bonds.[77] This is evident from the fact that the average share of bank credit of local bond market participants fell from 74 percent in 2000 to less than 50 percent in 2003, while the average share of bank credit of nonparticipants in the local bond market rose slightly (Appendix II, Figure 3).

18. **The liquidity ratios ("current" and "quick" ratios) of firms in the sample are at comfortable levels**.[78] The average current ratio increased from 167 percent in 2000 to 193 percent in 2003, while the quick ratio increased from 125 percent to 150 percent over the same period; however, the variation in liquidity ratios across firms was fairly high. Nevertheless, the positive and statistically significant correlation between liquidity ratios and the proportion of short-term debt in total debt suggests that firms facing higher debt-rollover risk generally try to maintain higher liquidity ratios.

[77] The latter has to be interpreted with some caution because not all firms in the sample reported their debt composition for 2003. However, if this is true (i.e., large industrial firms, on average, reduced the share of bank loans in total debt), it may also be the case that the recent expansion of the banks' loan books was driven by lending to new clients who are possibly smaller in size and lower on the credit spectrum than the top 200 names.

[78] The current ratio is the ratio of current assets to current liabilities. The quick ratio is a more conservative measure of liquidity, it is the ratio of current assets (net of inventories) to current liabilities. Both ratios should be comfortably above 100 percent. If that is not the case, i.e., if liquidity ratios are low, a company may not be able to reduce its current assets for cash in order to meet maturing obligations and, therefore, may be forced to roll over its debt to avoid insolvency.

Table 2. Debt Structure and Liquidity Indicators
(In percent; unless indicated otherwise)

	2000		2003	
	Mean	Median	Mean	Median
Leverage and debt structure				
Debt/equity ratio	34	10	71	29
Short-term debt/total debt	69	89	57	55
Bank credit/total debt	67	86	59	62
Foreign exchange debt/total debt 1/	35	27	36	38
Ruble bonds/total debt 2/	N.A.	N.A.	39	29
Liquidity				
Current ratio	167	123	193	156
Quick ratio	125	91	150	118
Interest coverage ratio *(times)*	20	11	15	7

Sources: CapitalLogica; Bloomberg; Dealogic; www.cbonds.ru; and staff estimates.

1/ Foreign exchange debt refers to the outstanding stock of Eurobonds and syndicated loans; the Foreign exchange debt/total debt ratios are based on the sample of international debt market participants.
2/ Ruble bonds refer to the outstanding stock of ruble corporate bonds (not including veksels); the ratios are based on the sample of corporate bond issuers (see www.cbonds.ru).

19. **Another indication that liquidity is at comfortable level is that the average interest coverage ratio of the firms in the sample is fairly high,**[79] possibly because around 60 percent of them continue to maintain fairly low D/E ratios (less than 50 percent). More generally, liquidity indicators of Russian firms compare favorably with those of other emerging-market companies (Appendix I, Table 1).

20. **While the number of Russian firms participating in international capital markets increased between 2000 and 2003, their average ratios of short-term and foreign currency debt-to-total debt remained broadly unchanged**, with the average D/E ratio below 100 percent and the average foreign debt-to-total debt ratio below 40 percent (Table 3).[80] This is consistent with anecdotal evidence suggesting that many Russian firms

[79] The interest coverage ratio is the ratio of operating income to gross interest expense.

[80] The ratios presented in Table 3 are based on a sample of 23 companies that had outstanding foreign currency bonds and/or syndicated loans at end-2000 or at end-2003.

used their access to international capital markets mainly to extend maturities and/or reduce debt-service costs.[81]

Table 3. Debt Structure of the International Debt Issuers 1/
(In percent; average ratios)

2003						
	All issuers	Regular issuers 2/	New issuers	D/E >100	D/E <100	Oil & Gas Sector
Total debt/book equity	82	42	101	184	35	114
Short-term debt/total debt	40	51	35	47	37	33
Foreign exchange debt/total debt	36	43	33	28	40	34
2000						
	All issuers	Regular issuers 2/		D/E >100	D/E <100	Oil & Gas Sector
Total debt/book equity	98	135	...	694	30	26
Short-term debt/total debt	49	46	...	25	52	51
Foreign exchange debt/total debt	35	24	...	3	38	16

Sources: Bloomberg; Dealogic; and staff estimates.

1/ Foreign exchange debt refers to the outstanding stock of Eurobonds and syndicated loans.
2/ Regular issuers include firms that had outstanding foreign exchange debt both in 2000 and 2003.
3/ New issuers did not have outstanding foreign exchange debt in 2000.

21. **Although average share of foreign currency debt-in-total debt of "regular issuers" increased and appears to have been higher than that of "new issuers," regular issuers do not necessarily face higher exchange rate risk exposure.** This is because most of the regular issuers are oil and gas companies, which generate foreign currency earnings and, therefore, are naturally hedged against foreign currency risk. In addition, more leveraged firms seem to have smaller shares of foreign currency debt than less leveraged firms.

Operating performance and profitability

22. **The operating performance of firms in the sample appears to have deteriorated between 2000 and 2003.** A comparison of several performance indicators (gross profit margin, operating income margin, and net income margin) for 2000 and 2003 suggests that companies across almost all sectors experienced a significant squeeze in profit margins

[81] The foreign currency debt estimates used in Table 3 are based on the firm-level data (provided by Dealogic) on the issuance of Eurobonds and syndicated loans in the international capital markets. These numbers represent the lower-bound estimates of the companies' foreign currency debt stocks because they do not capture all possible foreign currency debt exposures; for example, they do not include foreign currency-denominated bilateral bank loans.

Table 4. Operating Performance
(In percent)

	2000		2003	
	Mean	Median	Mean	Median
Gross profit margin				
All firms	17	15	13	10
Basic materials	20	19	14	12
Energy	31	30	16	14
Manufacturing	11	16	8	8
Communications	27	23	29	28
Utilities	9	9	9	7
Consumer goods	13	10	11	9
Operating income margin				
All firms	15	13	12	9
Basic materials	18	15	15	13
Energy	26	27	15	16
Manufacturing	15	15	6	10
Communications	22	26	24	23
Utilities	6	8	7	7
Consumer goods	11	9	10	7
Net income margin				
All firms	9	6	5	3
Basic materials	11	10	8	6
Energy	19	20	8	7
Manufacturing	7	6	2	2
Communications	14	16	11	10
Utilities	2	2	2	1
Consumer goods	4	2	6	4

Sources: CapitalLogica; Bloomberg; and staff estimates.

(Table 4).[82] For firms in the nontradables sector, the squeeze in profit margins can be attributed to the rising costs of domestic inputs and increased competitive pressures from imports because of real exchange rate appreciation. However, in the case of the energy sector, these explanations are less plausible, since the decline in all performance indicators was particularly dramatic (50–60 percent) during the period when output and exports continued to expand on the back of rising oil prices. It is, therefore, more likely that at least some of the balance sheet performance deterioration can be attributed to the increased incidence of transfer pricing.

[82] For detailed definitions, see Appendix I.

23. **The profitability indicators** (return on assets (ROA) and return on equity (ROE)) **show a deterioration as well** (Table 5). The 2003 average ROA was higher only in the utilities and consumer goods sector, while the 2003 average ROE exceeded the 2000 level only in the communications sector. Compared with other emerging-market companies, Russian firms seem to have been average performers, based on the median ROAs, and better-than-average performers, based on their operating margins.

Table 5. Profitability
(In percent)

	2000		2003	
	Mean	Median	Mean	Median
Return on Assets (ROA)				
All firms	9.0	5.2	6.0	4.9
Basic materials	13.9	11.8	10.1	8.8
Energy	19.3	18.5	6.6	7.1
Manufacturing	7.5	4.8	4.4	5.1
Communications	10.3	8.9	8.6	7.3
Utilities	1.2	1.2	1.4	1.5
Consumer goods	7.2	6.7	7.7	6.7
Return on Equity (ROE)				
All firms	17.8	10.9	8.8	4.6
Basic materials	27.8	29.2	16.5	14.5
Energy	36.5	31.0	12.2	11.6
Manufacturing	16.9	10.7	1.6	3.9
Communications	12.9	11.2	13.4	11.3
Utilities	1.2	1.8	0.7	0.8
Consumer goods	20.1	22.9	13.6	6.7

Sources: CapitalLogica; Bloomberg; and staff estimates.

Bankruptcy risk

24. **The risk of bankruptcy (default) is typically estimated using one of two methods**: **the traditional financial ratios analysis and the contingent claims approach**. The financial ratios approach consists of calculating several key financial indicators that can then be drawn together in one score, which provides a snapshot of the firm's financial health, as for instance, in the case of the Altman's Z-score.[83] The contingent claims approach uses the well-known Black-Scholes-Merton (BSM) option-pricing methodology for computing the

[83] The Altman's Z-score specification used in this paper was developed specifically for emerging market corporates (Altman, 2000). See Appendix I, for details.

probability of default using historical prices of the firm's traded shares and book values of debt.[84]

25. **The financial ratios approach suggests that the overall financial health of the firms in the sample was broadly stable between 2000 and 2003.** Based on the average and median Z-scores, the basic materials, utilities, and consumer goods sectors showed some improvement, while the manufacturing, energy, and communications sectors experienced some deterioration (Appendix II, Figure 1). In the cases where Z-scores increased, the improvement was achieved because the decline in profitability indicators was offset by the increase in the working capital-to-total assets ratio. The latter is consistent with the improvement in liquidity indicators discussed above. [85]

26. **The reduction in default probabilities computed using the BSM approach was more uniform across sectors than the improvement in Z-scores.** This decline was mainly driven by the sharp rise in share prices and/or decline in share price volatility, and only in a few cases—by the decline in the debt-to-market value ratios. Appendix II, Figure 5 presents the probabilities of default, computed for a subset of publicly traded firms, which had sufficiently liquid shares (or ADRs) traded throughout 1998–2004.[86] Consistent with the Z-scores, the probabilities of default of manufacturing firms appear to be higher than those of the firms in the energy or utilities sectors. For almost all firms in the energy sector, the current level of default probabilities is significantly lower than that of two–three years ago. The only "special case" is Yukos, whose probability of default rose rapidly during the second half of 2004 ahead of its default on a $1 billion syndicated loan on December 27, 2004.

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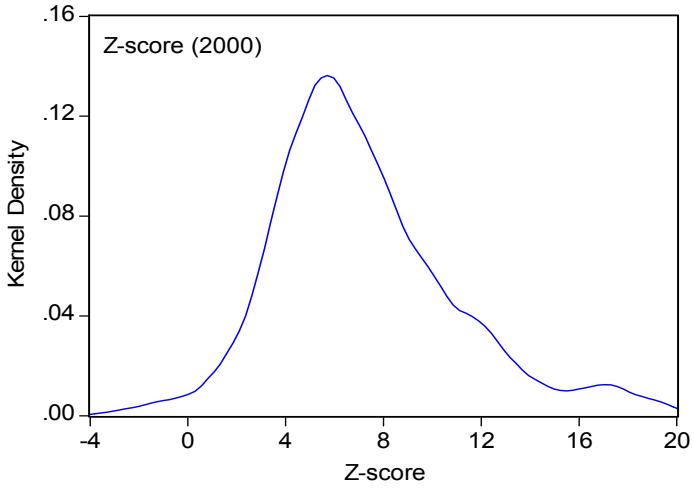
[84] The BSM method is based on the assumption that the equity value of a firm can be viewed as a European call option on the firm's assets, with the debt value as a strike price. The "distance to default" can therefore be calculated using the standard option-pricing equations and interpreted as the number of standard deviations of asset growth by which the market value of assets exceeds its liabilities. For more details on computation methodology used in this paper, which is a variation of the BSM technique, see Appendix I.

[85] Interestingly, some of the commonly used bankruptcy indicators in the traditional system of accounting and financial analysis in Russia are based on a comparison of the firms' liquidity indicators with "normative" values.

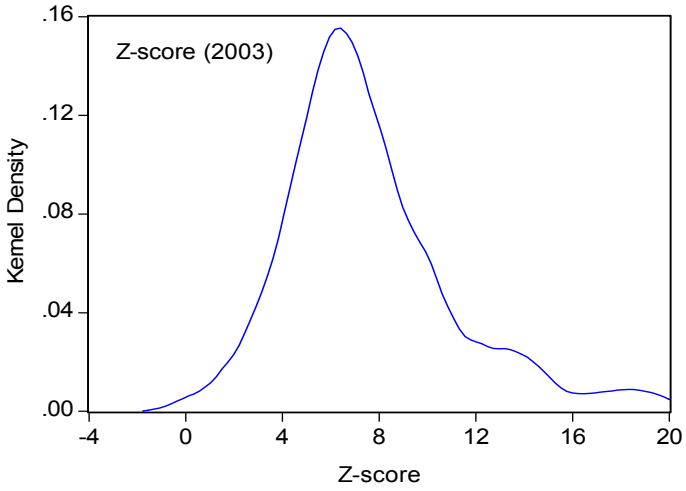
[86] The estimated default probabilities may have a downward bias, when free-float or secondary market liquidity and, therefore, equity price volatilities are too low.

Figure 1: Altman's Z-score



2000

	Mean	Median
All firms	7.2	6.6
Basic materials	7.9	7.5
Energy	8.3	7.1
Manufacturing	7.2	6.1
Communications	7.7	7.5
Utilities	6.5	5.5
Consumer goods	5.9	5.9



2003

	Mean	Median
All firms	7.6	6.9
Basic materials	8.2	7.2
Energy	6.8	6.4
Manufacturing	5.8	5.5
Communications	6.4	6.2
Utilities	9.4	8.2
Consumer goods	6.7	6.2

Sources: CapitalLogica, Bloomberg and Staff Estimates

D. Stress Testing

27. **This section attempts to assess the sensitivity of the Russian corporate sector to a number of adverse shocks affecting the availability and/or cost of external funding.** These shocks include sharp increases in (foreign) interest and exchange rates, and a decline in the rollover ratio of short-term debt. Using a sample of 23 companies[87] that had outstanding foreign currency-denominated debt at the end of 2003, two types of tests were performed:

[87] Same sample as the one described in footnote 15. The total accounting capital and total debt of the firms in the sample are equivalent to 23 percent of GDP and 10 percent of GDP, respectively.

- **Solvency test**. For each company, the loss from a shock or a combination of shocks was compared to its end-2003 accounting capital, with "technical insolvency" defined as a loss exceeding accounting capital.

- **Liquidity test**. For each company, the loss from a shock or a combination of shocks was compared to the estimated cash flow (net profit) generated by the firm during 2004 (based on the firm's preliminary assessments). A company was considered illiquid if the cash flow generated in 2004 was insufficient to cover the losses from the shocks, as well as the maturing debt obligations that it was assumed to have been unable to roll over.

28. **Exchange rate shocks were calibrated using historical data, while interest rate shocks were based on the "reasonable ranges" approach**. The exchange rate shock was modeled as a standard deviation of percent changes (annualized) of the monthly ruble-dollar exchange rate levels for the period 1999–2003. Interest rate shocks were modeled as 100-300 basis point increases in the U.S. LIBOR (three-month) rate, given that a large part of the outstanding foreign currency-denominated debt of the companies in the sample is in the form of syndicated loans, with the interest payments linked to the dollar LIBOR rate. The short-term debt rollover scenarios considered in this exercise included possible reductions in the rollover ratios of up to 20 percent.

29. **The stress tests presented in Table 6 suggest that Russian firms should be able to withstand significant adverse developments in the exchange and interest rates, as long as the short-term debt rollover does not fall below 50 percent**. Two firms (including Yukos), which account for about 10 percent of the total capital of all firms in the sample, were effectively illiquid even in the absence of any shocks, as these firms (tentatively) reported losses for the first nine months of 2004. The likelihood of a reduction in the rollover rate is difficult to assess without knowing the exact composition of the firms' short-term debt. Such an event could be related to banking sector problems or to a sudden decline in the foreign creditors' appetite for Russian bonds.

30. **Stress tests also point to a high concentration of risk**. Owing to the high production concentration in the Russian industry, the technical insolvency or illiquidity of a small number of firms could have significant implications for the sector or for the economy as a whole.

31. **Vulnerabilities may have increased during 2004**. For instance, given the relatively large amount of the foreign currency-denominated syndicated loans maturing in 2005 (see figure following paragraph 10), debt rollover risks may have increased. In addition, a big part of international debt issuance in 2004 was in the form of interest rate–sensitive instruments, which, combined with rising global interest rates, implies higher interest rate risk exposure. Therefore, it may be useful to conduct similar stress tests using the end-2004 data (whenever these data become available).

Table 6. Corporate Sector Stress Tests

	Solvency Tests			Liquidity Tests		
	Number of Firms technically insolvent	Total Accounting Capital of insolvent firms (in percent of sample)	Total Debt of insolvent firms (in percent of sample)	Number of Firms illiquid	Total Accounting Capital of illiquid firms (in percent of sample)	Total Debt of illiquid firms (in percent of sample)
Exchange Rate Shock (1 STD)	0	0	0	3	10	22
and Interest rate shock (100 bps)	0	0	0	4	13	28
and Interest rate shock (300 bps)	0	0	0	4	13	28
Exchange Rate Shock (2 STDs)	0	0	0	4	13	28
and Interest rate shock (100 bps)	0	0	0	4	13	28
and Interest rate shock (300 bps)	0	0	0	4	13	28
Exchange Rate Shock (2 STDs) and Interest rate shock (300 bps)						
and rollover rate at 80 percent	0	0	0	5	13	29
and rollover rate at 60 percent	0	0	0	5	13	29
and rollover rate at 40 percent	2	0.7	7	6	73	70
and rollover rate at 20 percent	2	0.7	7	7	74	72

Sources: CapitalLogica; Bloomberg; Dealogic; and staff estimates.

E. Conclusions

32. **The Russian corporate sector is highly concentrated, with access to capital markets and bank financing available only to top-tier corporates**, **while the majority of medium-sized and small firms continue to rely primarily on internally generated funds**. The relaxation of credit constraints for these firms, which is an important pre-condition for sustainable growth, remains a challenge.

33. **The average leverage of firms in the sample has increased, though it does not appear to be excessive, while the share of short-term debt in total debt has declined.** Liquidity indicators appear to be at comfortable levels. While the number of international capital market participants rose between 2000 and 2003, the average foreign currency debt-to-total debt ratio appears to have been stable. Many of the firms, which significantly increased their foreign exchange exposures between 2000 and 2003, were exporters from the natural resource sector. More recently, however, some nontradables sector firms (e.g., from the communications sector) have begun to tap into international debt markets as well, taking on unhedged and often interest rate–sensitive foreign exposures.

34. **The overall financial health of firms in the sample appears to have been broadly stable between 2000 and 2003**. The basic materials, utilities and consumer goods sectors

showed some improvement, and the manufacturing, energy and communications sectors experienced some deterioration. At the same time, the estimated default probabilities for a subset of publicly traded firms show a considerable reduction in credit risk.

35. **One important caveat is related to the quality of financial statements**. For the majority of firms in the sample, the only available accounting data are financial statements compiled in accordance with the Russian accounting standards (RAS); in some cases, information is reported on an unconsolidated basis. Recognizing this problem, the government is taking steps to improve financial accounting and reporting by nonfinancial firms. In 2004, the Duma considered (in the second reading) the draft of the new federal law On Consolidated Financial Reporting. Also, in July 2004, the ministry of finance adopted a new medium-term program aimed at improving the accounting framework and financial reporting in Russia.

36. **The simple stress tests presented in the paper suggest that the balance sheets of foreign borrowers are relatively robust to a combination of adverse shocks affecting the availability and/or cost of external funding, but also point to a high concentration of risk.** The tests indicate that the risk of liquidity difficulties could become significant (systemic) if, in addition to adverse shocks to the exchange rate and (foreign) interest rates, short-term debt rollover ratios were to fall below 50 percent.

37. **Despite the relatively benign picture that emerges from the analysis of the end-2003 accounting data, some corporate sector vulnerabilities remain, and may have increased, during 2004**. In particular, the issuance of interest rate–sensitive (gross) debt by Russian firms in the international capital markets has continued to rise, along with the increase in leverage. Going forward, other factors, such as an economic slowdown and/or a sharp decline in oil price, may affect the profitability and credit quality of Russian companies as well.

Definitions and Methodology

Definitions of financial ratios

Leverage (D/E) = $\frac{Short\text{-}Term\ and\ Long\text{-}Term\ Borrowing}{Book\ Value\ of\ Shareholders'\ Equity}$.

Current ratio = $\frac{Current\ Assets}{Current\ Liabilities}$.

Quick ratio = $\frac{Current\ Assets - Inventories}{Current\ Liabilities}$.

Interest coverage ratio = $\frac{Operating\ Income}{Gross\ Interest\ Expense}$.

Gross profit margin (GPM) = $\frac{Ordinary\ Income}{Net\ Sales}$, where *Ordinary Income* = net sales of goods, products, work, services (minus VAT, excise duties and similar obligatory payments) —cost of goods, products, work, services sold—selling & administrative Expenses;

Operating income margin (OIM) = $\frac{Operating\ Income}{Net\ Sales}$, where *Operating Income (EBIT)* = ordinary Income + other operating income, where *non-operating gains* include dividend and interest income, profits on sale of fixed assets/investments, foreign currency gains, share of associates' net profits; *nonoperating expenses* include interest expenses, finance charges, borrowing costs, loss on sales of fixed assets/investments, foreign currency losses, and share of associates net losses.

Net profit margin (NPM) = $\frac{Net\ Income}{Net\ Sales}$, where *Net Income* is operating income adjusted for tax payments and extraordinary income/expenses.

Return on assets (ROA) = $\frac{Net\ Income\ +\ Interest\ Payable}{Total\ Assets}$.

Return on equity (ROE) = $\frac{Net\ Income}{Equity}$.

Altman's Z-score (Z) is computed using the methodology described in Altman (2000) for emerging market firms, namely Z = 3.25+ 6.56 (X1) + 3.26 (X2) + 6.72 (X3) + 1.05 (X4),

where X1 = working capital/total assets; X2 = retained earnings/total assets, X3 = earnings before interest and taxes/total assets, and X4 = book value of equity/book value of total liabilities.

Probability of default computation methodology

The default probabilities presented in Appendix II, Figure 1 are computed using the methodology developed by CreditGrades (see http://www.creditgrades.com/)

The annualized probability of default at date *t*, for a maturity of *T* is: $p_t(T) = -1/T \ln(X_t(T))$, where $X_t(T)$ is defined as

$$X_t(T) = N\left[\frac{-A_T}{2} + \frac{\ln(d)}{A_T}\right] - dN\left[\frac{-A_T}{2} - \frac{\ln(d)}{A_T}\right]$$

and A_T and d are defined as

$$A_T^2 = \left(\sigma_s \frac{S_t}{S_t + \bar{L} \cdot D_t}\right)^2 T + \lambda^2 \quad \text{and} \quad d = \frac{S_t + \bar{L} \cdot D_t}{\bar{L} \cdot D_t} e^{\lambda^2},$$

where

$N[.]$ is the cumulative normal distribution function;

S_t is the share price at time *t*;

σ_s is the annualized standard deviation of log returns, ln (S_t/S_{t-1}), calculated using historical daily time series with a 1000-day moving window;

D is the financial debt-per-share, where financial debt = (short-term borrowing + long-term borrowing + 0.5* (other short-term liabilities + other long-term liabilities);

T is the term to maturity, which is chosen to be $T = 5$;

$\bar{L}$ is the mean global recovery rate, where $\bar{L} = 0.5$; and

λ is the percentage standard deviation of the global recovery rate *L*, where $\lambda = 0.3$.

Note: $\bar{L}$ and λ are estimated using actual recovery data for approximately 300 nonfinancial U.S. firms that defaulted during 1987–97. The default probabilities computed for the sample of Russian firms do not appear to be sensitive to changes in these parameters. There is no history of corporate defaults in Russia.

Sample Description

The sample contains around 200 firms representing the following sectors:

- *basic materials* (chemicals, forest products & paper, iron/steel and mining);
- *energy* (oil & gas products, pipelines, coal);
- *manufacturing* (building materials, electronic components/equipment, electronics, engineering/construction, hand/machine tools, machine construction, machinery, hardware, packaging and containers, shipbuilding, transportation);
- *communications* (telecommunications);
- *utilities* (electric); and
- *consumer goods* (airlines, apparel/textiles, auto manufacturers, food service, retail).

Sector	Code	Firms in the Sample (in % of total)	Total Assets of Firms in the Sample (in % of total)	Fixed Assets of Firms in the Sample in % of Fixed Assets of the Sector
Basic materials	S1	21	12	23.3
Energy	S2	15	61	98.1
Manufacturing	S3	16	3	3.9
Communications	S4	9	6	56.1
Utilities	S5	26	15	26.5
Consumer goods	S6	14	4	4.4

Note: for the consumer sector, the comparison of the fixed asset size of the firms in the sample with the total fixed-asset size of the firms in the industry is based on three subsectors (apparel/textiles, food service, retail). Also, there are differences in the classification of some metallurgical and manufacturing firms in different sources.

Table 1: Key Financial Ratios (Median Values): Cross-Country Comparisons 1/

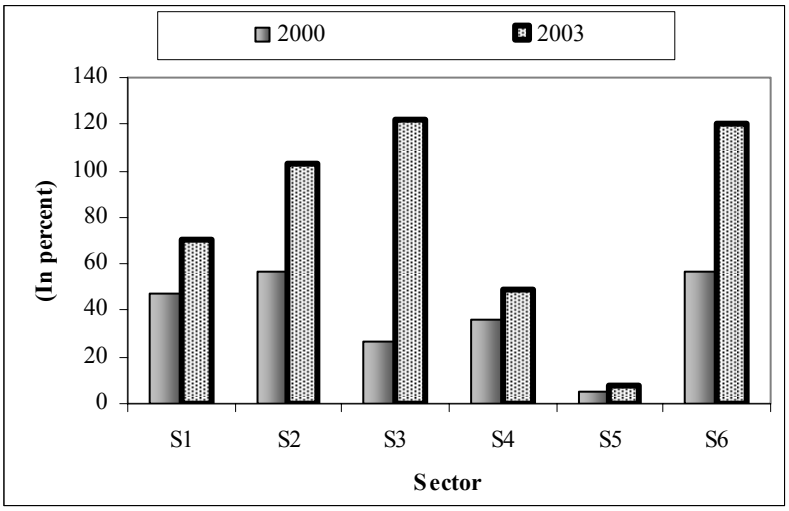
	Operating income margin				Return on assets				Debt/equity ratio			
COUNTRY	2000	2001	2002	2003	2000	2001	2002	2003	2000	2001	2002	2003
Emerging Market Countries												
ARGENTINA	6.4	6.7	2.0	8.3	2.6	1.6	-3.7	4.8	63.7	68.9	62.6	44.3
BRAZIL	10.7	9.6	8.9	10.4	6.4	7.5	7.5	7.4	51.8	57.3	61.6	67.6
CHILE	9.6	10.8	11.4	11.2	5.4	4.4	4.7	5.4	40.5	38.1	34.4	33.9
CHINA	7.6	6.5	8.0	7.1	4.9	3.8	4.3	3.9	48.0	53.3	48.6	57.1
COLOMBIA	14.9	11.3	16.7	29.3	2.9	4.3	6.5	4.5	7.9	16.1	17.4	15.5
CZECH REPUBLIC	3.3	2.6	3.0	8.3	4.5	4.4	4.5	2.7	16.8	10.5	10.1	17.9
HUNGARY	4.9	3.4	2.0	4.4	7.7	5.3	5.3	5.2	28.0	18.7	16.0	23.7
INDIA	10.7	9.9	8.6	9.5	8.2	7.9	6.9	7.4	61.5	56.7	53.4	60.1
INDONESIA	9.8	6.7	4.2	4.7	1.8	3.9	5.5	4.1	36.8	29.5	37.1	45.6
KOREA (SOUTH)	6.2	5.3	5.5	5.4	4.5	3.9	4.7	3.9	60.8	63.0	56.2	36.2
MALAYSIA	6.8	4.9	5.2	6.1	2.6	2.4	2.7	3.3	31.7	29.9	31.9	31.6
MEXICO	9.6	6.4	8.2	7.6	6.7	4.9	3.5	4.1	45.0	45.6	45.0	50.2
PHILIPPINES	4.4	4.0	4.0	5.3	1.2	0.7	0.8	1.5	28.6	16.5	15.8	17.8
POLAND	1.9	0.2	1.5	2.6	5.4	3.4	2.9	4.0	21.0	15.6	22.0	27.3
RUSSIA	13.0	...	...	9.0	5.2	...	...	4.9	10.0	...	...	29.0
SOUTH AFRICA	6.7	5.3	5.9	5.2	8.9	7.6	7.6	7.8	28.3	28.1	29.6	25.0
TAIWAN Province of China	5.8	3.7	6.0	5.8	4.3	2.6	3.9	5.0	52.0	51.6	46.5	47.9
THAILAND	5.0	5.4	5.8	8.6	5.1	5.5	6.4	7.6	54.8	47.8	37.8	29.1
TURKEY	7.7	11.8	8.4	2.7	13.1	19.0	12.9	7.7	44.4	52.1	29.8	22.9
Developed Countries												
FRANCE	5.0	4.1	3.6	4.1	5.1	4.1	3.1	2.7	49.3	55.7	52.5	62.3
GERMANY	0.4	-0.4	-0.8	1.9	3.4	1.9	0.9	1.8	23.6	31.5	35.4	31.5
HONG KONG SAR	2.9	2.0	1.1	2.0	3.3	2.3	1.4	2.4	19.6	21.1	16.2	18.0
JAPAN	3.7	4.0	3.0	3.6	1.7	1.6	1.3	1.7	56.5	53.8	51.2	49.2
SINGAPORE	6.0	3.3	3.2	4.1	3.7	2.0	2.5	3.9	34.9	32.3	29.8	27.6
UNITED KINGDOM	5.6	3.8	3.1	3.6	5.4	2.9	1.6	2.5	24.0	23.8	24.3	19.9
UNITED STATES	1.7	0.3	1.8	2.6	1.4	0.8	1.0	1.4	14.8	10.7	10.6	10.1

	Short-Term debt/total debt				Current ratio				Quick ratio			
COUNTRY	2000	2001	2002	2003	2000	2001	2002	2003	2000	2001	2002	2003
Emerging Market Countries												
ARGENTINA	46.1	56.4	58.8	45.8	1.0	1.0	1.2	1.2	0.7	0.6	0.8	0.6
BRAZIL	46.6	46.9	51.8	48.1	1.2	1.1	1.1	1.3	0.9	0.8	0.8	0.9
CHILE	46.5	44.2	47.0	34.4	1.4	1.4	1.4	1.4	0.9	0.9	1.0	1.0
CHINA	89.6	87.6	91.1	89.6	1.3	1.3	1.2	1.2	0.9	0.9	0.8	0.7
COLOMBIA	33.1	39.1	57.0	32.3	2.3	2.3	1.9	2.1	1.5	1.4	1.1	1.3
CZECH REPUBLIC	47.8	63.2	52.1	32.5	1.1	1.0	1.1	0.6	0.7	0.6	0.7	2.3
HUNGARY	50.0	71.7	67.0	50.9	1.5	1.4	1.3	1.2	0.9	0.8	0.7	1.1
INDIA	32.4	34.1	33.5	34.8	1.5	1.5	1.4	1.3	0.9	0.9	0.8	0.7
INDONESIA	66.0	68.0	59.4	45.7	1.3	1.3	1.5	1.7	0.7	0.7	0.8	0.7
KOREA (SOUTH)	58.4	60.6	63.4	69.8	1.3	1.3	1.3	1.5	0.8	0.9	0.9	1.0
MALAYSIA	82.2	77.9	75.9	75.1	1.4	1.4	1.5	1.6	0.9	1.0	1.0	1.1
MEXICO	37.7	32.6	25.2	28.4	1.4	1.2	1.4	1.5	0.8	0.8	0.9	1.0
PHILIPPINES	56.7	62.6	46.6	44.8	1.2	1.2	1.4	1.4	0.7	0.9	0.8	1.0
POLAND	55.1	54.4	62.1	50.7	1.3	1.2	1.2	1.3	0.9	0.9	0.8	0.9
RUSSIA	89.0	...	...	55.0	1.2	...	...	1.6	0.9	...	...	1.2
SOUTH AFRICA	52.5	53.6	50.8	49.5	1.4	1.4	1.4	1.4	1.0	0.9	1.0	0.9
TAIWAN Province of China	68.9	61.0	60.2	55.2	1.5	1.5	1.6	1.6	0.9	0.9	1.0	1.1
THAILAND	71.9	60.6	61.2	65.8	1.2	1.4	1.4	1.4	0.7	0.8	0.8	0.8
TURKEY	78.5	80.6	78.4	75.7	1.4	1.4	1.4	1.7	1.0	0.9	0.9	1.4
Developed Countries												
FRANCE	47.9	46.6	46.0	40.7	1.4	1.4	1.3	1.3	1.0	1.0	1.0	1.0
GERMANY	53.8	48.0	45.9	39.1	1.9	1.7	1.7	1.9	1.2	1.0	1.0	1.2
HONG KONG SAR	77.9	77.5	74.7	75.0	1.6	1.7	1.8	1.8	1.2	1.3	1.4	1.4
JAPAN	60.6	61.8	62.7	61.7	1.4	1.3	1.4	1.4	1.0	1.0	1.0	1.0
SINGAPORE	65.9	67.5	63.4	64.3	1.5	1.5	1.6	1.6	1.1	1.0	1.1	1.2
UNITED KINGDOM	43.6	44.0	42.4	36.6	1.4	1.4	1.3	1.3	0.9	0.9	0.9	0.9
UNITED STATES	29.7	28.8	25.4	22.0	1.8	1.6	1.6	1.7	1.1	1.0	1.0	1.1

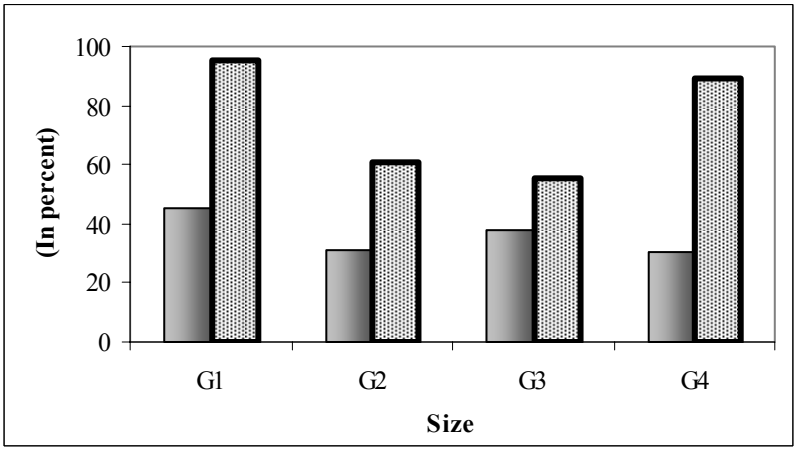
Sources: Worldscope; and staff estimates (for Russia).

1/ Nonfinancial firms only. All ratios are in percent, except current ratio and quick ratio.

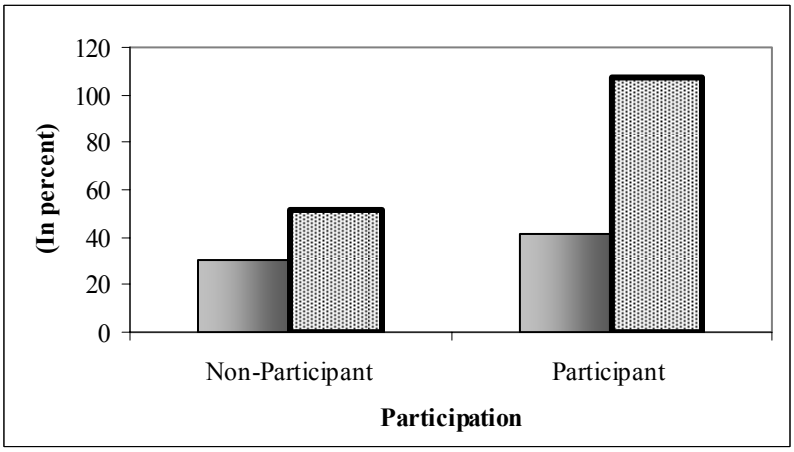
Figure 1. Total Debt in Percent of Equity (Cross-Section Means)



S1 = Basic materials
S2 = Energy
S3 = Manufacturing
S4 = Communications
S5 = Utilities
S6 = Consumer goods



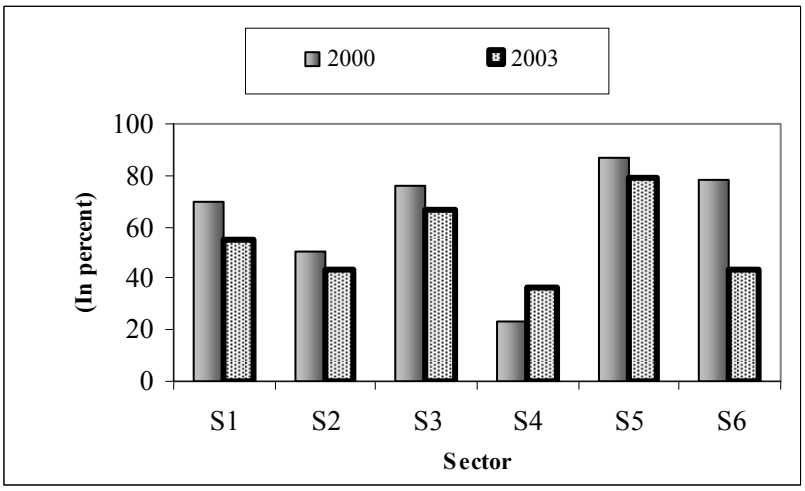
G1 = TA >50 billion
G2 = 10 billion< TA <50bn
G3 = 5 billion< TA <10bn
G4 = TA < 5bn
TA = Total Assets in Rubles



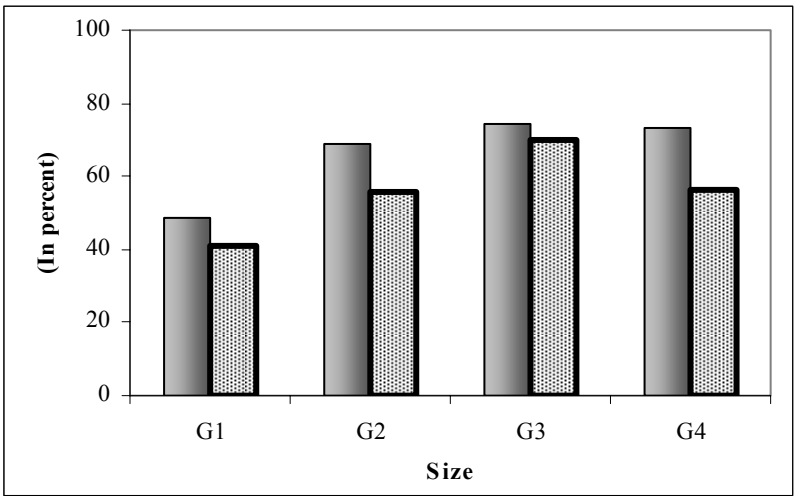
"Participant" =
has outstanding ruble-denominated bonds as of end-2003.

"Nonparticipant" =
does not have outstanding ruble-denominated bonds as of end-2003.

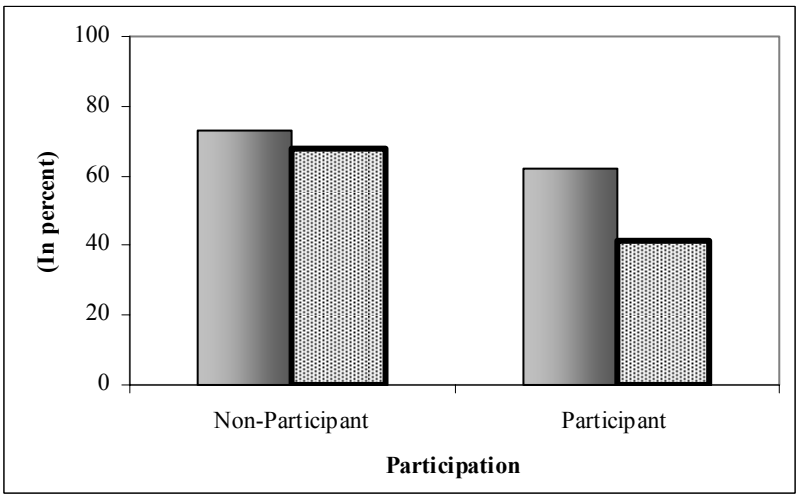
Figure 2. Short-term Debt in Percent of Total Debt (Cross-Section Means)



S1 = Basic materials
S2 = Energy
S3 = Manufacturing
S4 = Communications
S5 = Utilities
S6 = Consumer goods



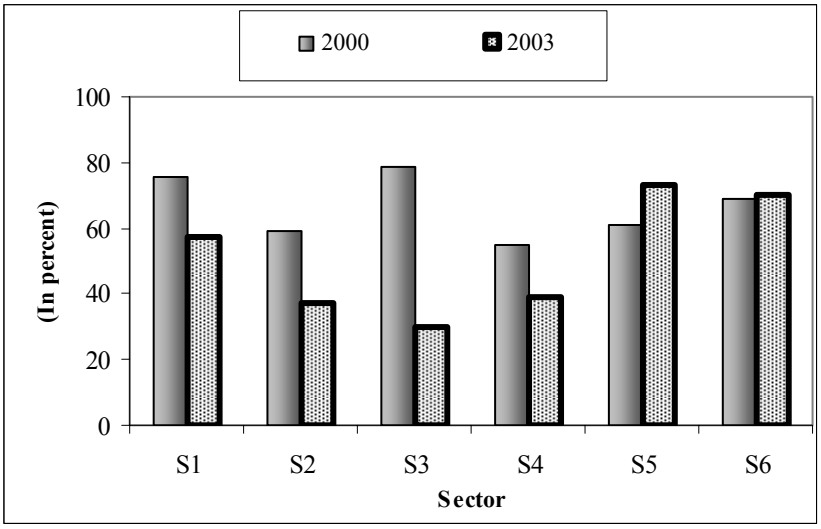
G1 = TA >50 billion
G2 = 10 billion< TA <50bn
G3 = 5 billion< TA <10bn
G4 = TA < 5bn
TA = Total Assets
in Rubles



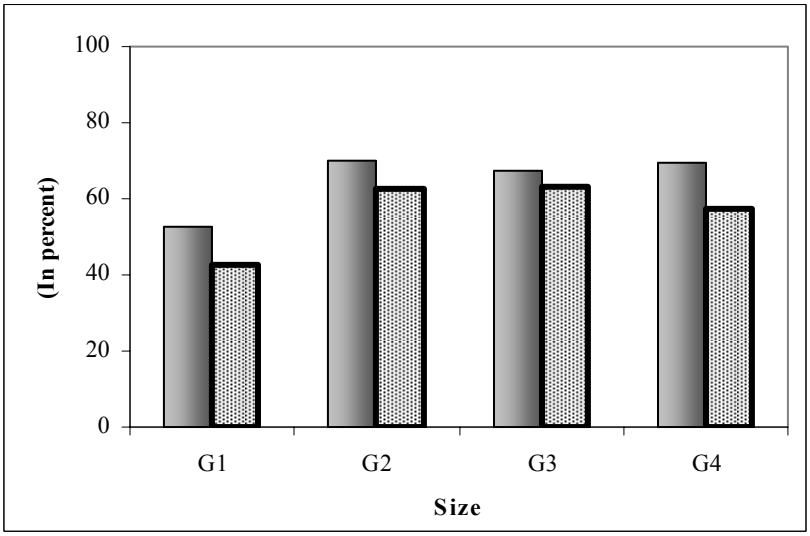
"Participant" =
has outstanding ruble-denominated bonds as of end-2003.

"Nonparticipant" =
does not have outstanding ruble-denominated bonds as of end-2003.

Figure 3. Bank Credit in Percent of Total Debt (Cross-Section Means)



S1 = Basic materials
S2 = Energy
S3 = Manufacturing
S4 = Communications
S5 = Utilities
S6 = Consumer goods

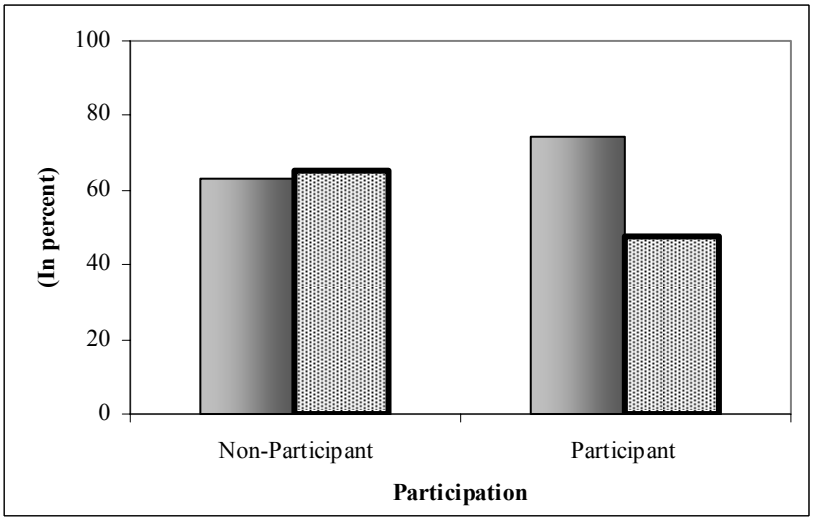


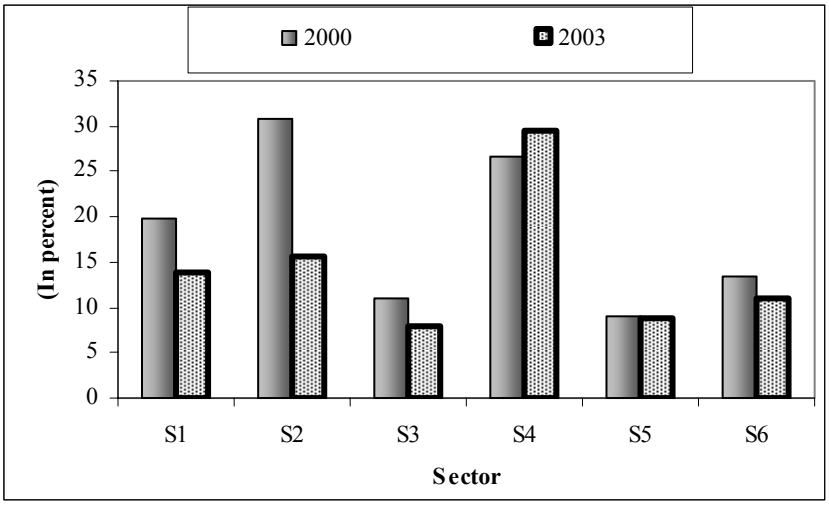
G1 = TA >50 billion
G2 = 10 billion< TA <50bn
G3 = 5 billion< TA <10bn
G4 = TA < 5bn
TA = Total Assets
in Rubles

"Participant" =
has outstanding ruble- denominated bonds as of end-2003.

"Nonparticipant" =
does not have outstanding ruble-denominated bonds as of end-2003.

Figure 4: Gross Profit Margin (Cross-Section Means)





S1 = Basic materials
S2 = Energy
S3 = Manufacturing
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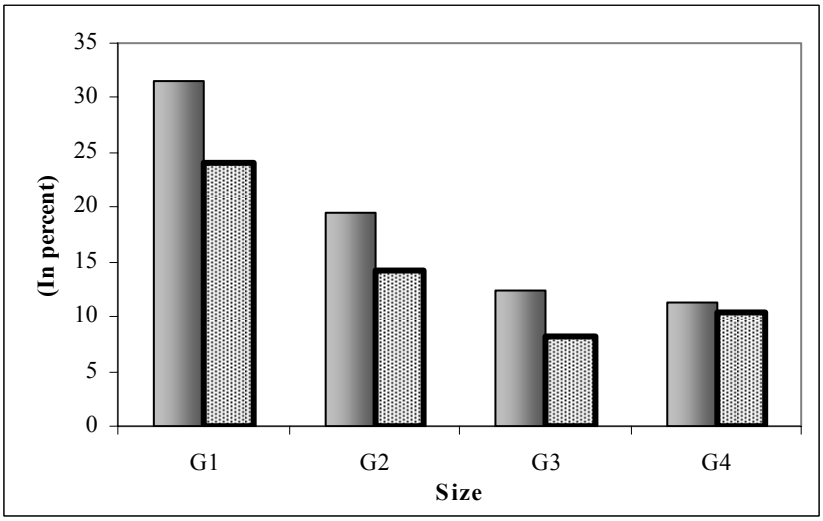
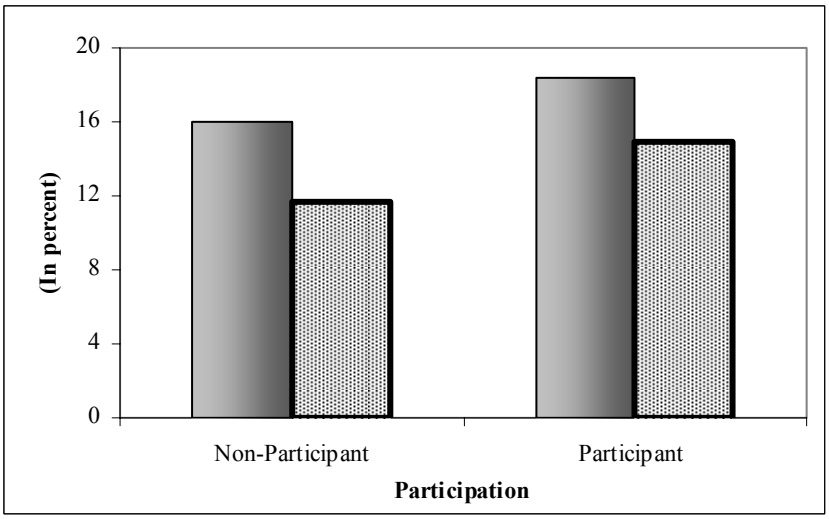
S5 = Utilities
S6 = Consumer goods



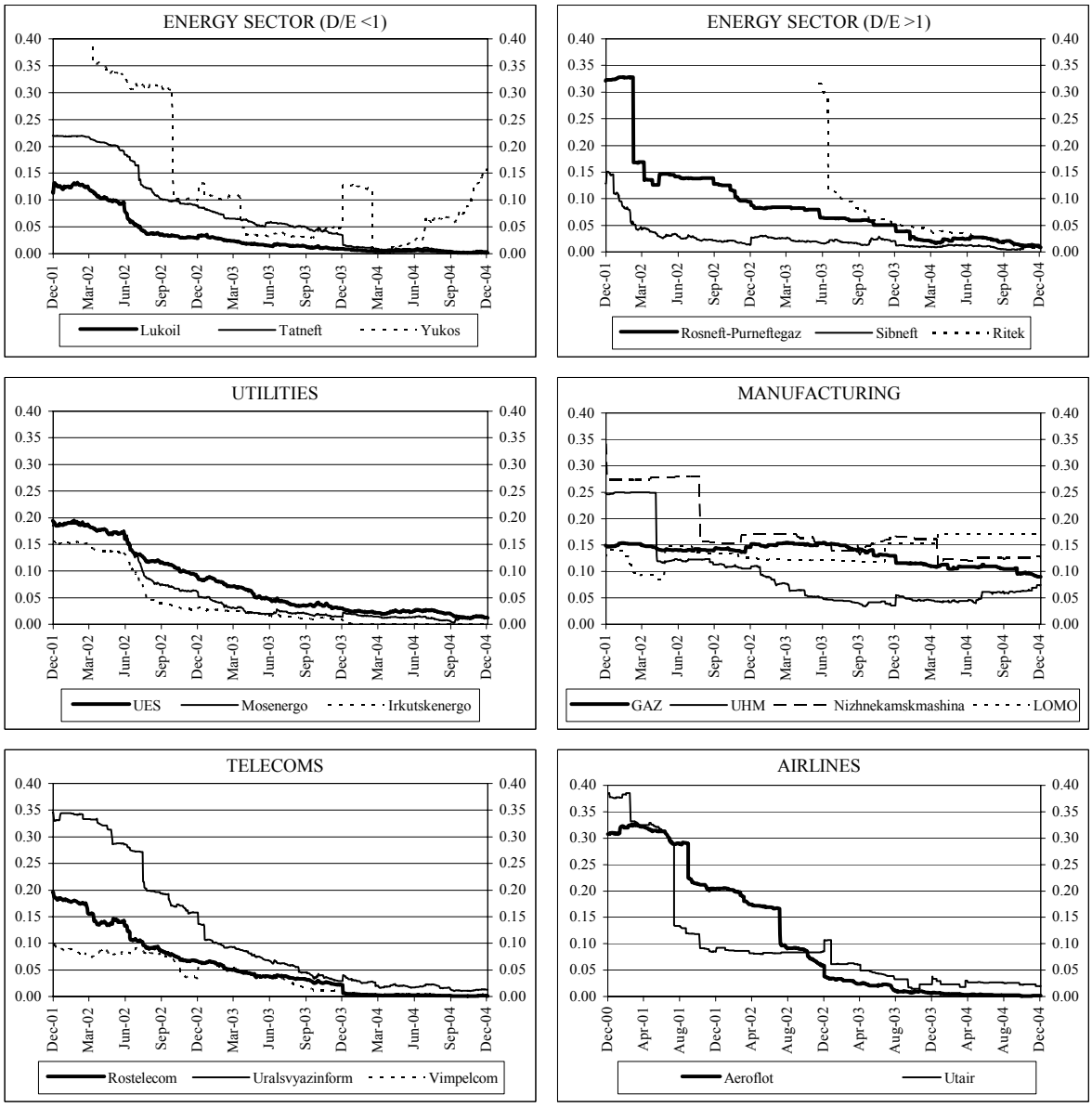
G1 = TA >50 billion
G2 = 10 billion< TA <50bn
G3 = 5 billion< TA <10bn
G4 = TA < 5bn
TA = Total Assets
in Rubles



"Participant" =
has outstanding ruble-denominated bonds as of end-2003.

"Nonparticipant" =
does not have outstanding ruble-denominated bonds as of end-2003.

Figure 5. Default Probabilities, December 2001-December 2004



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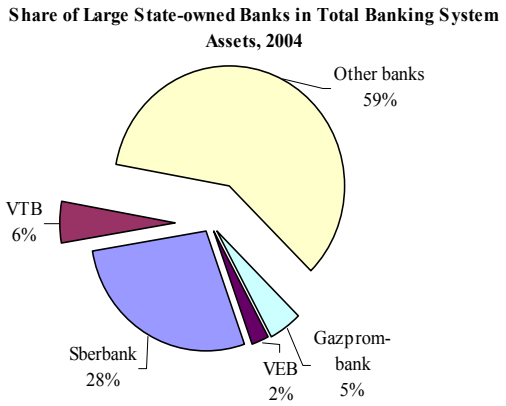
IV. Russian Banking Sector: Recent Developments and Remaining Challenges[88]

A. Introduction

1. **The strong macroeconomic environment continues to underpin banking sector developments**. In 2004, banking sector assets increased by 27 percent, with total credit to the private sector growing by about 47 percent in nominal terms. Credit to households, leading the expansion, increased by 107 percent, reflecting continued robust growth in real incomes. Despite the banking sector turmoil in the summer of 2004, confidence in the banking sector improved with household deposits expanding by 30 percent in 2004. However, in international comparison, the progress in financial sector deepening appears less impressive (Figure 1).

2. **The Russian banking sector continues to operate well below its full potential.** With solid growth rates over the last couple of years, financial sector intermediation has increased; however, it is still low in both absolute and relative terms. Despite strong profitability, robust capital adequacy ratios, and an increase in capital, the banking system is still small with total capital amounting to about 6 percent of GDP at end-2004 (Table 1). The government-controlled banks, led by Sberbank and Vneshtorgbank (VTB), continue to dominate the system (Figure 1).



3. **A number of recent policy measures are expected to give additional momentum to banking system development**. Reforms, such as introducing the Deposit Insurance Scheme (DIS), adopting international financial reporting standards (IFRS), and changing the Bankruptcy Law for Banks, will likely boost competition and increase transparency in the medium term.

[88] Prepared by Peter Lõhmus and Leslie Teo.

Table 1. Russia: Financial Soundness Indicators 1/
(In percent)

	2001	2002	2003	2004	2005 Q1
Capital					
Regulatory capital to risk-weighted assets	20.3	19.1	19.1	17.0	17.6
Regulatory capital to risk-weighted assets (Top 30)	22.0	19.7	16.8	13.2	12.6
Asset quality					
Nonperforming loans to total gross loans	6.2	5.6	5.0	3.8	3.7
Sectoral exposures					
Sectoral distribution of loans to total loans					
Industry	40.1	36.7	33.3	28.0	24.4
Agriculture	1.8	2.2	2.4	2.7	2.9
Construction	4.2	4.4	4.4	4.5	4.3
Trade and public dining	19.6	21.6	20.6	18.8	22.6
Transport and communication	4.5	4.6	5.1	4.8	5
Others	22.5	22.4	22.7	24.9	26.2
Individuals	7.3	8.0	11.5	16.2	14.6
Regions					
Russia	37.9	41.1	54.2	54.0	42.9
U.K.	13.5	23.4	9.0	6.6	8
U.S.	18.9	6.2	8.2	6.7	9.9
Germany	6.0	5.9	2.4	7.2	10.1
Austria	6.4	5.7	6.8	6.1	6
France	2.7	1.5	1.6	3.1	3.3
Italy	2.4	1.6	1.0	1.8	1.1
Others	12.2	14.5	16.8	14.5	18.8
Profitability					
Return on assets	2.4	2.6	2.6	2.9	…
Return on equity	19.4	18.0	17.8	20.3	…
Liquidity					
Liquid assets to total assets	40.8	39.1	36.1	30.3	30.5
Liquid assets to short-term liabilities	87.4	90.6	90.4	78.0	78.4
Market risk					
Net open position in foreign exchange to capital	22.6	18.5	8.4	5.8	5.6
Other FSIs					
Loan loss reserves to total gross loans	6.7	6.3	5.9	5.3	5.1
Large exposures to capital	216.1	228.6	241.0	242.8	233
Interest rate risk to capital	4.0	6.9	9.9	13.3	11
Net open position in equities to capital	5.6	11.7	12.4	12.6	11.9

Source: Central Bank of Russia.

1/ Credit and depository institutions.

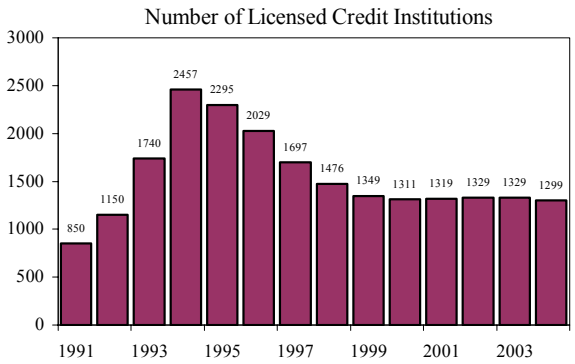
Figure 1. Russia: Features of the Financial System

Small size...

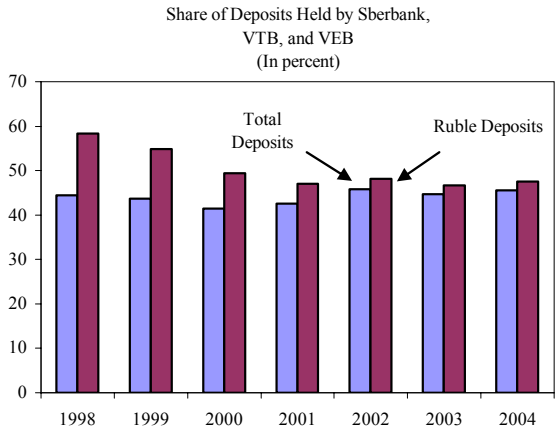
Ratio to GDP, end-2004
(In percent)

	Assets	Deposits	M2	Credit
Belarus	29.6	17.2	20.3	15.5
Czech Rep	89.9	67.0	76.5	35.2
Estonia	104.2	40.5	46.8	48.2
Hungary	71.4	41.4	48.1	47.0
Latvia	120.1	37.1	47.6	53.3
Lithuania	47.1	28.2	36.9	27.2
Poland	53.9	36.8	43.4	28.6
Russia	44.0	24.1	34.3	26.6
Ukraine	43.9	30.3	45.8	31.4

...large number of banks.



But dominated by state banks…



…with many of the larger private banks part of large financial-industrial groups.

Group	Bank
Alfa	Alfa Bank
Interros	Rosbank
Lukoil	Sobinbank, Petrocommerce, Ural-Sib
MDM	MDM Bank
Menatep	Trust & Invesment, KB Menatep
Rosprom	DII Bank

Source: Bankscope, Central Bank of Russia, International Financial Statistics.

B. Earnings, Capital, and Efficiency

4. **Financial soundness indicators remain at healthy levels and were little changed over 2004** (Figure 2 and Table 1). The indicators, which are based on Russian accounting standards (RAS), show that banks are, on average, profitable and have relatively good assets.[89] This should not be surprising given the strong economic performance and the rapid growth in the sector. Capital ratios have moderated in recent years as internal capital generation has failed to keep pace with rapid loan growth. The average risk-weighted capital adequacy ratio, albeit declining from 2003 levels, remained robust at 17 percent as of end-2004. Based on RAS, banks' profitability increased in 2004 after a slight decline in 2003.

5. **The general trends are broadly similar for a smaller subset of banks—the top 30 or so—which produce IFRS-consistent data** (Figures 3–5). On the one hand, equity, assets, and loans have continued to grow at a vigorous pace since the financial crises in 1998. However, banks' profitability has declined as measured by the IFRS, indicating that competition pressures may well be rising. On the other hand, banks have cut marginal costs, leading to improvements in the banking system efficiency ratio. Asset quality has deteriorated slightly, but loan loss reserves have remained adequate.

6. **Increasing competition is expected to compress banks' profits as spreads have narrowed in recent years.** Competition pressures are giving additional impetus for banks to enter new market segments, as evidenced by growth in credit cards, auto loans, and mortgages. While these pressures asset diversification which even kept spreads from narrowing in 2004 have led to more they bring new challenges and risks, particularly given the limited risk-pricing and management abilities. However, with competition weighing particularly on small and medium-sized banks, it remains to be seen how well they can adapt to market volatilities and to the needs of the customers—by pioneering new segments and business lines—without exploiting economies in scale.

7. **Banks are increasingly turning to foreign capital markets to fund their rapid expansion and reduce costs.** During the first four months of 2005, banks issued about US$ 3 billion worth of Eurobonds, mostly with maturities from two to five years, and received syndicated credits for almost US$ 2 billion. While foreign capital has helped banks to diversify their funding base, wholesale capital markets can be volatile and remain poor substitutes for deposit-based funding over the longer term.

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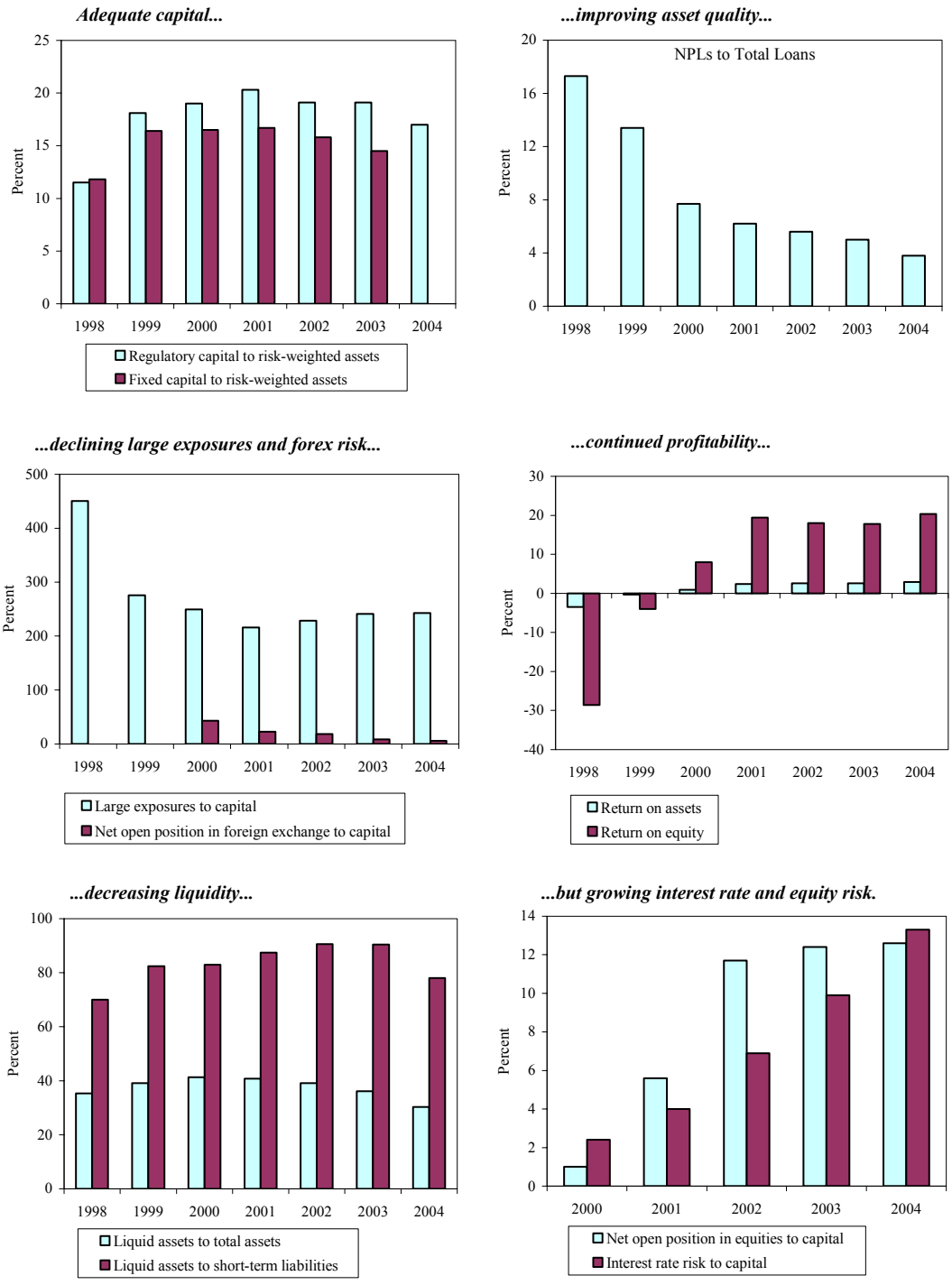
[89] This paper draws mostly on two sets of data: the Central Bank of Russia 2004 aggregated reports (based on RAS) as well as on Bankscope data (based on the IFRS) for 2003 (30 largest banks), and for 2004 (10 largest banks). The weaknesses of RAS data are identified in previous work such as the FSAP and Selected Issues—The Russian Banking System: Recent Developments, 2004.

Figure 2. Russia: Banking Sector Financial Soundness Indicators 1/

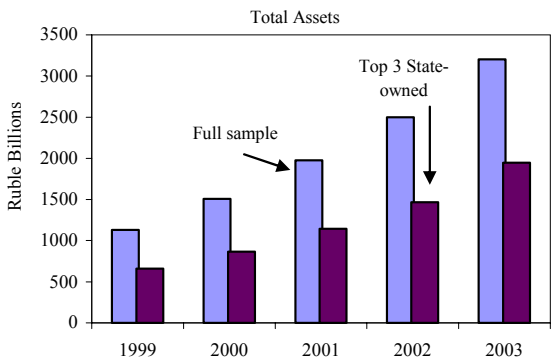


Source: CBR.

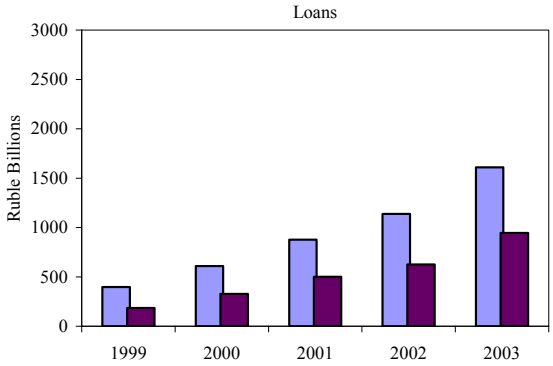
1/ For all credit and depository institutions. Based on Russian Accounting Standards.

Figure 3. Russia: Recent Developments in the Largest Banks 1/

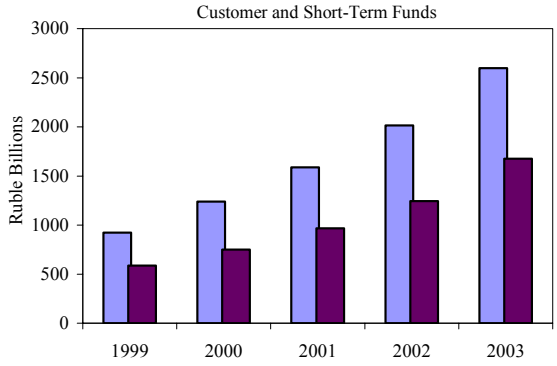
Total assets have grown by around 30 percent per year…



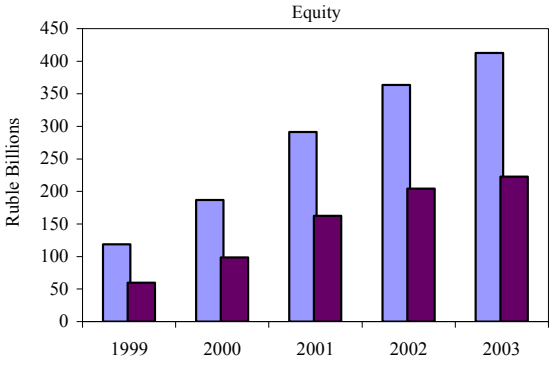
…driven by increases in loans and other earning assets.



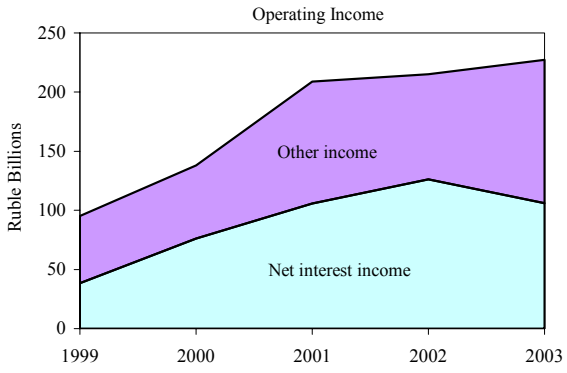
This has been largely funded by customer deposits & other short-term funding…



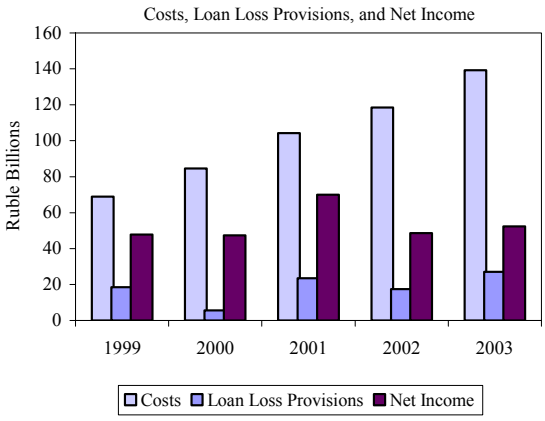
…although equity has also increased.



Operating income has grown by about 50 percent in 1999-2003 before leveling of…



…while net income has remained roughly the same.

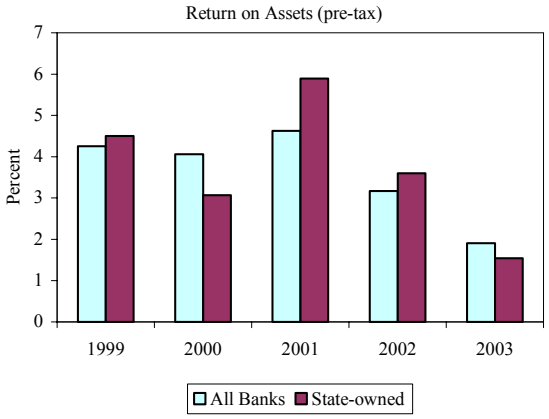


Source: Bankscope

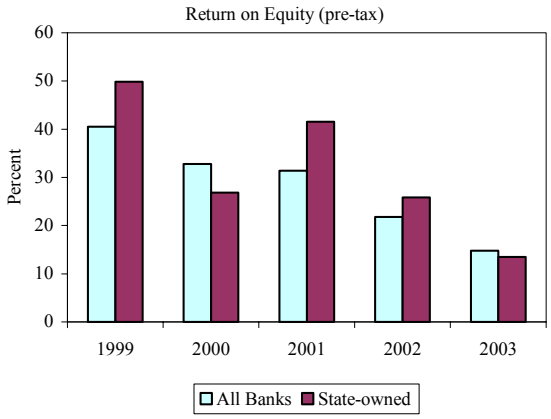
1/ Calculated from the aggregated balance sheets of the top 30 banks that have data over the period. Based on international finacial reporting standards.

Figure 4. Russia: Recent Developments in the Largest Banks (continued) 1/

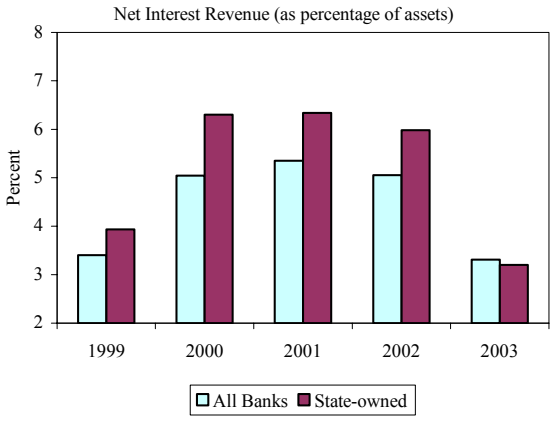
Banks have been profitable, but ROA has started to decline…



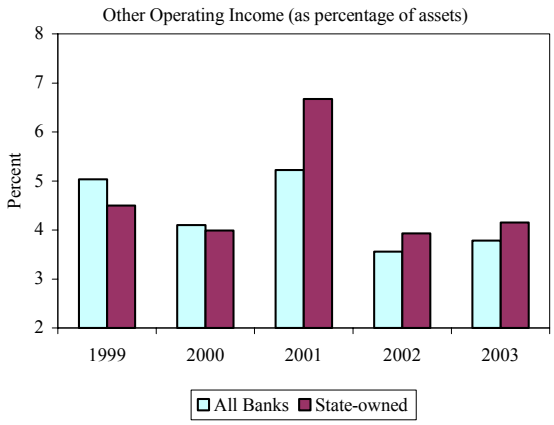
…as is ROE.



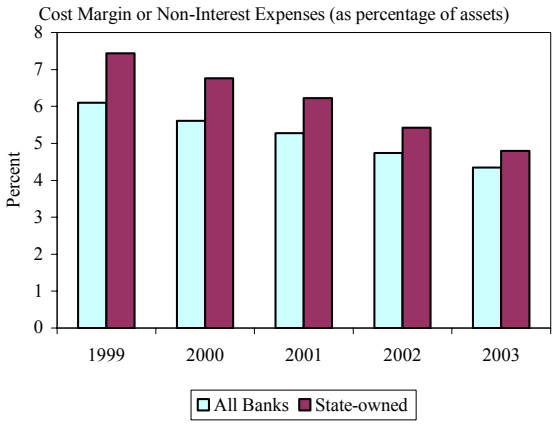
The competition has started to squeeze net interest income...



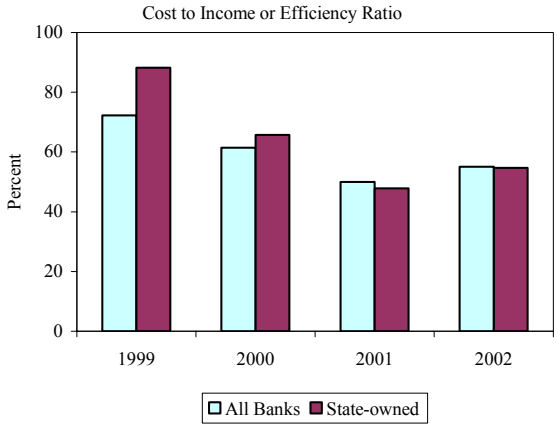
…as other operating income has increased...



…and marginal costs have decreased…



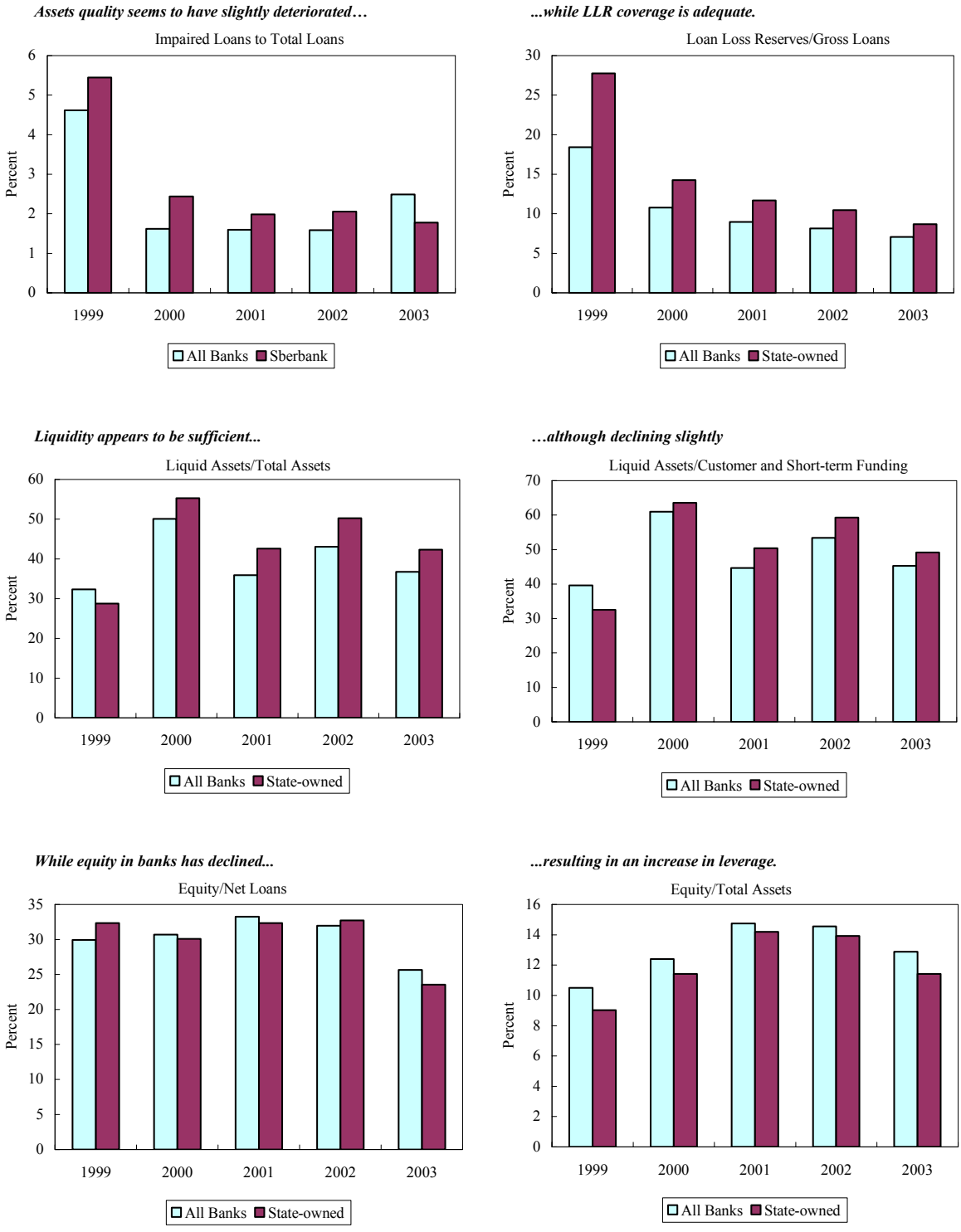
…leading to an improvement in banks' efficiency ratio.



Source: Bankscope

1/ Calculated from the aggregated balance sheets of the top 30 banks that have data over the period. Based on international financial reporting standards.

Figure 5. Russia: Recent Developments in the Largest Banks (continued) 1/



Source: Bankscope

1/ Calculated from the aggregated balance sheets of the top 30 banks that have data over the period.

8. **The overall performance of Russian banks compares favorably with peer banks in terms of common performance indicators** (Table 2). However, data quality and timeliness are issues, and there are significant differences in performance within the group.

Table 2. Russia: Largest Banks in the International Context 1/

Banks	Net Interest Margin	Return on Average Equity (ROAE)	Return on Average Assets (ROAA)	Cost to Income Ratio	Liquid Assets / Customer & Short-term Funding	Loan Loss Reserve / Gross Loans
Min	0.3	0.2	0.0	20.0	16.7	2.0
25th percentile	3.1	4.6	0.9	40.6	28.4	4.5
50th percentile	4.6	14.6	1.7	58.8	36.4	6.2
75th percentile	8.1	22.0	3.3	73.6	51.2	7.9
Max	9.4	35.1	8.8	173.3	89.4	18.4
Average for Transition Peers 2/	3.6	9.9	0.9	68.2	23.3	0.0

Source: Bankscope.

1/ Based on audited 2003 financial statements which were prepared in accordance with the IFRS.
2/ Sample of 22 banks from Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and Slovakia.

C. Banking System Structure

9. **Increasing competition, stronger enforcement of prudential and supervisory requirements, including anti-money laundering/combating the financing of terrorism and the DIS enrollment process have led to a decline in the number of banks.** The number of operating banks decreased from 1,329 to 1,299 in 2004, with 33 licenses being withdrawn by the CBR.[90] However, the system remains fragmented, with several large state-owned or controlled banks, a few larger private banks, about 100 or so medium-sized private banks, and a large number of small private banks.

10. **At the same time, the banking sector has become slightly more concentrated.**[91] The share of the five largest banks by assets increased from 41 percent in 2003 to 43 percent in 2004 (Table 3). However, with the exception of Sberbank and the VTB, no single bank has a share of more than 5 percent of total loans or deposits. Only six other banks have more than a 1 percent share of household deposits. The number of banks that have capital below EUR 5 million (Rub 180 million) continues to be high—close to 700—although they make up only about 5 percent of total banking sector capital.

[90]This includes eight banks out of the largest 200.

[91] This is confirmed by the CBR calculations based on the Herfindahl-Hirschman concentration index. However, the index shows only moderated concentration levels for banking sector assets, capital, and credits, and very high concentration for deposits.

Table 3. Russia: Structure of the Banking System, end-2004
(In percent of total)

	Sberbank	Top 4 state banks 1/	Top 5 banks 2/	Top 30 banks
Assets	28	40	43	66
Credit to the economy	30	38	44	...
Deposits	42	52	54	72
Of which: Household deposits	60	67	68	79
Memorandum items:				
Number of banks	1,299			
Of which: state-owned	6			
Of which: fully foreign-owned	32			

Source: Central Bank of Russia; and Fund staff estimates.

1/ Includes Sberbank and VTB as well as state-controlled Gazprombank (owned by Gazprom Group) and Bank of Moscow (63 percent owned by Moscow government).
2/ In addition, includes Alfabank.

11. **The share of state-controlled banks has remained broadly stable** (Box 1). In total, 21 state-owned or controlled banks operate on the market while four of the top five banks by assets are state owned or controlled. The state-controlled banks constituted about 38 percent of total assets, 42 percent of credits, and 66 percent of household deposits of the banking sector as of end-2004 (compared with 36 percent, 38 percent, and 68 percent, respectively, in 2003). Among the largest state-controlled banks, the gradual decline in Sberbank's position—where the share of household deposits has declined from 75 percent in 2000 to 60 percent in 2004—has been offset by expansionary policies of other state-controlled banks, particularly by the VTB.[92]

12. **Foreign banks form a small but increasingly important group**. As of end-2004, 131 banks had some kind of foreign participation, and 33 banks were 100 percent foreign owned. Among the 30 largest Russian banks, 3 are controlled by foreign credit institutions. The share of nonresidents in the capital of the banking sector rose in 2004 to 6.2 percent (from 5.2 percent in 2003)—a sign of the growing foreign interest in Russian banks, although this share was even higher in 2000 at 10.7 percent.[93] A number of foreign banks have fostered competition, including in consumer lending, by becoming, at least in the major cities, viable alternatives to state-owned banks. Moreover, the access to cheaper funding through their parent companies or through international capital markets have given them a strong

[92] VTB expanded its assets by 1½ times in 2004. The government has announced its plans to inject an additional $1.5 billion of new capital in 2005.

[93] This growing foreign interest is evidenced by GE Capital's recent purchase of Delta Credit Bank, Banca Intesa's acquisition of 75 percent of KMB-Bank, and Nova Ljubljanska Banka's acquisition of Promsvyazbank. Svenska Handelsbanken has also announced plans to start operations in Russia.

Box 1. State-owned Banks

The Russian banking sector continues to be dominated by state-owned banks. Federal or regional authorities have stakes in more than 20 banks. Such banks account for about 70 percent of retail deposits and about 40 percent of credits outstanding. In addition, many banks are owned by state-owned enterprises. Many regional banks are practically in monopoly positions on local markets through official backing. Moreover, Sberbank has 500 times more branches than the second-biggest retail bank in Russia.

The banking strategy paper for 2005−08 does not propose any significant steps to reduce the dominance of state-owned banks. While the government intends to complete the procedures to reduce the share of government-owned entities in some of the commercial banks by 2006, it remains assured that the state should retain its share in the banking system if this objective is supported by the strategic goals set by the country's economic policies. However, the authorities will refrain from establishing new state-owned banks and avoid giving any new preferences to the existing ones.

Sberbank's market share is expected to remain large. Having by far the largest branch network, pension and other social payments are expected to continue to flow through Sberbank for some time. As to Vneshekonombank (VEB), the government plans to focus VEB on servicing the official external debt. The government intends to keep its control over the VTB to the extent the implementation of government policies is ensured. The recently established Development Bank and Agricultural Development Bank will operate to finance certain areas of the economy and to recover the bad assets it inherited from the government and some failed banks.

International experience shows that relying too much on state banks to provide financial intermediation generally hampers the development of the financial system and economic growth in general. The combination of politicized lending and weak management operating under greater regulatory forbearance—reflecting weaknesses in the oversight exercised by government supervisors of the banks owned by the government or by the central bank—has led to severe fiscal losses even in more developed countries. State-owned banks should exist, if at all, only to correct market failures: their activities should be specialized in sectorial and other niches that the market will not address on its own. In practice, however, many state-owned banks in Russia operate as universal banks. Moreover, as in the case of Sberbank and, increasingly, the VTB, they use their protected positions to extend their businesses in other market segments.

competitive edge over the domestic banks. Thus, foreign banks accounted for more than 50 percent of the foreign capital attracted by the Russian banking system in 2004.

13. **The CBR has mostly finished its assessment of banks entering the DIS** (Box 2). The first phase of enrolling banks in DIS was completed in March 2005, with 824 banks, representing 98 percent of household deposits, admitted. Banks that applied but failed to gain acceptance have the opportunity to appeal the CBR's decision; final results are due by September 2005. While it is expected that the introduction of DIS will eventually help level

Box 2. Deposit Insurance

The promotion of confidence, a level playing field for private and public banks, and a sound banking system were the main objectives behind the introduction of the Deposit Insurance Scheme (DIS). The coverage provided under the new system is rather limited. Only physical persons' deposits are covered (up to Rub 100,000 or about US$3,500), excluding deposits with exceptionally high interest rates and those held in the foreign branches of Russian banks. This compares with the per capita GDP of US$3,800. According to initial estimates, more than 90 percent of all depositors are now fully covered owing to a large number of small deposits in the system. Given the current threshold for the maximum coverage, the potential DIS liabilities are equal to about 40 percent of all deposits.

Participating banks are obliged to pay each quarter a premium of no more than 0.15 percent of the average value of their insured deposits in the preceding quarter. The maximum potential contribution will fall to 0.05 percent after this fund has accumulated 5 percent of the insured deposits. The actual payment is set by the DIS board. If the fund is not in a position to meet its obligations, it may apply to the government for budgetary support. The DIS system began with a Rub 3 billion contribution from the government of which two-thirds will be allocated to the fund and the rest for institutional expenses.

The authorities had planned to use the introduction of DIS to consolidate the banking system by revoking licenses to collect household deposits from unsound and imprudently managed banks. As the number of banks accepted into the system is relatively large, the full benefits of the reform will be achieved only if DIS encourages further consolidation of the banking sector and helps level the playing field for state-owned and private banks.

Also, cooperation between DIS and the authorities should be well established. The exchange of information on banking sector developments between DIS and the CBR, as well as a detailed contingency plan, developed with the government, to cover unexpected liquidity gaps in the course of bank liquidations, is essential for the successful operation of DIS.

The creation of DIS has enhanced the supervisory and regulatory standards of the banking system. However, moral hazard issues should be taken seriously. In countries like Russia with an undeveloped legal system, deposit insurance schemes could actually increase financial instability. Therefore, further improvements in banks' transparency, prudential regulation, and the administration of justice are essential to make DIS fully effective and the banking sector more attractive.

the playing field for all state-owned and private banks, including Sberbank, the latter will retain its state guarantee on existing deposits until 2007 (or until its market share falls below 50 percent, whichever comes first).

D. Risks

14. **The strong economic growth and rapid increase in loan portfolios may actually hide increasing risks.** This is especially true in light of the well-known weaknesses in

accounting, auditing, corporate governance, and legal frameworks. Stress tests conducted by the CBR and Fund staff show that liquidity and credit risks rose slightly in 2004. Equity and interest-rate risk also increased, reflecting a rise in banks' trading activities. Foreign exchange risk declined.

15. **Rapid credit growth continues to reduce banking sector liquidity, although, on average, liquidity indicators seem adequate** (indeed, high compared with other countries). The share of total assets that are liquid has declined as the loan portfolio has expanded, shrinking the coverage of deposits and short-term funding (Table 4). The liquidity stress test, based on aggregate maturity gaps, continues to point to an increasing exposure to liquidity risks, as the negative asset gap at one month or less has kept widening (Tables 5 and 6). Liquidity issues are likely to remain central given the segmented interbank market, uneven distribution of assets, and increasing demand for longer-term funds.[94]

Table 4. Russia: Selected Liquidity Indicators 1/

(Ratios, in percent)

	2002	2003	2004
Highly liquid assets to total assets	22.3	20.6	17.0
Liquid assets to total assets	39.1	36.1	30.3
Highly liquid assets to demand deposits	68.6	68.1	56.2

1/ As compiled by the CBR.

Table 5. Russia: Liquid Assets to Customer and Short-term Funding

(In percent)

	2002	2003	2004
Average 1/	41.8	40.9	36.0
Average for top 3 banks 2/	57.6	45.9	…
Median 1/	37.4	38.0	38.4
Average for Transition Peers 3/	23.3	22.7	…

Source: Bankscope.

1/ Based on 15 banks constituting about 50 percent of banking sector assets without Sberbank.
2/ Sberbank, Vneshtorgbank, Gazprombank.
3/ Sample of 22 banks in 2002 and a subset of 18 in 2003 from the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and Slovakia.

[94] For instance, Sberbank alone holds more than 70 percent of outstanding central government paper. With another large share held by the Pension Fund, the rest of the banking system is left with a very limited amount of eligible collaterals to be used to manage liquidity.

Table 6. Russia: Stress Test for Liquidity Gap up to One Month

	2002	2003	2004 1/
In percent of GDP	-3.4	-4.2	-4.4
In percent of banking system assets	-8.8	-9.9	-10.1

Source: Author's calculations.

1/ Preliminary data.

16. **Credit risk, although also on the rise, remains fairly low.** Stress tests conducted by the CBR and Fund staff demonstrate that the credit risk faced by the banking system increased moderately through 2004, even if nonperforming loan ratios stayed low (Table 7).[95] Some credit quality issues will be addressed by the opening of credit bureaus starting in late 2005, although it will likely take some time to get them fully operational.

Table 7. Russia: Comparison of Results of Stress Tests for Credit Risk

	Total loss (In percent of GDP)	Coverage	
		Number of banks	In percent of assets
FSAP (end-2001 data)			
Bank-specific NPL ratios	3.4	64	75
Uniform NPL ratios	3.7	64	75
Staff update for Article IV 2004 (end-2002 data)			
Uniform NPL ratios	4.4	38	70
Staff update for Article IV 2005 (end-2003 data)			
Uniform NPL ratios	5.6	10	62

Source: FSAP; and Fund staff estimates.

17. **Foreign exchange risk has declined significantly in the banking sector as the net open position in foreign currencies has narrowed.** The recent ruble appreciation alongside the higher yelds of ruble assets led banks to switch from short positions to long positions in rubles in 2004. The CBR stress test, based on end-2004 data, shows that a ruble appreciation of 30 percent would lead to losses of less than 3 percent of banking sector capital.

18. **Large exposures remain a concern in many banks.** Assets highly concentrated around a few large borrowers and related lending are common, reflecting the structure of an economy where a handful of business groups represent close to half of the GDP. The ratio of

[95] For the Fund stress test, see "The Russian Banking System: Recent Developments" in Russian Federation: Selected Issues, IMF Country Report No 04/316, (Washington: International Monetary Fund, 2004). The complete methodology for the stress-test conducted by the CBR was not available for 2004.

aggregated large credit risks (large exposures) to capital has stabilized at around 240 percent for the system as a whole, after falling slightly in recent years. The systemic risks may be somewhat mitigated, as banks exhibit concentration toward those large entities on both sides of the balance sheet. On the other hand, the current credit concentration indicators may actually understate the problem, as the regulations and limits for connected lending affect only entities with legal ties, and not with economic ties. Somewhat relatedly, the CBR is powerless to regulate banks on a consolidated basis if a bank is not the parent—but only a branch—of a financial-industrial holding group.

19. **Growing competition and declining margins are changing the risk profile faced by the banking sector.** As the traditional sources for bank revenues—mostly trading gains from foreign exchange, equities, and, most recently, fixed income—have diminished, the banks are moving into new markets. Consumer and mortgage lending is picking up. The share of credits to households increased to 16 percent in 2004 from 11 percent in 2003. Also, the current legislative framework governing the new market segments, including the Law on Mortgage-Backed Securities, adopted in late-2003, has yet to be tested.

20. **In an increasingly competitive environment, establishment of transparent ownership structures and management practices is becoming crucial for reducing capital cost and improving competitiveness.** Transparency has improved as a growing number of banks are turning to international capital markets for cheaper and larger funding. Furthermore, it is becoming apparent that shady ownership structures may restrict access to even domestic interbank credit markets in times of market tightness based on developments in the summer of 2004. Anecdotal evidence suggests that a number of larger Russian banks are making efforts to improve corporate governance, in part to attract foreign capital. For instance, the banks are bringing in overseas managers and streamlining operations. However, continued distrust within the banking sector is still prevalent.

21. **The banks' rights to long-term deposits remain unsecured.** The Civil Code gives clients the right to break term deposit contracts before maturity, thus negating them as a source of long-term funding and aggravating the banking sector liquidity profile.

22. **In sum, well-known banking system weaknesses remain, exposing banks to various types of risks.** These include, for example, connected lending, concentrated balance sheets, nondiversified income sources, and inflated capital—all of which reflect a history of weak regulation, nontransparent practices, a narrow economic base, and a weak legal environment.[96] These weaknesses are largely part of the structural problems facing the Russian economy and will take time to resolve. Meanwhile, they make the banking system vulnerable to adverse shocks.

[96] See the Russian FSAP for a discussion of these weaknesses.

23. **These weaknesses are well recognized and reflected in private sector views of the banking sector.** For example, credit rating agencies have upgraded Russia's sovereign rating to investment grade but they remain cautious about the banking sector. Banks continue to be a source of vulnerability over the medium term.[97] Russian banks, as a group, continue to be rated among the riskiest among emerging-market economies.

E. Prudential Regulation and Supervision

24. **The legal infrastructure for the banking sector has been strengthened, and the CBR's credentials as a prudential regulator have improved.** Particularly, the establishment of compulsory DIS membership was combined with an intense examination of all banks. The banks were tested with respect to the quality and adequacy of their reported capital and management quality, along with their ownership transparency, risk management and internal control, and liquidity. The process put the CBR into a stronger position than ever to assess the "true value" of banks' capital as well as to identify the banks' "real" owners.[98] As to ownership transparency, no requirements are in place yet that would make the information on ownership available to the general public.

25. **The CBR has started to move to "substance-over-form" regulation.** This will help to limit the scope for manipulating the computation and reporting of prudential norms, particularly the calculation of capital and loan provisioning; it will also reduce the number of forms the banks have to fill out for supervision purposes.[99] As a start, the CBR has cut the number of mandatory norms from 14 to 7. The changes made to loan loss provisioning rules in 2004 allow the banks to exercise "professional judgment" in assessing their assets. However, because the general legal system is unfamiliar with practices based on professional judgments, rather than specific rules, implementation issues are likely to remain. Also, the greater discretion allotted to supervisors in this matter raise some concerns within the banking community.

26. **The authorities have taken measures to build up the framework governing the resolution of problem banks.** Particularly, the recent amendments to the Bankruptcy Law for Banks made the Deposit Insurance Agency responsible for liquidating the banks, thereby bringing much-needed change by accelerating the liquidation process. More generally, however, the resolution strategies available to the CBR are very limited, making it difficult

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[97] See the Fitch Ratings announcement from November 18, 2004 as an example. In general, market indicators that might reflect private sector views of Russian banks are difficult to monitor. Some banks have issued debt but these are not widely traded.

[98] In 2002, the CBR reported that about 60 percent of the top 100 banks had inflated their capital in one way or another.

[99] See also W. Thompson, "Banking Reform in Russia: Problems and Prospects," OECD ECO/WKP(2004)33 (available via internet: http://www.olis.oecd.org/olis/2004doc.nsf/linkto/eco-wkp(2004)33)

for it to handle banking problems flexibly and efficiently. The CBR also lacks sufficient authority to remove management and to take enforcement actions against the misappropriation of funds by bank shareholders and management.

27. **Although IFRS-based accounting became mandatory for banks in 2004, their short-term effect will be limited.** Only a handful of banks provide reports fully consistent with international accounting standards and very few banks provide them on a consolidated basis. For most banks, the IFRS compliance is achieved by using a "correspondence table," provided by the CBR, which transforms the RAS-based accounts into the IFRS. Moreover, since RAS will stay in use in the rest of the economy and for tax purposes, the IFRS-based reports will be used for analytical purposes only.[100] However, while the IFRS are clearly preferable to RAS, neither can curtail opportunities for "window dressing" in the absence of better corporate governance. The extent to which the IFRS makes the system more transparent depends on the incentives for the banks to become more transparent.

28. **The minimum risk-weighted capital requirement (CAR) will be set at 10 percent starting in 2007.** The strategy also makes clear that should CAR fall below 10 percent, the banking license will be revoked instantly. However, the authorities have not reached a consensus on whether some grace time should be given for banks to comply with the requirement. At the same time, the minimum paid-in capital level will be set at EUR 5 million—in line with the requirements in the EU—with a clause to grandfather existing banks as long as their capital does not fall below their 2007 level.[101]

29. **The recent banking sector strategy paper focuses on a number of ambitious targets for 2008.** Among others, the strategy seeks to (i) enhance banking sector competitiveness; (ii) increase the efficiency of financial intermediation; (iii) protect creditors; (iv) level the playing field for all banks and ensure the transparency of individual banks; and (v) improve public confidence in the financial sector.

30. **Russia's capital account appears fairly open and is much liberalized**. A new foreign exchange transactions law was implemented in June 2004, removing the existing cumbersome system of ad hoc permits and controls and empowering the CBR and the ministry of finance to impose unremunerated reserves requirements (URRs) on capital flows. The new law provides for a removal of restrictions on residents opening accounts in nonresident banks from the summer of 2005 onward. Anecdotal evidence suggests that because earlier restrictions had been widely circumvented, their removal may not have a significant effect on the banking system.

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[100] As regards the corporate sector, the Russian Duma gave preliminary approval to a bill requiring corporations with more than one subsidiary to publish financial statements that conform to IFRS in 2004; however, the legislation has stalled.

[101] Currently, only newly established banks have to comply with this requirement.

F. Challenges

31. **Strong macroeconomic fundamentals provide a window of opportunity for an extensive restructuring of the banks.** A number of weaknesses that make Russian banks vulnerable to adverse shocks remain unaddressed and the banks are to a large extent still exposed to sudden shifts in market conditions and public confidence. The authorities have implemented only a part of the recommendations in the 2002 FSAP (Box 3).

32. **Further consolidation in the banking system—with the exits or mergers of small banks—looks inevitable and would increase confidence, as well as enhance efficiency by introducing economies of scale.** By adopting necessary legislative and regulatory acts, bank merger and acquisitions costs could be lowered and financial sector deepening accelerated in the least disruptive way. The legal environment should be further amended to give the CBR authority to deal effectively with problem banks.

33. **The continued large market share of state-owned banks could hamper the broad-based growth of the banking sector**. Moreover, at worst, implicit government endorsement of some state-owned banks could lead to a renewal of politically-motivated lending and could slow financial sector development.

34. **Further reforms to improve the operating environment faced by banks and their counterparts would reduce vulnerabilities in the banking system.** One of the main reasons for the underdeveloped banking sector in Russia is related to the broader business and legal environment in which the banks operate. Improvements in accounting, auditing, corporate governance, and legal framework—including proper implementation of existing rules—would increase transparency and improve governance.

Box 3. A List of Recommendations from the 2002 FSAP

The FSAP report highlighted several areas in the financial sector calling for improvements. The key recommendations more closely related to the banking system were the following:

Banking system

- Tighten the definition of capital and transparency of ownership structures (immediate).
- Provide supervisors with enhanced training and move to risk-based supervision (ongoing).
- Address the uneven playing field in part caused by the large size of Sberbank and by the 100 percent guarantee of household deposits for state banks (medium term).
- Hold Sberbank to the same standards as other banks operating on a fully commercial basis with a hard budget constraint (immediate).
- Develop medium-term options for Sberbank in the context of a comprehensive strategic review (immediate).
- Press ahead with the privatization of the VTB (immediate).
- Close (or restrict licensing to no longer allow soliciting of household deposits) those banks which are nonviable, overburdened with connected lending, or in transgression of supervisory norms (ongoing).
- Ensure that only viable banks enter into the proposed mandatory deposit insurance scheme (medium term).

Payment systems

- Adopt a revised payments system concept paper and submit it for a limited period of public consultation before the launch of a properly managed and resourced project (immediate).
- Develop a real-time gross settlement system (RTGS) operating on centralized principles, with appropriate liquidity and operational risk management features (medium term).

Corporate governance

- Increase transparency of ultimate ownership and control structures (ongoing).
- Adopt legislation requiring disclosure of related-party transactions (draft Law on Affiliated Persons) and to halt insider trading (draft Law on Insider Trading, and draft amendments to the Administrative Code and Criminal Code) (immediate).
- Strengthen financial reporting by requiring publicly traded joint stock companies and other large-scale enterprises to prepare financial statements in accordance with IAS (medium term).
- Establish a centralized securities depository (medium term).

Accounting and auditing

- Identify and amend restrictive provisions in the Civil Code, Accounting Law, Banking Law, Law on Central Bank, and other laws to create an enabling legal framework for IAS-based financial reporting (ongoing).
- Make necessary arrangements for preparing and disseminating official translation of the IAS and related interpretations on a timely basis (ongoing).
- Develop the capacity of the CBR for monitoring and enforcing of the IAS requirements (medium term).

V. Terms of Trade and Economic Growth in the Former Soviet Union[102]

A. Introduction

1. **The economic literature on countries of the former Soviet Union (FSU) suggests that the transition process has been complex and experiences have varied.** The actual onset of the transition differs among countries (Havrylyshyn, 1999), as does the pace of reforms. However, what is common to almost all the countries is that they experienced initial output declines, such that the first half of the 1990s can be broadly characterized as a period of output contraction. This period was followed by a recovery during 1996–97, followed, in turn, by a slowdown during 1998–99 as a consequence of the 1998 financial crisis in Russia, which coincided with a fall in the world prices of oil and other primary products. The subsequent pickup has been accompanied by an improvement in the terms of trade of almost all the countries in the region, especially net exporters of oil.

2. **This sequence of events has raised an important question.** This is whether the positive terms of trade shock, driven to some extent by rising oil prices, is the major factor behind the region's improved growth performance, in particular in the Commonwealth of Independent States (CIS).[103]

3. **Controlling for growth spillovers within the region might enhance the assessment of the impact of the terms of trade shocks on growth**. The IMF's *World Economic Outlook* (International Monetary Fund 2004, p. 47) suggests that "on the back of the strong regional economic growth momentum, economic activity in the low-income CIS-7 countries has generally expanded rapidly, although lagging reformers, including Uzbekistan, have gained considerably less." Against this background, it would be useful to ascertain the extent of growth spillovers within the region and the link of such spillovers to reforms in individual countries.

4. **This chapter looks into the impact of the terms of trade shocks on economic growth in the twelve countries of the CIS (the CIS-12) and the three Baltic states**.[104] The analysis excludes the tumultuous earlier years of the transition. It covers the period 1995-2004. The analysis differs from most of the growth studies related to transition economies on two fronts. First, it extends the analysis of economic performance in the FSU to the linkage to external terms of trade, an avenue that has not been explored very much, as far as we know.[105] Second, it examines the growth impact of the terms of trade in an

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[102] Prepared by Mwanza Nkusu.

[103] The CIS-12 comprises the Russian Federation—referred to hereafter as Russia, Ukraine, Kazakhstan, Belarus, Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Moldova, Tajikistan, Turkmenistan, and Uzbekistan. The last seven of these are referred to as the "CIS-7."

[104] The Baltic states are Estonia, Latvia, and Lithuania.

[105] A 2003 World Bank report on Russia focused mostly on the growth impact of oil price increases.

integrated framework that controls for trade links between countries in the region and the associated spillovers, as well as for progress in economic liberalization and other institutional reforms, and other important determinants of growth identified in the growth literature.

5. **We try to answer five questions**. First, what is the effect of the terms of trade shocks on economic growth? Second, have the growth impacts of the terms of trade shocks differed between net oil exporters and net oil importers? Third, are there spillovers from regional growth? Fourth, does intraregional trade matter for a country's growth, including as a channel for regional growth spillovers? Finally, are the growth effects of the terms of trade shocks and the spillovers from regional growth different between lagging and advanced reformers?

6. **The findings of the analysis can be summarized as follows**. First, there is a significant positive impact of the terms of trade growth on economic growth, although it is not the only (and perhaps the major) factor. Second, the magnitude of the impact is almost 25 percent higher for net oil exporters than for importers, although statistically not different. Third, regional economic growth exerts positive externalities on individual countries' growth. Fourth, after controlling for the terms of trade shocks, the share of regional trade in total trade is positively associated with growth. However, there is no evidence that trade is a channel through which regional growth spills over. Finally, progress in institutional and structural reforms does not affect the spillovers from regional growth. More specifically, there is no evidence that lagging reformers benefit less from regional growth than advanced ones. But progress in structural reforms affects the growth impact of the terms of trade shocks. In particular, the interaction of the terms of trade growth with an indicator of stabilization and reforms suggests that the more advanced the reforms, the greater the contribution of a terms of trade improvement to growth.

7. **Our results are subject to a number of caveats, and, therefore, should be interpreted with caution.** These caveats arise from biases associated with measurement problems, including the subjectivity of our reform measure, the potential nonstationarity of some variables, the short sample period, and the possible sensitivity to model specification.

8. **The remainder of the chapter is organized as follows**. Section B presents some stylized facts relevant to the analysis of the CIS-12 countries and the Baltic states. Section C reviews selected findings of the literature on terms of trade shocks and economic growth and on growth spillovers. Section D presents the empirical analysis. Section E concludes.

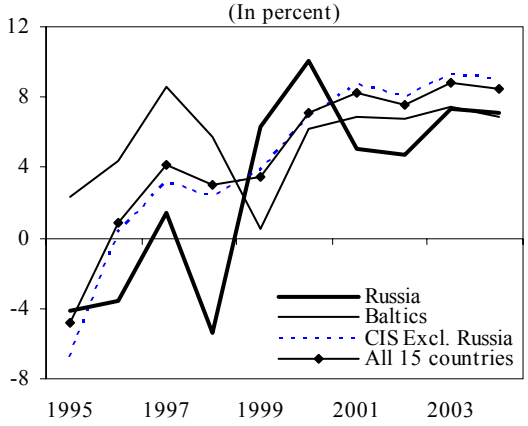
B. The CIS-12 Countries and the Baltic States: Stylized Facts

9. **The 15 countries covered in this study have had growth experiences that show both similarities and differences.** The similarities are in the output path—a substantial decline in the earlier years of the transition, followed by a gradual recovery. Great differences, however, have been observed in the depth and length of the decline, as well as the timing and strength of the subsequent recovery (Berg and others, 1999; and Havrylyshyn, 2001). By 1995, output had started to recover in the Baltics while still declining in the CIS-

12 countries, except Armenia and Belarus. The first year of positive average growth for the 15 countries of the FSU is 1996. Since then, average real GDP growth has been positive and quite strong, except for the 1998–99 slowdown associated with the financial crisis in Russia and its aftermath.

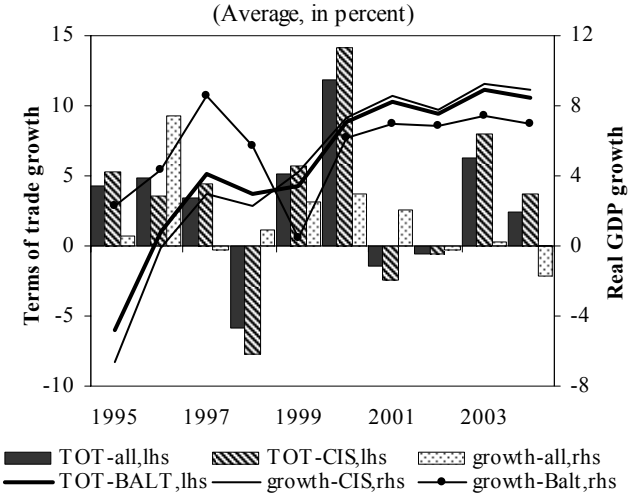
10. **Although many observers link the strong growth in many countries included in our analysis to the improvement in the external terms of trade, the evidence is not clear-cut**. While the terms of trade have, on average, evolved favorably for the 15 countries during the ten-year period ended in 2004, there are noteworthy differences. The terms of trade have been less favorable to the Baltic countries than to the CIS-12 as a group (Table 1). Moreover, within the CIS, the seven net fuel importers have faced less favorable terms of trade than the five net fuel exporters—Azerbaijan, Kazakhstan, Russia, Turkmenistan, and Uzbekistan. Interestingly, although, they have faced less favorable terms of trade than the CIS-12 countries, the Baltic states have experienced a higher annual average rate of economic growth during the ten years ended 2004—5.6 percent compared with 4.5 percent for the CIS-12. Also, in the second half of the ten-year period to 2004, their growth rate tracked that of the CIS-12, despite significantly less favorable terms of trade (Figures 1 and 2; Table 3). Among the CIS-12 countries, Armenia has faced the most adverse terms of trade shocks, but its average growth has been above the average of both the Baltics and the CIS-12. Russia, meanwhile, is among the five countries with the largest average increase in the terms of trade and one of the three with the lowest average growth among the 15 during 1995–2004 (Table 1). This suggests that factors other than the terms of trade have shaped growth.

Figure 1. Real GDP Growth in the CIS and the Baltics, 1995-2004
(In percent)



Source: Authorities; and IMF staff calculations.

Figure 2. Terms of Trade Shocks and GDP Growth in CIS and Baltics, 1995-2004
(Average, in percent)



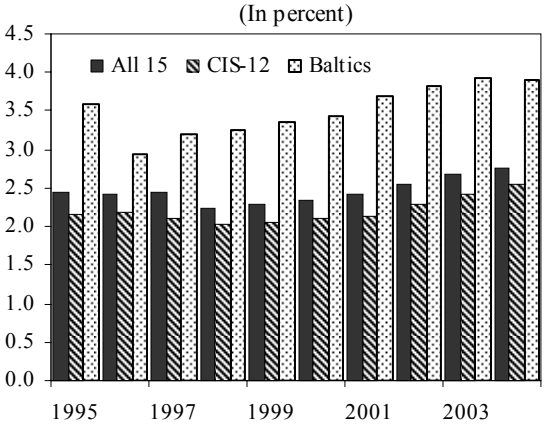
Source: Authorities; and IMF staff calculations.

11. **Earlier studies have identified the strength and consistency of macroeconomic stabilization and structural reforms as important determinants of growth differences among transition countries (Havrylyshyn and others, 1999).** Differences in the reform effort have been identified between the Baltic

states and the CIS-12 at the onset of the transition and thereafter. First, the pace of reforms has been very different. The Baltic states, which welcomed the transition as a liberation from the Soviet empire and an opportunity to access the Western club of nations, were more open to reforms from the start of the transition (Roland, 2001). Accordingly, they have made remarkable progress compared with the CIS-12. The Baltic states are currently rated on a par with industrial countries in many structural and institutional areas.[106] Their objective of joining the European Union has been an important factor behind the faster and more consistent reform process. Second, and related to the first point, following the disruption of traditional trade and distribution channels of the Soviet era, the Baltic states have been more open to, and successful in, reorienting trade from the FSU to other economies, Western European countries in particular. Their trade with countries of the FSU as a share of total trade is smaller than that of the CIS-12. However, most CIS-12 countries have also made progress in opening themselves to markets outside the FSU in recent years.

12. **The differences pointed out above between the CIS-12 and the Baltic countries regarding macroeconomic stabilization and structural reforms and the direction of trade are highlighted in Tables 1 and 2.** We choose the index of economic freedom, published by the Heritage Foundation, to illustrate differences in macroeconomic policies and structural reforms.[107] Havrylyshn and Rooden (2003) indicate that the overall index of economic freedom rating is based on the evaluation of institutional changes spanning a broad range of areas. They find the index to be thorough and reasonable, albeit still fundamentally subjective. On a scale of 1 to 5, where 5 represents the most liberalized economic environment, the rating of all 15 countries included in our analysis averaged 2.5. The average was 2.2 and 3.5 for the CIS-12 countries and the Baltic states, respectively (Table 1 and Figure 3). Regarding trade

Figure 3. Index of Economic Freedom for the CIS and the Baltics, 1995-2004
(In percent)



Source: The Heritage Foundation.

[106] Most notably property rights and government intervention in economic activity.

[107] The Heritage Foundation rates countries according to progress achieved on factors considered as most influential for the institutional setting of economic growth. These factors cover the following categories: trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation, and informal market activity (Heritage Foundation, 2005). Countries are rated on a 1 to 5 scale, where 1 represents the most liberalized economic environment. We have rescaled the rating to make 1 and 5 represent the least liberalized and most liberalized environments, respectively. Therefore, an increase in the rating represents an improvement in economic freedom.

partnerships, during 1995–2004, regional trade as a share of total external trade averaged almost 43.7 percent for all the 15 countries, while it was 46.8 percent and 31.1 percent for the CIS-12 countries and the Baltic states, respectively (Table 1). Exports to the region as a share of total exports were also smaller for the Baltic states than for the CIS-12. Distinguishing between the growth effects of the terms of trade and those of policies and reforms, as well as other factors, requires an econometric analysis, which Section D provides.

C. Brief Literature Review

13. **Our analysis relates to at least three areas of the economic growth literature, the first of which is growth in transition economies.** Havrylyshyn (2001) is a very informative review of empirical studies on growth in transition economies. It indicates that most studies identify macroeconomic stabilization, economic liberalization, and market-friendly institutions as important determinants of growth. It also highlights the lack of significance, thus far, of traditional factors, investment in particular, in explaining growth.

14. **The second area is the growth impact of the terms of trade, whose predictions have varied on both the theoretical and empirical fronts.** Some theoretical studies predict that rapid growth in the terms of trade will bring about windfall gains that can undermine economic growth through Dutch disease-type effects (Corden, 1984; and Sachs and Warner, 1999), rent-seeking behavior that breeds corruption, or disincentives to pursue reforms and a coherent economic policy framework needed for long-term growth (Auty, 2001; and Sachs and Warner, 2001). A contrasting view comes from Mendoza (1997). He develops a small-economy, endogenous growth model that predicts that while the average rate of change of the terms of trade has a positive impact on average growth, its variability can result in slower growth if the coefficient of relative risk aversion is small.[108] Another view suggests that the effects of terms of trade shocks are ambiguous, depending not only on whether the shock is temporary or permanent, but also on the rate of time preference and access to capital markets (Svensson and Razin, 1983).

15. **Some empirical studies of the impact of the terms of trade on growth have found positive relationships.** Several studies have included the growth or volatility of the terms of trade as explanatory variables in growth regressions. One strand of literature finds conclusive one-way relationships between the terms of trade and growth. For instance, Easterly and Rebelo (1993) and Fischer (1993) find that the rate of change of the terms of trade has a positive significant impact on economic growth, after controlling for policy variables and other determinants of growth. Likewise, Mendoza (1997) tests his theoretical model on a sample of 40 industrialized and developing countries covering 1971–91 and finds support for a robust positive relationship between the rate of change of the terms of trade and growth. His findings also support the robustness of a negative relationship between terms of trade

[108] Smaller than two more specifically.

volatility and growth. As regards Russia, a World Bank report (World Bank, 2003) focusing on the growth impact of oil price increases rather than improvement in the terms of trade in general suggests that there is a positive relationship between oil price increases and growth.

16. **Another strand of empirical literature, however, finds varied or less conclusive results.** Using a sample of industrial and developing countries covering 1970–88, Lutz (1994) finds no significant impact of growth in the terms of trade on economic growth, and an insignificant—or, in some instances, a positive and significant impact—of the volatility of the terms of trade on growth. When he divides his sample into subgroups of countries according to their income levels or the structure of their exports, he finds a negative significant impact of terms of trade growth on output growth for some groups.109

17. **Like Lutz (1994), Turnovsky and Chattopadhyay (2003) and Blattman, Hwang, and Williamson (2004) find mixed results**. Using a sample of developing countries covering the period 1975–95, Turnovsky and Chattopadhyay find that neither the growth rate of the terms of trade nor its volatility has a significant impact on output growth. When they split the sample into two groups according to the degree of volatility of the terms of trade, their findings are in line with Mendoza (1997) for the high-volatility group and the full-sample results in Lutz (1994) for the low-volatility group. Assessing the impact of the terms of trade on economic development during 1870–1939, Blattman, Hwang, and Williamson (2004) find that the effects or the core and the periphery are asymmetric.110 First, an improvement in the terms of trade is associated with output growth in the core, but not in the periphery. Second, increased volatility in the terms of trade has a significant negative impact on growth in the periphery, but not in the core.

18. **The third area of the economic growth literature that our analysis relates to is that of spillovers.** Many studies suggest that externalities across countries are relevant in explaining growth. Coe and Helpman (1995) suggest that foreign research and development (R&D) has beneficial effects on a country's total factor productivity, and that these are stronger the more open a country is to foreign trade. Arora and Vamvakidis (2004) suggest that a country's economic growth is positively influenced by both the relative income and the growth of its trading partners. In a more recent paper—Arora and Vamvakidis (2005)—they find that South African growth had a substantial positive impact on growth in the rest of Africa. The literature also consider capital movements as a channel through which growth can spill across national borders.

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[109] These groups include high- and middle-income countries, separating these from less-developed countries (LDCs); oil exporters, separating these from exporters of other primary products and manufactured goods; and LDCs exporters of oil and other commodities, separating these from LDCs exporters of manufactured goods.

[110] In the sample, the core is made up of the industrial leaders and latecomers—the United States and Western Europe—and the periphery comprises primary products exporters, including Canada, New Zealand, Australia, Latin America, Asia and the Middle East, and some European countries (Greece, Spain, Portugal, the Soviet Union, and Yugoslavia).

D. Empirical Analysis

19. **We use a standard growth model augmented by several variables of interest:**

$$GRW_{it} = \beta_{0i} + \beta_1 controls_{it} + \beta_2 Z_{it} + \varepsilon_{it}, \qquad (1)$$

where *GRW* is real GDP growth in percent, and *controls* includes variables that were significant in many other growth regressions in the literature. Z is the vector of our variables of interest. The $\beta_{oi}s$ are country-specific intercepts, and ε is the error term. The indices i and t represent countries and time periods, respectively.

The variables

20. **The regressions contains several control variables usually included in empirical growth models:**

- *Initial income* (*IGDP*) is proxied by 3-lags of the natural logarithm of real per capita GDP at 1995 U.S. dollars. The use of lagged real GDP in regressions with fixed effects circumvents the unsuitability for fixed-effects regressions of income at the beginning of the sample time period, which is time invariant.

- The *investment ratio*, commonly used to capture the impact of factor inputs;

- The *broad money-to-GDP* ratio is used as a measure of financial development.

- *Inflation*, measured as the natural logarithm of one plus the rate of consumer price inflation, expressed as a decimal, is meant to capture the impact of macroeconomic stabilization.

- The trade-to-GDP ratio (*trade*) aims to reflect the impact of trade openness. The exports-to-GDP ratio (*exports*) is also used as an alternative measure of trade openness, following Levine and Renelt (1992).

- The ratio of net capital flows to GDP (*capital flows*) tries to capture the impact of external finance. *Net remittances* is an alternative measure of external financial flows.

21. **In addition to the "controls," we include our variables of interest, which can be grouped in four categories.** The *terms of trade* is our primary variable of interest.[111] Previous research suggests that the terms of trade affect growth through their rate of change and the variability of the rate of change, a measure of risk. Therefore, we include in the regressions the following:

- the annual percentage change in the terms of trade; and

[111] In our regressions, terms-of-trade growth is part of the baseline regressions.

- the volatility of the terms of trade growth, which, following Lutz (1994), is computed as a short-run variance within each cross section, based on subsamples updated period by period.[112] (Mendoza uses the standard deviation over the entire time period covered by his sample, but such time-invariant measure does not suit our fixed-effect regressions).

22. **We include some indicators of regional growth and countries' trade with regional partners to control for their effects on growth, thereby capturing potential spillovers effects.** Specifically:

- *growth of all,* determined for a country j, as $\frac{1}{n}\sum_{i=1}^{n} w_i Growth_i$, $i \neq j$, where i refers to the countries in the regional sample, w_i is the purchasing-power parity (PPP) weight of country *i*'s GDP in the region's GDP, and n is the number of countries in the sample excluding *j*.

- *trade with all* and *exports to all* represent, respectively, a country's trade with, and exports to, the other countries contained in the sample in percent of its total trade.

23. **To account for the role of reforms and institutions in economic development—a factor increasingly emphasized in the literature—we include a measure of structural progress.** As indicated above, we choose the index of economic freedom published by the Heritage Foundation because of its comprehensiveness. As it encompasses macroeconomic stabilization, among other indicators of institutional progress listed in Havrylyshyn and others (1999) as key measures of reforms, its use lessens the need to include indicators of macroeconomic management or stability—exchange rate, government consumption, and fiscal deficit for instance—whose effects on growth have been found in the literature to be mixed.[113]

24. **We rescale and standardize the raw indices published by the Heritage Foundation**. First, as indicated in footnote 6, we rescale the ratings so that the higher the score, the higher the level of economic freedom a country enjoys. Furthermore, following Wei (2001), we standardize the rating by subtracting the mean and dividing by the standard deviation. With such a transformation, the coefficient of *economic freedom* in the growth

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[112] More specifically, for each cross section, the cyclical component of the terms of trade, e_t is obtained from the following regression: $\ln TOTG = c_0 + c_1 trend + e_t$, where *trend* is the linear time trend, whose upper limit is the number of observations in the cross section. The variance of e_t is a measure of volatility of the terms of trade (see Lutz (1994) for details).

[113] Havrylyshn and Rooden (2003) indicate that the overall *index of economic freedom* rating is based on the evaluation of institutional changes spanning a broad range of areas. They find the index to be thorough and reasonable, albeit still fundamentally subjective. This criticism applies to alternative indices as well.

equation will be interpreted as the response of real GDP growth to a one-standard-deviation increase in the rescaled *economic freedom*, that is, to an improvement in economic freedom.

25. **Finally, we introduce interaction terms to capture indirect effects and dummy variables in order to distinguish subgroups of countries.** Specifically, the dummy variable *DUMOIL* equals 1 if the country is a net oil exporter and 0 otherwise. *DUMNOIL* is the reverse of *DUMOIL.* Furthermore, we construct the following interaction variables:

- *growth of all*trade with all* or *growth of all*exports to all* are used to explore the idea that trade is a channel through which regional growth spills across borders.[114]
- *growth of all*economic freedom* is used to test the hypothesis that the gains from regional growth may be linked to reforms in individual countries.
- *terms of trade growth*economic freedom* is used to test relevance of the "curse of natural resources."
- *trade*trade with all* and *exports*exports to all* are used to explore the indirect effects of regional trade partnerships on growth through openness.

Regression estimation

26. **The data come from various sources**. The share of trade with regional partners in total trade is computed from data published by the IMF's Direction of Trade Statistics (DOTS). Real per capita GDP at 1995 U.S. dollars is from the World Bank's World Development Indicators (WDI). The Index of Economic Freedom is from the Heritage Foundation as indicated above. Data for the remaining variables are from the IMF's World Economic Outlook (WEO). We use annual data, as in many of the previous studies of growth in transition countries. This contrasts with some other growth regressions, which use data averaged over several years. In the data base, we have 15 cross sections, covering the period 1995–2004. However, because of some missing data, Turkmenistan has been dropped from the regressions. We use fixed effects to control for differences in countries' characteristics not properly captured by variables included in the regressions.

27. **We begin the analysis with a basic regression including the control variables, *economic freedom*, and our primary variable of interest, the growth of the terms of trade, as well as the volatility of the terms of trade growth.** Columns (1) and (2) of Table 4 present the regressions with growth of the terms of trade, as well as control variables in the set of explanatory variables. Among the variables that are statistically significant, *capital flows*, *inflation*, and *initial income* are negatively associated with growth, while *growth of the*

[114] Capital flows constitute another channel through which regional growth can influence growth in individual countries. We do not examine the relevance of this channel in the analysis because of the lack of data on capital flows among the 15 countries.

terms of trade, *trade*, *broad money-to-GDP*, and *economic freedom* are positively associated with growth. *Investment ratio* and *volatility of the terms of trade growth* are not significant. They are excluded from the regression in column (3), which is our baseline.

28. **In subsequent regressions, we include our additional variables of interest to try to answer the five questions that were raised in the introduction.** To explore whether the growth effects of the terms of trade shocks differ between net oil exporters and importers, in the regressions summarized in Table 5 we also include two separate terms of trade shock variables (See Appendix 1). Overall, the best performing equations are those in column (5) of Table 4 and column (4) of Table 5. They suggest that a 10 percentage points increase in the growth of the terms of trade is associated with a 0.7–1.0 percentage point increase in the growth rate of the economy. Also, a one-standard deviation increase in the index of economic freedom strengthens the growth impact of a terms of trade shock by 0.05 to 0.06 percentage point.

Results

29. **Our results, while subject to a number of caveats, provide useful insights into the growth experience of countries of the FSU during 1995–2004.** Also, they are broadly in line with findings of previous studies. These results can be summarized as follows.

30. **Higher terms of trade growth boosts economic growth, and even more so if policies and reforms are advanced.** The indicator of progress in reforms and macroeconomic stabilization, *economic freedom*, is the single most important determinant of growth in the baseline model. The significance of the coefficient associated with the interaction of *economic freedom* and the change in the terms of trade suggests that reforms are a channel through which the growth effects of terms of trade improvement can be enhanced. Specifically, the growth effects of an improvement in the terms of trade are larger the more advanced are the reforms.

31. **The magnitude of the direct effect of terms of trade growth on economic growth is higher for net oil exporters than for net oil importers.** Net oil exporters gain 25 percent more from an increase in the terms of trade growth than do net oil importers. Nonetheless, a Wald test for the equality of the coefficients associated with the terms of trade growth of the two groups fails to reject the hypothesis that the two coefficients are equal (Table 5).

32. **Regional growth is unambiguously beneficial to individual countries' growth.** We also test the importance of reforms and trade partnerships for growth spillovers. We find that the advancement of reforms in a country does not affect the magnitude of the spillovers from regional growth. This undermines the idea that lagging reformers benefit less from regional growth than advanced ones. In fact, some regressions suggest the opposite: advanced reformers benefit less from regional growth spillovers than lagging ones.

33. **The evidence on regional trade partnerships as a channel through which regional growth spills over is mixed**. Also, this suggests that there are other channels than regional trade linkages through which regional growth spills over.

- Trade with all regional partners as a share of total external trade is positively associated with growth, but its interaction with regional growth does not have a significant impact on growth.

- The share of exports to regional partners in total exports is a significant determinant of growth. However, in its possible role as a transmission channel for regional growth, it weakens the magnitude of the growth spillovers. In particular, the spillovers from regional growth to an individual country are smaller the larger is the share of the country's exports to the region in its total exports. This could be interpreted as indicating that, for a transition country of the FSU, concentration on regional markets for exports reflects the country's insufficient progress in channeling its exports toward new, more profitable markets.

34. **Trade openness is good for growth, and the direction of trade matters.** Using exports-to-GDP and total trade-to-GDP ratios as indicators of openness, our analysis confirms the findings of previous studies that trade openness is good for growth**.** However, the significance of the negative coefficient of the interaction of exports-to-GDP and *exports to all* suggests that the greater the share of total exports directed to regional markets, the smaller the contribution of openness to trade. Therefore, openness with a greater concentration on regional markets seems to be "limited openness."[115]

35. **Capital flows have a negative and significant impact on growth.** This result is somewhat surprising, considering that the sample consists of low- and middle-income countries, which could be expected to benefit from external capital to finance reforms and productive investment. Nonetheless, the negative association of economic growth with capital flows could suggest that capital flows have not been used properly, or that they may have been used to postpone reforms rather than finance them (Havrylyshyn and others, 1999).

36. **Net remittances do not have a robust impact on growth**. A positive and significant impact is detected in a couple of regressions, but such significance disappears when Moldova is dropped from the sample. Overall, the fit of the regressions was better when total capital flows rather than net remittances was used as an indicator of external financial flows.[116]

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[115] This finding points to the weakness of trade flows as indicators of openness.

[116] Moldova is an outlier because of the significantly large remittances it has received over the past several years,

37. **Financial development, macroeconomic stabilization, and initial income are also relevant in explaining growth**. However, the coefficient of *initial income* is small, suggesting that convergence plays a secondary role in explaining growth differences among FSU countries. Although inflation is taken into account in the determination of the *economic freedom*, it is highly significant, providing robust support to the idea that macroeconomic stabilization is important for economic growth.[117]

38. **The improvement in the terms of trade does not appear to be the major factor behind growth recovery in the FSU**. As the empirical analysis suggests, many factors have played a nonnegligible role. This explains why some countries have had a higher (lower) growth rates notwithstanding more (less) favorable terms of trade. For instance, as indicated above, Armenia's growth has been above the average for both the Baltics and the CIS-12 countries, although it has faced the most adverse terms of trade shocks among all 15 countries. The answer seems to lie in Armenia's macroeconomic stabilization and the depth of its structural and institutional reforms.[118]

39. **Our results are subject to a number of caveats, and, therefore, should be interpreted with caution.** First, measurement problems associated with key variables such as the reform measure and the economic growth measure could bias the results. In particular, our reform measure—the Heritage Foundation Index of Economic Freedom—is inherently subjective. Also, the calculated GDP growth rates may be biased owing to the failure to sufficiently account for the underground economy, which could represent a large share of total output in some countries. Second, the results could be biased owing to the possible nonstationarity of some variables.[119] Third, the short sample period precludes general conclusions about long-term growth. Finally, in light of the modeling difficulties that characterize the growth literature in general, results could be sensitive to model specification.

E. Concluding Remarks

40. **Subject to the caveats mentioned above, our findings lend support to the idea that improvements in the terms of trade have contributed significantly to economic growth in the countries of the FSU**. They also indicate that the impact on growth of changes in the terms of trade is statistically the same for both net oil exporters and importers. Beyond terms of trade shocks, there have been significant spillovers from economic growth in the region as a whole. To the extent that regional trade linkages have not been found to be

[117] The coefficients associated with inflation in our preferred regressions suggest that a 10 percent increase in inflation would reduce growth by almost 0.4 percentage point.

[118] Armenia has the best index of economic freedom among the CIS-12 countries.

[119] Owing to the small number of observations we could not formally test for nonstationarity. Nevertheless, it seems reasonable to assume that GDP growth and terms of trade growth are stationary.

significant in enhancing growth spillovers, the analysis suggests that externalities may take place through channels other than regional trade.

41. **The analysis also highlights the importance of other determinants of growth identified in the previous literature**. In particular, financial development, macroeconomic stabilization, and structural reforms have a positive impact on growth. The analysis also establishes a link between reforms and the impact on growth of a change in the terms of trade, a very important finding from a policy standpoint.[120] In particular, the advancement of structural and institutional reforms enhances an economy's capacity to manage resources from terms of trade improvements in a manner that does not undermine economic growth. This suggests that, where reforms and institutional development are advanced, they provide a channel through which the positive impact of favorable terms of trade shocks is enhanced and the adverse impact of negative terms of trade shocks is mitigated.

[120] As evidenced by the positive and significant coefficient on the interaction between *terms of trade growth* and *economic freedom*.

Table 1. The CIS-12 and the Baltic Countries: Selected Economic Indicators
(In percent, unless otherwise indicated)

	Average real GDP growth			Average terms of trade growth			Average inflation			Average BMGDP 1/		
	1995–99	2000–04	1995–2004	1995–99	2000–04	1995–2004	1995–99	2000–04	1995–2004	1995–99	2000–04	1995–2004
Armenia	5.35	10.56	7.95	-5.32	-0.32	-2.82	43.73	3.02	23.37	9.13	13.96	11.55
Azerbaijan	2.41	10.09	6.25	15.58	7.18	11.38	85.19	3.30	44.24	11.04	13.88	12.46
Belarus	3.13	6.66	4.89	0.29	0.46	0.37	238.51	63.76	151.13	14.18	16.00	15.09
Estonia	4.94	6.56	5.75	1.37	0.85	1.11	14.95	3.54	9.25	27.76	39.15	33.46
Georgia	5.90	6.35	6.12	1.87	3.26	2.56	46.34	4.96	25.65	7.45	11.78	9.61
Kazakhstan	-1.06	10.36	4.65	3.49	7.72	5.60	49.71	8.18	28.95	10.71	19.59	15.15
Kyrgyz Rep.	3.42	4.73	4.07	0.46	3.11	1.78	23.22	6.97	15.09	14.57	14.36	14.47
Latvia	3.84	7.36	5.60	3.28	-0.75	1.26	11.65	3.26	7.45	22.48	31.64	27.06
Lithuania	4.11	6.67	5.39	3.79	2.29	3.04	15.77	0.52	8.14	17.82	28.61	23.22
Moldova	-5.89	5.86	-0.02	-4.86	2.26	-1.30	22.49	14.07	18.28	19.74	28.52	24.13
Russia	-1.06	6.87	2.91	0.17	9.41	4.79	74.79	16.52	45.65	15.48	20.73	18.11
Tajikistan	-1.22	9.68	4.23	16.92	3.98	10.45	237.37	21.44	129.41	10.20	8.24	9.22
Turkmenistan	-0.43	16.64	8.11	...	...	...	424.32	7.99	216.15	12.96	15.40	14.18
Ukraine	-5.47	8.38	1.45	-1.23	2.84	0.81	101.15	11.03	56.09	13.99	28.79	21.39
Uzbekistan	1.74	3.79	2.77	-2.67	9.88	3.60	98.15	32.98	65.56	17.13	10.74	13.93
Average all	1.31	8.04	4.68	2.37	3.73	3.05	99.16	13.44	56.30	14.98	20.09	17.54
Average, excl. Russia	1.48	8.12	4.80	2.53	3.29	2.91	100.90	13.21	57.06	14.94	20.05	17.49
CIS-12	0.57	8.33	4.45	2.24	4.53	3.39	120.41	16.18	68.30	13.05	16.83	14.94
CIS, excl Russia	0.72	8.46	4.59	2.45	4.04	3.24	124.56	16.15	70.36	12.83	16.48	14.65
Oil exporters	0.32	9.55	4.94	4.14	8.55	6.35	146.43	13.79	80.11	13.46	16.07	14.77
Oil exporters, excl. Russia	0.67	10.22	5.45	5.46	8.26	6.86	164.34	13.11	88.73	12.96	14.90	13.93
Oil importer CIS countries	0.74	7.46	4.10	1.16	2.23	1.69	101.83	17.89	59.86	12.75	17.38	15.07
Baltics	4.30	6.86	5.58	2.81	0.80	1.81	14.12	2.44	8.28	22.69	33.14	27.91

Table 1. The CIS-12 and the Baltic Countries: Selected Economic Indicators (continued)
(In percent, unless otherwise indicated)

	Average trade-to GDP			Average trade with all			Average exports to all		
	1995–99	2000–04	1995–2004	1995–99	2000–04	1995–2004	1995–99	2000–04	1995–2004
Armenia	74.92	74.23	74.58	34.56	21.85	28.20	38.35	22.34	30.34
Azerbaijan	80.40	95.41	87.91	38.30	21.40	29.85	39.73	14.23	26.98
Belarus	105.50	133.87	119.69	70.84	67.28	69.06	73.12	65.81	69.47
Estonia	149.42	165.97	157.70	17.05	18.31	17.68	35.48	23.74	29.61
Georgia	60.18	76.43	68.30	38.03	36.01	37.02	52.66	43.42	48.04
Kazakhstan	72.45	96.67	84.56	51.44	33.38	42.41	47.06	24.37	35.72
Kyrgyz Rep.	89.55	84.89	87.22	58.65	47.11	52.88	59.54	38.53	49.04
Latvia	97.98	95.63	96.80	35.14	27.44	31.29	38.11	22.61	30.36
Lithuania	103.72	105.06	104.39	41.16	31.27	36.21	49.72	32.42	41.07
Moldova	125.53	131.19	128.36	59.22	45.23	52.23	67.05	55.52	61.29
Russia	56.36	60.65	58.51	24.33	19.19	21.76	21.36	17.30	19.33
Tajikistan	173.54	142.66	158.10	53.29	55.50	54.39	40.88	35.15	38.01
Turkmenistan	103.41	75.34	89.38	38.61	46.52	42.56	29.84	51.24	40.54
Ukraine	92.09	112.21	102.15	50.09	40.80	45.44	41.77	29.58	35.68
Uzbekistan	57.83	64.80	61.32	44.73	43.92	44.33	50.00	47.73	48.87
Average all	96.19	101.00	98.60	43.69	37.01	40.35	45.65	34.93	40.29
Average, excl. Russia	99.04	103.88	101.46	45.08	38.29	41.68	47.38	36.19	41.79
CIS-12	90.98	95.69	93.34	46.84	39.85	43.34	46.78	37.10	41.94
CIS, excl Russia	94.13	98.88	96.50	48.89	41.73	45.31	49.09	38.90	44.00
Oil exporters	74.09	78.57	76.33	39.48	32.88	36.18	37.60	30.97	34.29
Oil exporters, excl. Russia	78.52	83.05	80.79	43.27	36.30	39.79	41.66	34.39	38.03
Oil importer CIS countries	103.04	107.93	105.48	52.10	44.83	48.46	53.34	41.48	47.41
Baltics	117.04	122.22	119.63	31.11	25.68	28.39	41.10	26.26	33.68

Source: World Economic Outlook, Heritage Foundation, and author's calculations.
1/ BMGDP is the ratio of broad money to GDP in percent.

Table 2. The Index of Economic Freedom for the CIS-12 and the Baltic Countries, 1995–2004 1/

	Period averages		
	1995–99	2000–04	1995–2004
Armenia	2.45	3.15	2.84
Azerbaijan	1.50	2.26	1.92
Belarus	2.12	1.85	1.98
Estonia	3.60	4.15	3.88
Georgia	2.14	2.49	2.34
Kazakhstan	1.82	2.44	2.26
Kyrgyz Rep.	2.14	2.40	2.33
Latvia	3.07	3.54	3.33
Lithuania	2.89	3.58	3.27
Moldova	2.36	2.68	2.63
Russia	2.37	2.35	2.36
Tajikistan	1.78	1.87	1.84
Turkmenistan	1.56	1.66	1.63
Ukraine	2.16	2.29	2.23
Uzbekistan	1.34	1.57	1.51
Average all	2.22	2.55	2.42
Average, excl. Russia	2.21	2.57	2.43
CIS-12	1.98	2.25	2.16
CIS, excl Russia	1.94	2.24	2.14
Oil exporters	1.72	2.05	1.94
Oil exporters, excl. Russia	1.56	1.98	1.83
Oil importer CIS countries	2.16	2.39	2.31
Baltics	3.19	3.76	3.49

Source: Heritage Foundation (2005) and author's calculations.

1/ The index ranges from 1 to 5, with 5 being the most free. See footnote 6 for full explanation of index.

Table 3. The CIS-12 and the Baltics: Annual Real GDP Growth, 1995–2004
(In percent)

	All 15 countries	Baltics	CIS Excl. Russia	Russia
1995	-4.80	2.31	-6.80	-4.10
1996	0.81	4.34	0.25	-3.61
1997	4.11	8.60	3.14	1.38
1998	2.99	5.74	2.33	-5.34
1999	3.46	0.50	3.84	6.35
2000	7.06	6.20	6.87	10.05
2001	8.22	6.93	8.69	5.09
2002	7.56	6.82	8.07	4.74
2003	8.86	7.43	9.28	7.35
2004	8.49	6.94	9.00	7.14
Average	4.68	5.58	4.43	2.91

Source: World Economic Outlook, 2005, and author's calculations.

Table 4. Impact of Terms of Trade Shocks on Growth in the CIS–12 and the Baltics, 1995–2004

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	excluding Moldova (6a)	(7a)	(4a)	(5a)
terms of trade growth	0.053 ***	0.052 ***	0.514 ***	0.087 **	0.070 **	0.101 ***	0.070	0.070 ***	0.047	0.075 **	0.071 **
capital flows (net, in percent of GDP, lagged)	-0.181 ***	-0.163 ***	-0.152 ***	-0.142 ***	-0.092 ***					-0.144 ***	-0.092 ***
broad money-to-GDP (lagged)	0.480 ***	0.497 ***	0.481 ***	0.510 ***	0.476 ***	0.500 ***	0.440 ***	0.544 ***	0.452 ***	0.52 ***	0.48 ***
inflation [1n(1+0.01*CPI inflation)]	-5.137 ***	-4.787 ***	-4.677 ***	-4.64 ***	-3.8 ***	-4.1 **	-3.89 ***	-3.1 *	-3.381 **	-3.93 ***	-3.8 ***
net remittances (in percent of GDP, lagged)						0.151	0.142 **	0.040	-0.140		
growth of all				0.416 **	0.610 ***	0.461 ***	0.529 ***	0.458 ***	0.553 ***	0.433 **	0.609 ***
trade with all (lagged)				0.174 **		-0.063		-0.073		0.181 ***	
exports to all (lagged)					0.290 ***		0.163 ***		0.177 ***		0.286 ***
*growth of all*trade with all* (lagged)				-0.004		-0.002		-0.004 *		-0.007 **	
*growth of all*exports to all* (lagged)					-0.01 ***		-0.006 **		-0.01 ***		-0.012 ***
economic freedom	1.762 ***	1.206 **	1.862 ***	-0.170	-0.200	-0.195	-0.143	0.310	0.135	0.088	-0.200
*growth of all*economic freedom*				-0.100	-0.237 **	0.070	-0.044	-0.002	-0.163 *	-0.162 *	-0.237 **
*terms of trade growth*economic freedom*				0.060 ***	0.050 **	0.055 **	0.030	0.039	0.017	0.053 **	0.05 **
initial income (3-lag, ln per capita GDP)	-0.009 ***	-0.008 ***	-0.009 ***	-0.008 ***	-0.006 **	-0.001	-0.009 ***	-0.01 ***	-0.008 ***	-0.008 ***	-0.006 **
trade (trade in percent of GDP, lagged)	0.071 ***	0.074 ***	0.074 ***	0.110 ***	***	0.003		-0.016		0.10 ***	
*trade*trade with all* (lagged)				-0.001 *		0.001		0.001		-0.0007	
exports (in percent of GDP, lagged)					0.320 ***		0.274 ***		0.290 ***		0.319 ***
*exports*exports to all* (lagged)					-0.004 ***		-0.003		-0.004 ***		-0.004 ***
volatility of the terms of trade growth		-46.78									
investment ratio (in percent of GDP, lagged)	0.045										
Adjusted R-squared	0.747	0.722	0.722	0.804	0.856	0.751	0.840	0.703	0.790	0.815	0.856
Number of cross-sections	14	14	14	14	14	13	13	12	12	13	13
Number of observations	117	118	118	118	118	111	111	102	102	109	109

Notes: Dependent variable: growth of real GDP.
Estimation using panels with fixed effects. *, **, and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively; based on White heteroscedasticity-consistent *p* -values.

Table 5. Impact of Terms of Trade Shocks on Growth in the CIS–12 and the Baltics, 1995–2004
(Difference Between Net Oil Exporters and Importers)

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	excluding Moldova (5a)	(6a)	(3a)	(4a)
*terms of trade growth*DUMOIL*	0.053	0.055	0.1 **	0.104 **	0.117 *	0.089	0.092 *	0.063	0.090 **	0.086
*terms of trade growth*DUMNOIL*	0.053 ***	0.05 **	0.082 **	0.077 **	0.098 **	0.067	0.070	0.036	0.077 **	0.064
capital flows (net, in percent of GDP, lagged)	-0.183 ***	-0.166 ***	-0.161 ***	-0.107 ***					-0.162 ***	-0.105
broad money-to-GDP (lagged)	0.481 ***	0.5 ***	0.519 ***	0.486 ***	0.499 ***	0.439 ***	0.543 ***	0.448 ***	0.531 ***	0.492
inflation [1n(1+0.01*CPI inflation)]	-5.147 **	-4.707 ***	-4.4 ***	-4.275 ***	-4.044 **	-3.541 **	-3.050	-2.87 *	-3.635 **	-3.466
net remittances (in percent of GDP, lagged)					0.132	0.127 *	0.008	-0.192		
growth of all			0.477 *	0.538 **	0.489 **	0.535 ***	0.479 ***	0.536 ***	0.494 **	0.621
trade with all (lagged)			0.159 **		-0.052		-0.065		0.157 **	
exports to all (lagged)				0.249 ***		0.135 ***		0.131 **		0.247
*growth of all*trade with all* (lagged)			-0.005		-0.001		-0.004		-0.007 **	
*growth of all*exports to all* (lagged)				-0.007 **		-0.006 *		-0.011 ***		-0.012
economic freedom	1.728 **	1.13 *	-0.906	-0.792	-0.633	-0.700	-0.166	-0.535	-0.618	-0.768
*growth of all*economic freedom*			-0.077	-0.137	0.103	-0.011	0.033	-0.144	-0.136	-0.211
*terms of trade growth*economic freedom*			0.062 ***	0.059 ***	0.057 *	0.029	0.045	0.016	0.057 ***	0.050
initial income (3-lag, ln per capita GDP)	-0.009 ***	-0.008 ***	-0.008 ***	-0.007 ***	-0.01 ***	-0.009 ***	-0.01 ***	-0.008 ***	-0.007 ***	-0.006
trade (trade in percent of GDP, lagged)	0.071 ***	0.075 ***	0.105 ***		0.014	***	-0.004		0.092 ***	
*trade*trade with all* (lagged)			-0.001 *		0.001		0.001		0.000	
exports (in percent of GDP, lagged)				0.308 ***	***	0.285 ***		0.297 ***		0.294
*exports*exports to all* (lagged)				-0.004 ***	***	-0.003 **		-0.003 ***		-0.003
volatility of the terms of trade growth		-50.03	-51.897	-39.14	-30.58	-35.89	-28.47	-41.79	-46.93	-39.26
investment ratio (in percent of GDP, lagged)	0.045									
Adjusted R-squared	0.742	0.711	0.802	0.859	0.735	0.828	0.640	0.761	0.787	0.858
Wald test for equality of the two terms of trade growth coefficients										
F-statistic			0.580	1.150					0.325	0.990
p-value			0.448	0.286					0.57	0.323
Number of cross-sections	14	14	14	14	13	13	12	12	13	13
Number of observations	117	118	118	118	111	111	102	102	109	109

Notes: Dependent variable: growth of real GDP.
Estimation using panels with fixed effects. *, **, and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively; based on White heteroscedasticity-consistent *p* -values.

A Guide to the Regressions in Tables 4 and 5

1. **The first three columns of Table 4 show our basic regressions, while in subsequent regressions we experiment with different combinations of variables**. Specifically, in column (4) of Table 4, we introduce *growth of all*, *trade with all,* and some interaction terms. In column (5), *trade* and *trade with all* are replaced with *exports* and *exports to all,* respectively. *Growth of all* and *trade with all* are positive and significant, but their interaction is not significant. *Exports to all* is positively associated with growth, while its interaction with either *growth of all* or *exports* is negatively associated with growth. *economic freedom* loses significance, but its interaction with *terms of trade growth* is positive and significant. The remaining interaction terms are not significant. Except for economic liberalization, all variables included in the baseline regression maintain their significance. Columns (6) and (7) have the same variables as columns (4) and (5), respectively, except that *net remittances* replaces *capital flows* as a measure of external financial flows. *Net remittances* is not significant in column (6) and the other variables, except *trade with all* and its interaction with *trade,* lose significance. In column (7), the coefficient of *net remittances* is positive and significant, and the coefficients of the other variables change drastically. To ascertain to what extent the regressions including *net remittances* among the explanatory variables are affected by potential outliers, in columns (6a) and (7a) we exclude Moldova from the cross sections, as it is the only country in the sample with net remittances far in excess of the sample average. Excluding Moldova, the coefficient of *net remittances*, which was positive and significant in regression (7), becomes negative and non significant. Also the coefficient of growth of the terms of trade declines, while remaining non-significant in column (7a), as it was in column (7).

2. ***Net remittances* seems to perform more poorly than *capital flows* as a proxy for external financial flows**. For the full sample, the fit of the regressions including *capital flows*—columns (4) and (5)—is better than that of the corresponding regressions—columns (6) and (7)—which include *net remittances*. The same is true when Moldova is excluded from the sample. Not only is the fit of the regressions in columns (4a) and (5a) better than that of the regressions in columns (6a) and (7a), respectively, but also the coefficients are almost the same as in columns (4) and (5), suggesting that Moldova is probably not an outlier when *capital flows* rather than *net remittances* is the indicator of external financial flows.

3. **To explore whether the growth effects of the terms of trade shocks differ between net oil exporters and importers, we include two separate terms of trade shock variables in the regressions**. *Terms of trade growth* is interacted with *DUMOIL* and *DUMNOIL* in the regressions presented in Table 5. In the first two columns of Table 5, *terms of trade growth* DUMOIL* is marginally not significant and volatility of the growth of the terms of trade is marginally significant in column (2), which is the baseline for the new series of regressions. When additional variables of interest are included, the results compare with those in Table 4. Columns (3) and (4) compare with columns (4) and (5) in Table 4. The direct growth effect of terms of trade growth is positive for both net oil exporters and importers. The regressions presented in the remaining columns follow the same steps of

including *net remittances* and checking for its explanatory power after dropping Moldova. Again, regressions in which external financial flows are measured by *capital flows* perform better than corresponding ones in which *net remittances* replaces *capital flows*. In particular, the regressions in columns (3), (3a), (4), and (4a) have a better fit than that of the regressions in columns (5), (5a) (6), and (6a), respectively.

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