

Russia (1991-2001): A Reassessment of Macroeconomic Performance in Comparative Perspective¹

*Russia is always stronger, and weaker, than it looks”
(Old adage, “Economist”, February 23, 2002)*

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Abstract

Using Törnquist-Divisia index numbers' formula, Augmented Solow Production Function, Ordinary and Modified Human Development Indices (adjusted for Index of Institutional Quality (IIQ) and IT dissemination), the author makes an attempt to reassess *de nouveau* Russia's macroeconomic performance during the first transition decade. The main findings are as follows: 1) Despite considerable social, demographic and economic sacrifices, Russia is already approaching pre-reform levels of per capita GDP; 2) Output contraction was *substantially* less than is generally believed; 3) Liberalization significantly increased factors' flexibility, enhanced cost-effective processes. Calculations suggest that on the whole in 1991-1998 Total Factor Productivity (TFP) might not have diminished: the decline in Total Factor Inputs (TFI) was, perhaps, greater than in GDP; 4) If the relative level of Russia's IIQ, IT dissemination and huge outflows of human and financial resources are factored in, Russia's *overall* comparative performance turns out to be *no better* than for the *lower* middle income countries; 5) Russia's reforms are progressing, but slow. Its growth underpinnings are rather shaky: in 1999-2001 economic recovery was largely due to extensive factors. More vigorous pro-reform policies, including intensive institution-building, human capital and IT upgrading, can and should be realized to cope with internal problems and challenges of the new century.

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Transitology has become voluminous, but as a liberal science it is open to reinterpretations, based on facts, logic and rational models. Trying to take stock of Russia's performance in 1991-2001, we considered essential: 1) as far as possible to escape (politically motivated) biases and preferences in judgments; 2) to apply (where it was justified) some of the modern tools of analysis, repackaging new (and not very new) data.

1. *Economic transformations and problems.* As it is well known, by the end of the 1980s the Soviet system had become increasingly unworkable, being at the same time dangerously decaying and persistently 'unreformable'. After the failed coup-d'etat, organized by hardliners, and dismantling of the USSR in 1991, no room was practically left out for gradual reforms. The system was subjected on the whole to radical, yet, to a large degree, haphazard and painful transformation. This kind of transformation was, however, caused not only (and not so much) by the 'errors of young reformers' and lack of experienced cadres for this new job. Enormous economic, political and institutional hurdles, representing heavy communist legacy (including widespread corruption, rent-seeking activities of the former *nomenklatura*, the dominance of communists and other antireform fractions in Russian parliament), and egregious weakness of the state hindered the implementation even of the most urgent reforms.

So, I would argue that one must be surprised not so much by relatively unimpressive economic and social performance of the 1990s, as by the fact that the things had not got uglier (with much more chaos, political and social disorder, as was the case in some post-communist societies) and that some of the most vital reforms had been carried out.

Despite some clear setbacks, the main aims of internal and external liberalization were more or less attained. However, hyperinflation of 1992, the dimensions of which had not been predicted by almost anybody, nearly liquidated household savings, what caused people's deep discontent and had a harsh negative impact on the economy. Nevertheless, the rapid growth of monetary mass and prices was eventually restricted (table 1).

Table 1
Annual Growth of Consumer Price Index and Monetary Supply Aggregates

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CPI (times)	1.93	26.09	9.39	3.13	2.31	1.22	1.11	1.85	1.37	1.20
M2, %	110	670	395	228	130	34	30	36	57	62
M2/GDP, %	...	...	19.0	16.0	14.3	13.4	15.1	16.6	15.5	21.1

Sources: Russian Federation: Selected Issues, 2000, *IMF. Staff Country Report N 00/150*. Washington, D.C. P.43;
Russian Economic Trends. Russian-European Center for Economic Policy (RECEP). Vol.9, N 4, 2000. P.7, 77, 82.

These processes were largely determined by the decrease in government deficit, which was primarily (by 2/3) accounted by the cuts in government expenditures and to some extent (less by 1/3) by the increase in budget revenues (see table 2). Internal monetary demand was significantly curtailed by realization of unpopular policy of arrears (including wage arrears)². One can also see from the table 1 that M2/GDP is meager compared to advanced and middle income countries³. It reflects very serious underdevelopment of the banking sector in Russia.

Table 2
Enlarged Government, % GDP

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Revenues	29.1	30.9	34.6	34.1	33.5	36.5	33.4	35.6	38.8
Expenditures	56.8	43.9	45.0	40.2	42.4	44.4	41.4	39.4	35.6
Balance	-27.7	-13.0	-10.4	-6.1	-8.9	-7.9	-8.0	-3.8	3.2

Sources: Russian Federation: Selected Issues, 2000, *IMF*, P.79; Russian Federation: Report on Post-Program Monitoring Discussions. Washington, D.C., July, 2001. *IMF. Country Report No.01/102*. P.6.

² The amount of total arrears as % of annualised GDP diminished from 47 in 1998 to 32 in 1999, 24 in 2000 and 12 in 2001 (it has risen before – from 5% in 1993 to 29% in 1997. Russian Economic Trends. P.87).

³ Here we display extended M2=M2+foreign currency deposits.

The dimension of Russia's external liberalization to some extent can be demonstrated by the index of trade openness (export plus import of goods and services related to GDP, measured in current exchange rates). This index rose from 27 % in 1991 to 44% in 1997 and 66% in 2000⁴.

Russian government launched an ambitious and intensive privatization program. Its implementation was, however, associated with errors and corruption. But eventually, privatization and the creation of new enterprises have drastically changed the shape of the Russian economy. In 1992-2000 the share of the employed in state and municipal sector declined from 68.9% to 38.1% and in the private sector it soared from 19.5% to 45.0% (the share of total employment in mixed forms of ownership increased from 11.6% to 16.9%).⁵ By the beginning of 2001 the private sector accounted for nearly 3/5 of the total Russia's capital stock, 3/4 of the total number of Russian registered enterprises and 70% of the measured GDP.⁶

By many *conventional* criteria, the overall Russia's performance of the last decade is rather unimpressive. This can be primarily explained by poor protection of property rights, legal uncertainties, arbitrary regulations and awfully poor functioning of the rule of law⁷. According to official data, to some extent adjusted by experts of Goskomstat, IMF and World Bank, in 1991-1998 real measured GDP curtailed by 42-43%, agricultural production – by 44% and industrial production decreased by 54% (machine building industry fell by 63%, light industry - by 88%).⁸

The 1990s have witnessed a very rapid des-industrialization in production and employment structures of the Russian economy and the parallel increase in the production and employment shares of the services (Table 3). All that is not a negative trend in itself, because nearly the similar tendencies are under way in the advanced and in newly industrialized countries. The problem is in a very harsh absolute and relative (as a share of total industry) drop in machine-building and light industry and a rise in importance of fuel and first-stage-processing industries (up to 60 % in 1999-2000)⁹. Crisis in Russian industry, destruction of traditional commercial

⁴ Russian Federation: Selected Issues, 2000. P.29; Russia in Figures, 2001. P.152, 354.

⁵ Russia in Figures, 2001. P.78.

⁶ Rossiiskii statisticheskii ezegodnik .Moscow, 2000. P.269; Russia in Figures, 2001. P.157.

⁷ See: O'Driscoll et al.(2000, pp. 21, 315-316); Stiglitz (1999); Aslund (1999, pp.19-20); Ellman (2000); Shorroks, Kolennikov (2001); Lucas (2001); Popov (2000, 2001); Transition (2001, prt.2).

⁸ Rossiiskii statisticheskii ezegodnik, 2000. P.16; Russia in Figures, 2001. P.32, 177; Russian Federation: Selected Issues, 2000. P.29. Our recalculation of the figures for 1991-1998 as well as the data concerning the period of 1999-2001 will be dealt with in part 3.

⁹ Rossiiskii statisticheskii ezegodnik, 2000. P.305.

links with countries in Eastern Europe and former republics of the FSU and loss of other external markets (due to acute competition with developed and less developed countries - DC and LDC) have substantially deteriorated the structure of Russian exports. By the end of 1990s fuels, raw materials, as well as products of the first stage of processing of this materials totaled nearly 4/5 of all Russian merchandise exports¹⁰.

Table 3.
The evolution of the structure of the Russian Economy in 1990s, %

Sector/Year	Gross Domestic Product			Effective Employment		
	1991	1995	1999	1991	1995	1999
Agriculture	14.0	6.7	6.9	13.5	15.1	13.8
Industry ¹	47.6	42.2	37.8	41.8	35.2	29.9
Services	38.4	51.1	55.3	44.7	49.7	56.3

¹Including construction.

Sources: Rossiiskii statisticheskii ezegodnik, 2000. P.112; Russia in figures, 2001. P.32; Russian Federation: Selected Issues, 2000, *IMF. Staff Country Report N 00/150*. Washington, D.C. P.30, 34.

Among many acute economic problems of the 1990s at least three should be especially emphasized – drastic collapse of the share of gross capital formation (from 37.1% of GDP in 1991 to 15.4% in 1998), real collapse in the volume of gross (fixed) investment (in 1991-1998 – by 83-86%); rapid rise in external debt (from \$60 billion in 1990 to \$183.6 billion, or 62% of Russian GNP in 1998)¹¹ and the parallel outflow of capital, which can be roughly measured by net exports of goods and services related to GDP (measured in current exchange rates) – from 0.3% of Russian GDP in 1991 to 7.2% in 1998, 16.8% in 1999 and 20.4% in 2000.¹²

Being very rich in natural resources, Russia during the period of radical transformation possessed financial resources for capital accumulation even without substantial increase of foreign debt. But the legal and institutional environment has been, as was already emphasized, very poor. Early and rapid opening of external capital account made it quite easy and profitable

¹⁰Russian Federation: Selected Issues, 2000. P.106; Rossiiskii statisticheskii ezegodnik, 2000. P.582.

¹¹World Bank. World Development Report, 2000/2001. Washington, 2001. P.315; Russian Federation: Report on Post-Program Monitoring Discussions. Washington, D.C, 2001. *IMF. Country Report No.01/102*. P.17

¹²Rossiiskii statisticheskii ezegodnik, 2000. P. 265; Russia in Figures, 2001. P.152.

to strip assets of the privatized (and not privatized) enterprises and eventually to transfer capitals abroad. According to estimates by Russian economist A.Lifshitz, during the 1990s average annual outflow of capital from Russia was equal to some \$20 to 25 billion.¹³

Wear and tear of fixed assets as percent of the total value of industrial funds has risen dramatically from (25.7% in 1970, 36.2% in 1980) 46.4% in 1990 to 52.4% in 2000. For machines and equipment this indicator has reached 66-67%.¹⁴ (Making some adjustment to official figures, one can say, that no less than 2/3 of Russian equipment is technically obsolete).¹⁵ Perhaps, much more telling is the evolution of the average age of the industrial equipment (in years): 8.4 in 1970, 9.5 in 1980, 10.8 in 1990, 14.1 in 1995 and 17.9 in 1999. In 1990 ¼ of the Russian industrial equipment was ‘older’ than 20 years; by 2000 this figure was close to 3/5.¹⁶

2.Deterioration in the social sphere. First of all, it should be pointed out to the phenomenon of depopulation, brought about by long-term demographic processes that had already been under way in Russia before the start of the reforms, as well as by the effects of deep economic and social crisis of the 1990s. Although by the end of the 1980s average annual growth rates of the Russian resident population was diminishing (in 1985-1990 it was no more than 0.6% per annum), in the 1990s we have been witnessing an abrupt absolute decline – from 148.3 million in 1992 to 144.8 million in 2000 and 144.0 million in 2001¹⁷. The analysis of vital statistics rates reveals that it was caused not only by the decline in number of births (per1000 population), but also it was determined by the increase in number of deaths¹⁸.

Life expectancy at birth in Russia, which reached its peak in 1989 (69.6 years), decreased to 65 years by 2000¹⁹. According to this indicator and to the newly introduced index of disability adjusted life expectancy at birth (58-59 years), Russia’s figures are lower than the average for middle income countries²⁰.

¹³ Radio ‘Svoboda’. 03/11/1999.

¹⁴“Rossiiskii statisticheskii ezegodnik” (2000, pp.270, 315); Russia in Figures (2001, p.183).

¹⁵The percentage of worn out equipment in agriculture and in some branches of industry reaches 70-75% (Izvestia, 05/04/2001).

¹⁶ “Rossiiskii statisticheskii ezegodnik” (2000, pp.270, 316).

¹⁷Rossiiskii statisticheskii ezegodnik”, 2000. P.53; Russia in Figures, 2001. P.26; Melikova, 2002.

¹⁸ As a result, natural increase per 1000 of population, which was positive in 1980s (5.3 in 1985, 2.2 in 1990), changed into decrease and augmented from (-)1.5 in 1992 to (-)6.6 in 2000. (See: Rossiiskii statisticheskii ezegodnik, 2000. P.53; Russia in Figures, 2001. P.70).

¹⁹Rossiiskii statisticheskii ezegodnik, 2000. P.53; Russia in Figures, 2001. P.72.

²⁰World Bank. World Development Indicators, 2001. P.114-116.

The share of Russian population, living in poverty, increased from 5 to 10 % in 1987-1991 to approximately 28-30 % in 1999-2000.²¹ Gini index (measuring the distribution of money income) testifies to rapid growth of inequality among Russian population. Russian statistics reports that this index has risen from 0.260 in 1991 to 0.409 in 1994, but then diminished to 0.375 in 1996. Later on it started to grow and in 1998-2000 reached 0.390-0.400.²² Although these figures depict an alarming picture, they probably underestimate the dimension of inequality in contemporary Russia. Suffice it to say, that according to the data from Human Development Report 2001, Gini index (based on consumption shares)²³ for Russian Federation in 1998 was much higher – 0.487. (The richest 10% of population possessed 38.7% of consumption funds, while poorest 10% had only 1.7%).²⁴ Judging by the data, given by the UNDP, Russia was among the 23 countries of the world with most acute income/consumption inequalities.

3.1. *However, a more accurate look at statistics* can produce more favorable image of Russian economic performance during the 1990s. It should be acknowledged that some upward adjustments to the dynamics of Russian GDP have been already made by Russian, IMF and World Bank experts in the middle of the 1990s.²⁵ Some scholars (E.Gavrilenkov, M.Sidorov) suggest that the evolution of energy consumption and transport freight-turnover could be rather good approximations for the dynamics of GDP or industrial production. But this approach is criticized by other researchers. They argue, using examples from historical statistics (including US data for 1929-1932), that the correlation mentioned above could be correct in normal times. In periods of crisis it could bring about overstatement/underestimating of GDP growth. All depends on the intensity (based on system of incentives), with which these components of intermediate consumption are used.²⁶ So we did not use this method for correction of GDP figures.

²¹These figures should be treated as tentative, as not all incomes (including in kind) are taken into account by statistical agencies. (See: World Bank. Russian Federation Towards Medium-Term Viability. Washington, June 1995. P.6; World Bank. World Development Indicators, 1999. Washington, 1999. P.7; Russia in Figures, 2001. P.99).

²²Rossiiskii statisticheskii ezegodnik, 2000. P.155; Russia in Figures, 2001. P.108.

²³ Gini indices gauged using the data on consumption usually underestimate the real dimensions of inequality, as poor people generally consume a greater proportion of their income than rich people do.

²⁴ UNDP.Human Development Report, 2001. P.183.

²⁵See: Vsemirnyi Bank (1995, p.XX-XXII).

²⁶ Hanin (1997, p.59).

Very interesting recalculations of Russian consumer price index (CPI) for 1992-1996 has been made by Russian economist V. Bessonov. He managed to prove that, due to changes in consumers' preferences for cheaper goods and services, which were not factored in by official statistics, the official CPI for these years was overstated by 35%.²⁷ It means that all other factors being equal, during the period under consideration average annual rates of decline in Russian GDP must have been *at least* 3 percentage points less (as at that time private consumption in Russia reached approximately ½ of the GDP).

3.2. *I have made some adjustments to the official Russian figures of GDP dynamics* (decline) in 1991-1998. First of all, I have built chained production index of Russian GDP, applying official numbers of growth (decline) rates of production in three main sectors (agriculture, industry and construction, and services), weighted by changing weights: they represent the average shares of value added of these sectors (measured in current prices) for each pair of subsequent years (1990 and 1991; 1991 and 1992 etc). *The average annual rate of decline in 1991-1998 turned out to be (-) 5.9% instead of (-)6.7%*, which is currently the average of the official annual growth rates of Russian GDP for that period.²⁸ This result was due to the increasing share of the services' sector, which did not experience comparatively harsh decreases in its 'production'. (Moreover, it should be argued that the dynamics of this sector is probably underestimated, as for most branches of this sector inputs' proxies are usually used without adjustments for the possible growth in efficiency and productivity under new market circumstances).²⁹

GDP growth, measured at production basis, is frequently biased downwards (because of underestimating of output, overstatement of intermediate consumption and application of poor deflators). *That is why I constructed a weighted chain index of GDP measured by final*

²⁷ Bessonov (1998, p.60).

²⁸ Calculated on: Russian Federation (2000, p.5); Russia in Figures (2001, pp.32-33); Rossiiskii statisticheskii ezegodnik" (2000, pp. 16, 252-257).

²⁹ Using the data of World Bank for 1990-1999 it is possible to demonstrate that if we apply the weights (sectors' shares) of 1990 (share of GDP, attributed to agriculture is equal to 17%, to industry 48%, to services 36%) and take into account the respective average growth rates of value added in these sectors – (-)7.9%, (-)9.6%, and (-)2.2%, the average annual GDP growth rate will be (-)6.7%. But if we use a 'modernized' proportions of GDP, which has undergone changes during the transitional period (for 1999 it was respectively 7%, 34% and 58%), the weighted average growth rate of GDP would be (-)5.1. (See: World Bank. World Development Indicators, 2001. P.195; World Bank. World Development Report, 2000/2001. P.297). So there is a big difference. By first estimate, using outdated system of weights, Russian GDP curtailed nearly by half. By the second estimate, which is based on application of new weights (of 1999) to each year beginning from 1991 (this procedure also creates some bias), the GDP declined but only a little bit more than by 1/3. The average of the two estimates of growth rates is (-) 5.9 and it nearly tallies the result of my chain calculation.

expenditure (with changing weights/shares of main components). In 1991-1998 average annual real growth rate of this aggregate turned out to be equal to (-)4.1%. This much more 'positive' result was due not only to very fast growth (in volume) of net exports of goods and services in Russia (let us remember the massive outflow of capital from Russia at that period). Despite awfully high annual rates of decline in real gross investment (on average (-)21.7%) households' consumption contraction was relatively small (-) 1.4% per year.³⁰

It is to some extent arguable, but two of my estimates of GDP growth (at production basis and by expenditure) do not overtly take into account unofficial economy. I assumed, basing on some published estimates that unofficial economy was about 14-18% of the Russian measured GDP in 1990 and about 30-40% in 1993-1998.³¹ Applying this proportions to two of my estimates of GDP growth I obtained the following figures for respectively two adjusted average annual GDP growth: (-) 4.0% and (-) 2.1%. The results are tentative, but they are seemingly robust: consumption contraction per annum was substantially smaller, than my second estimate. My guess, the second estimate is closer to reality.³²

To sum up, in 1991-1998 the contraction of Russian GDP was not by 42-43%, or (-) 6.7% on average per annum (according to Russian official point of view shared by the IMF and the World Bank, see above), but substantially smaller. I have calculated three approximate variants of decrease in GDP:

- 1) by 38-39%, or by an annual average rate of (-)5.9%;*
- 2) by 28-29%, or by (-) 4.1% per annum;*
- 3) by 15-16%, or by (-)2.1% annually.*

So my conclusion is that the *cumulative decline in GDP in 1990-1998 was 1.5 or 2.5 times less than it is generally conceived*. I posit that the Russian people on the whole has actually been much more adaptive to new circumstances, although social, demographic and other costs involved, as we have seen above, were considerable. The point is that the state did not *play the*

³⁰ Calculated on: Russian Federation (2000, p.29).

³¹ Ivanov Y., Alekseev A. (2000, p.19); Nekotorie problemi retrospektivnogo ischislenia VVP Rossii (Some problems of the measurement of the Russian GDP), *Voprosi Statistiki*, 2000, N 5. p.19; "Rossiiskii statisticheskii ezegodnik" (2000, p. 249).

³² My calculations are based on GDP approach. I have not tried to exclude defence spending and unsaleable goods from the GDP of 1990. No approximations are made on the change in quality of produced goods and services. Some of these revisions are made by A.Aslund, but his approach is most likely that of welfare than of GDP. (See: Aslund, 2001).

proper role – in creating a sound environment for capital formation, diminishing the ‘room’ for rent-seeking activities, curtailing corruption and crime.

3.3. *Was the transformational crisis accounted primarily by the fall in productivity, as it is often claimed, or by the reduction in inputs and productivity as well, and to what extent?*³³ This issue is crucial for understanding the viability of the forces and factors capable in principle of bringing about steady rebound in economic growth.

In order to assess such viability/vitality we shall apply the very simple model of production function (because of data limitation). The formula we used is as following:

$$Y = \alpha * L + (1 - \alpha) * K + R,$$

where Y, L, K denote respectively average annual growth rates of GDP, labor and capital input. Each of the measured inputs was corrected for utilization of ‘capacities’; some adjustment was made for the identified dynamics in quality. R is residual, which can be interpreted as the growth of Total Factor Productivity (or, if you want, the ‘measure of ignorance’).

3.3.1. From Russian national accounts statistics (GDP, national income) it is not easy to sort out exactly the corresponding shares of labor income and profits. The share of wages in Russian GDP was on average equal in 1991-1994 to 43-44%, in 1995 - 45%, in 1998 - 47% and in 2000 - 40%. But profits as well as some part of labor income are included in mixed income, which in 1991-1994 reached on average 48-50%, some 43% in 1995, 38% in 1998 and 43% in 2000 (the remaining part adding up to 100% represents net taxes).³⁴ Assuming, as is done in some research works on growth accounting, that labor’s share in the ‘mixed incomes’ is approximately 1/3 and recalculating the respective shares in percentage points, given above, it is possible to arrive to a

³³ See: De Broeck, Koen, 2000; Dolinskaya (2001). According to M. De Broeck and V. Koen (who obviously did not make substantial corrections on the data, concerning output and input statistics) in Russia in 1991-1997 average annual decline in GDP was about 7.5%, factor (capital and labor) inputs contribution totalled (-)1.6 percentage points and Total Factor Productivity (TFP) fall (by approximately 6.0% per annum) accounted for about 80% of Russia’s GDP contraction (De Broeck, p.15). Having discussed the problem of possible inaccuracy in the measurement of Russian GDP growth during the transitional period (1991-1997), I. Dolinskaya, however, did not make any correction on the data of GDP. But she made some reasonable adjustments for the utilization of inputs. On her calculations, average annual contraction in TFP was about 4-4.3% and its contribution to GDP decline was equal to 50-53% (Dolinskaya, 2001, p. 19-20).

³⁴ See: Rossiiskii statisticheskii ezegodnik” (2000, p. 250); Russia in Figures, 2001, p.115.

conclusion that the corresponding shares of labor and capital in 1990s could have been on average 2/3:1/3.

3.3.2. Let us, first of all, gauge the labor input. According to official estimates, in 1990-1998 the employment diminished from 75.3 million to 63.6 million people, or approximately by 2.1% annually. (By 2000 it rose to 64.6 million, or roughly by 0.8% per annum).³⁵ Taking into account the figures of the involuntary underemployed (some 3.7 million in 1990, 8.2 million in 1998 and 2.7 million in 2000/2001),³⁶ one can arrive at a (tentative) conclusion, that effective employment could have possibly decreased from 71.6 million to 55.4 million, or by an average annual rate of 3.2%. (By 2000/2001 it increased to 61.9 million, or by approximately 4.0% per annum). Some amendments should be also made on the quality of the employed.

The 1990s was not the best period in Russia for the development of education, health and science. According to estimates made by the Russian economist B.Bolotin, the share of R&D expenditures in GDP curtailed: from 2.2% in 1991 to 0.6% in 1998 (calculation on data in current prices) or from 2.2% to 1.5% (in constant prices of 1990). For the same period the share of health and educational expenditures in GDP (measured in constant prices of 1990) have possibly increased respectively from 2.4% to 4.0% and from 5.1% to 7.4% (in current prices the corresponding figures were only 2.4 and 2.6% and 5.1 and 3.8%).³⁷ But it should be borne in mind that B.Bolotin apparently considered that in 1991-1998 Russian GDP contracted by 34-36%.³⁸ It seems plausible to infer from this data that real health and educational expenditure at least did not increase, and R&D expenditures decreased by 55-65%.

Despite a certain decline in the enrolment rates in Russia during the first years of transition, on the whole the number of students in general (plus vocational) institutions rose in 1990s: from 22.3 million in 1990/1991 (15% of Russia's population) to 25.7 million (17.6% of population) in 1998/1999, although it decreased to 24.6 million in 2000/2001 (17.0%). The number of students in higher education after the middle of the 1990s was progressing more rapidly: from 2824 thousand in 1990 (1.9% of Russia's population) to 3598 thousand (2.5%) in 1998 and 4742 thousand (3.3%) in 2000. It also should be pointed out that in higher education the faculty with candidate degrees increased in 1990-2000 by 10-11% (from 115,200 to 127,200) and the faculty

³⁵ Russia in Figures, 2001. p.79; Rossiiskii statisticheskii ezegodnik" (2000, p.16, 112).

³⁶ See: RECEP (2000, p.74); Rossiiskii statisticheskii ezegodnik" (2000, p.105,112) and our estimates for 2001.

³⁷ See: Kuznetsov (2000, p.83).

³⁸ See the detailed system of deflators, used by B.Bolotin, cited in Kuznetsov (2000, p.81) and Rossiiskii statisticheskii ezegodnik" (2000, p.16, 112).

with Doctoral degrees nearly doubled (from 13,700 to 27,200). However, during 1990s the number of researchers in scientific institutions of Russia decreased by approximately 60 % - from 1,227,000 in 1990 to 492,000 in 1998 (in 2000 it rose to 511,000).³⁹

It is worth mentioning that liberalization intensified the brain drain -- the internal and external migration of researchers, professionals, scholars. On estimates, in the 1990s 10-20% of all Russian scientists (and among them 1/4-1/3 of the best) left Russia forever or temporarily.⁴⁰

The data on educational attainment of the Russian adult population for 1989 and 1994, as well as for Russian employed population, allow us to make conclusion that the share of employed with higher (mostly complete higher) education in the number of all employed increased from 16.9% in 1989 to 22.6% in 1998 and 26.2% in 2000. The share of those with secondary education rose respectively from 67.6% to 70.6% and 71.9%. And proportion of those with elementary education decreased from 15.5% to 6.8% and 1.9%.⁴¹ Following A.Maddison's 'tradition', let us give to primary education a weight of 1, secondary 1.4 and higher 2, in line with international evidence on relative earnings associated with different levels of education.

We can now assess the weighted years of education for the Russian employed population. By our estimates, this indicator increased from 11.4 years in 1989 to 12.1 in 1998 and to 12.5 in 2000/2001. Based on these data, it is possible to suggest that the quality of labor, gauged by the index of educational attainment, was increasing annually during 1991-1998 by 0.7% and in 1999-2001 by 0.9%. Summing up the measured effects of 'quantity, utilization and quality', we can infer that in 1991-1998 labor input in Russia was on average decreasing annually by (-) 2.5% [(-)2.1%+(-)1.1%+0.7%].

3.3.3. With regards to the input of Physical capital stock (PCS), it should be pointed out that Post-Soviet Russian statistical agencies go on publishing quite odd figures on the indices of physical volumes of Gross Capital Stocks: in 1971-1980 +7.4% annually, in 1981-1990 +5.6% annually.⁴² Later in the 1990s the figures of annual growth of PCS have been smaller (see table 4), but despite a certain and substantial physical and moral decay, it is quite clear that these effects have not yet been properly factored in.

³⁹“Rossiiskii statisticheskii ezegodnik” (1995, p.147; 2000, p.181, 204, 481); Russia in Figures (2001, p.115-120, 266).

⁴⁰ Granin (2000, p.83).

⁴¹“Rossiiskii statisticheskii ezegodnik”, 1995, p.119; 2000. p.117.

⁴² Rossiiskii statisticheskii ezegodnik, 2000, p.269,270.

Table 4.
Annual growth of the volumes of Physical Capital Stock and Gross Capital Formation
(GCF), official version, %

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PCS	4.1	3.5	1.9	0.5	-0.2	0.1	-0.1	-0.4	-0.4	0.1	0.2
GCF	0.1	-15	-40	-12	-24	-10	-18	-5	-12	5	17

Source: Rossiiskii statisticheskii ezegodnik, 2000, p.269-270; Russia in figures, 2001, p.32, 58.

Given the fact that in the 1990s there occurred a very sharp decline in real gross investment (table 4), it is also quite queer to find out from Russian statistics that the rate of obsolescence in Total Physical Capital (the percent of worn out funds) was not noticeably increasing: 40.6% in 1992, 38.6% in 1995, 40.1% in 1998 and 39.1% in 2000.⁴³ So, based on these two sets of data on GCS, one could possibly suggest that capital input was rising on average per annum: in 1991-1998 by 0.7% and in 1999-2000 by 1.0%.

I find these figures odd. Applying R.Goldsmith's perpetual inventory method, I have added to the volume of GCS that existed in Russia in 1990 (its value was about three times greater than that of Russian GDP) the annual volumes of diminishing investments. No allowance was made (because of the limitation of data) for necessary withdrawal of fixed assets. But it must have been great. The share of equipment in Russian industry which had the average age more than 15 years increased from 25.8% in 1990 to 50.2% in 1998 and 55% in 1999.⁴⁴ On our estimates, (overworn) Russian GCS in constant 1990 prices rose from 1.83 trillion rubles in 1990 to 2.46 trillion in 1998 and 2.61 trillion rubles in 2001 (estimate)⁴⁵. To correct these 'inflated' figures of capital input growth, I had nothing to do but to adjust them for average capacity utilization rate, which I calculated as a weighted average on the data for industrial enterprises (86.5% in 1990; 79.4% in 1991; 68.0% in 1992; 45% in 1998 and 57-58% in 2000/2001).⁴⁶ The adjusted figures

⁴³ Russia in Figures, 2001, p.59.

⁴⁴ Rossiiskii Statisticheskii Ezegodnik, 2000, p.316.

⁴⁵ Rossiiskii Statisticheskii Ezegodnik, 2000, p.14, 16, 546; Russian Federation (2000, p.29); Russia in figures, 2001, p.317; "Expert", 2002, #6, February, 10.

⁴⁶ Rossiiskii Statisticheskii Ezegodnik, 2000, p.314; Russia in Figures, 2001, p.175-182.

for Russian GCS show that in 1991-1998 capital input may have decreased on average by 4.4% annually (but after the crisis of 1998, in 1999-2001, it was already growing by 10.6% annually).

In order to gauge roughly the dynamics of quality of Russian GCS, I constructed an approximate weighted index of the age deterioration of GCS, using the data for rapid rise in the age of equipment (in industry – from 10.8 years in 1990 to 16.1 in 1998 and 17.9 years in 1999), taking into account that in total Russian GCS machines and equipment reached 27-33% (in gross fixed capital formation equipment constituted 38% in 1990, 28 % in 1998 and 33% in 2000) and also taking into consideration that in the segment of GCS, encompassing structures and buildings, the obsolescence in the 1990s was 1.5 to 2 times less than in the ‘equipment’ segment.⁴⁷ The rough order of magnitude of the decrease in quality was about (-)3.0% per annum in 1991-1998 and in 1999-2001. So adjusted for quality, capital input diminished on average in 1991-1998 by 7-8% annually, and in 1999-2001 (estimate) it, on the contrary, could have grown by 7-8% annually.

Before pulling together our estimates of inputs and calculating the growth of total factor inputs as well as of total factor productivity growth, it is possible make a few remarks on the dynamics of *the structure of total capital stock*. Due to considerable degradation of conventional physical capital stock (intensive process of underinvestment) and comparatively better dynamics of investments in human capital, the proportion of the later in total stock *increased from 1/4 in 1990 to 1/3 in 1998-1999*. So this relative amelioration in the structure of TCS should be much enhanced through active investment in both stocks, *but it should be borne in mind that in DC the proportion of human intangible capital to conventional physical capital is already 2:1 and in the USA 2.5-3:1. It means that, being stuck in the transitional problems, Russia is lagging far behind the DC by this crucial proportion of development (See table A2).*

3.3.4. The table A3 depicts ‘scenarios of interpretation’ of Russian economic decline in the 1990s. According to variant ‘A’ (let us call it an ‘official’ version) nearly all the decline was due to the fall in efficiency, in TFP. But we have just made corrections to the growth of GDP and major inputs.

Variant ‘B’ is not a radical change with respect to calculation of GDP growth. But in the variants ‘B’ through ‘E’ we have gauged augmented pack of inputs. Although variant ‘D’ for

⁴⁷Rossiiskii Statisticheskii Ezegodnik, 2000, p. 270, 316; Russia in Figures, 2001, p.321.

1990-1998 is possibly the most comprehensive (among the considered cases) from the point of view of the measured effects in inputs and in output as well, some double account in effects is not ruled out. Possibly, at least partly, the effect of unofficial economy was already factored in, when GDP was recalculated (in variant 'C') on an annual base from the expenditure approach. So, to my mind, the real picture of the growth performance is captured in between two scenarios – 'C' and 'D'.

It is plausible, from my point of view, that 'the true' average annual growth rate of the Russian GDP in 1991-1998 was close to (-) 3.0% (cumulative contraction by 20-25%). TFI decline was even greater (by 27-33%). But as the economy was moving from plan to market, some cost effective processes got under way. And despite overall decline, the very painful transition has already resulted in some growth in efficiency: the average annual growth rate of TFP could have been growing by some 1.0%.

3.3.5. This finding is not at all new, as in some other transitional (Visegrad) countries TFP have already started to impact considerably their economic growth.⁴⁸ In Russia this figure was massively (two-three times) lower. This positive phenomenon is quite unstable, but the process is, nevertheless, quite important for the start of the effective transition from plan to market and the productivity-based economic growth.

3.4. In 1999-2001 substantial real devaluation of ruble, increase in external competitiveness, enhancement of the import-substituting processes⁴⁹ and the rise in oil revenues brought about considerable extension of productive capacities and resumption in growth of capital formation. Russian GDP began to grow, but its quality is rather poor (low-tech, almost no high-tech) and *its underpinnings are still very shaky. This growth is not accompanied by the increase in TFP (See table A3).*

3.5. Comparative calculations made for 1990-2001 show that Russian GDP per capita first declined and then recovered to 95 % of 1990 level. And the gap in average incomes between the developed countries and Russia has risen from 2.7 to 1 to 3.4 to 1 (see table A1).

According to per capita GDP, in 1990 Russia/USSR were more or less *somewhere in between LDC and DC*, but by 2001 the situation had massively changed. *The relative distance between*

⁴⁸De Broeck, Koen (2001, table 7).

⁴⁹ The share of imports in overall retail trade after rising from 14% in 1991 to 48-52% in 1994-1997 fell to 30-34% in 1999-2000 (See: RECEP, 2000, p.73).

Russia and, for example, China has become much shorter than between Russia and DC. In 2001 Russian per capita GDP was only two times more than Chinese, but German and U.S. indicators of GDP per capita have already become respectively 3 and 4 times greater than Russian average income. The absolute gap in per capita GDP between the advanced countries and Russia grew by third (from \$15,000 to nearly \$20,000, in 2000 international dollars).⁵⁰

Although during the 1990s Russia's life expectancy at birth and GDP per capita decreased, the formal indicator of educational attainment has apparently increased (see table A1). That is why no drastic decrease in Russian Ordinary HDI (OHDI) has occurred. However, Russia surpassed China by this index in 1990 by 88-89% and in 2001 by only 38-39%. As for the DC, they on average increased their gap with Russia from 60% to 80%.

3.6. It is, however, important to emphasize that OHDI tends to *underestimate the gap between the LDC and DC*, as some of its components do not and can not grow exponentially very fast (longevity, educational attainment). But in order to assess the real gap between more and less advanced countries it is useful to shed some light on other very important indicators of socio-economic development - Global competitiveness ranks (GCR) and Index of economic freedom rankings (IEFR) (See table 5)

⁵⁰ It is worth to remind the reader that the *absolute gap in GDP per capita* between the West and Russia increased from \$400 in 1800 to \$2,700 in 1913, \$15,000 in 1990 and \$20,000 in 2001 (in 2000 international dollars). Average annual rate of increase in this gap was growing: from 1.7% in 1800-1913 to 2.3% in 1913-1990 and to 2.6 % in 1990-2001 (Calculated from table A1).

Table 5
Global competitiveness ranks (GCR) and Index of economic freedom rankings (IEFR) in
2000/2001

Country	GCR ¹	IEFR ²
USA	2	5
Germany	11	20
Japan	18	14
China	43	114
India	47	133
Russia	61	127
Total number of countries in the survey	75	155

Notes: 1.Average of Growth competitiveness and Current competitiveness indices.

2.Composed index encompassing the respective sub-indices for trade, government intervention, foreign investment, monetary policy, realization of property rights and other sub-indices.

Source: World Economic Forum. The Global Competitiveness Report, 2001-2002. Geneva, 2001. P.15; O'Driscoll, G., Holmes, K., Kirkpatrick, M., "2001 Index of Economic Freedom". *The Heritage Foundation*. Washington, D.C. P. 18, 22.

According to these key indicators of development, *Russia by the beginning of 21st century turned out to be not between the DC and LDC, as it is sometimes claimed, but among less successful (or even 'failed') states*. It is crucial to point out that at the present time when globalization is changing the shape of the world these indicators are becoming much more telling, revealing the real achievements of the states, and testifying to different aspects of economic potential for the future development.⁵¹

3.7. In order to reflect these crucial *factors I constructed Modified (or Augmented) HDI*. The fourth element of the AHDI is the index of *institutions quality*, being produced by recalculating and normalizing (the USA=100) the data presented by D.Kaufmann, A.Kraay, and P.Zoido-

⁵¹ Russia's technology index rank was 60 (the 'Chinese' indicator was equal to 53); public institutions index rank in Russia reached 61 (in China 50). World Economic Forum, 2000, p.20.

Lobaton (see table A4). It encompasses the extent of government effectiveness, political instability, rule of law, graft and other indicators.

If according to OHDI, Russia in 2001 was in the *middle of world spectrum* (50% of the US level, and its place was a little bit higher than for middle income countries, 43 %, weighted average for the world was 44%), *index of institutions quality (IIQ)*, reveals a different picture. *Russia's index (24%) is substantially worse than in India (52%) and China (44%), nearly two times less than the world average, more than two times less than the average for middle income countries and even less than the average for low income countries (27%).*⁵² As for DC, their IIQ turned out to be higher than OHDI.

*The quality of institutions is, perhaps, one of the major determinants of development, affecting the behavior of the flows of different types of capital and the efficiency of their use. Institutions, especially informal institutions, which are rooted in the country's culture, evolve slowly but matter hugely.*⁵³

3.8. The *information revolution* has substantially modified our life. I have calculated two indices, characterizing the dissemination of traditional means of communication (E) – radios, television sets, telephone mainlines, and of relatively new means of communication (F) - mobile telephones, internet, computers. The first index (E) in Russia (31%) is substantially worse (2-3 times less) than in DC (73-74% of the USA), and very close to the average for the middle income countries (although less than the average for this group of countries, - 36-37% of the USA). *But index 'F' (dissemination of the new means of communication etc), in Russia (2.8% of the USA) is better than for low income countries (0.2%) and the overpopulated countries as China (0.9%) and India (0.3%), but is two-three times lower than the average for middle income countries and 4-5 times lower than the world average.*

IT are, of course, developing in Russia, but their level is substantially lower than in the advanced countries: *the share of high tech in GNP is 6 to 8% of GNP in DC and only 0.6% of Russia's measured GNP.* Due to the collapse in the investment process during most of the 1990s,

⁵² Russia occupies 79th rank out of 91 ranks in corruption perception index, what corroborates the above mentioned feature of Russia's relative development.

⁵³ See: Ritzen, Woolcock., 2000, p.23, 31-32; Thomas et al (2000, ch.6, 7); Roland (2000, ch.11, 13); Shleifer, Treisman (2000, ch.9); Easterly (2001, ch.11, 12); Bulding Institutions (2001); Weder (2001).

new technologies are now being introduced only in 5% of the machine-building industry. And absolutely new 'work outs' total no more than 1/5 of these costs.⁵⁴

Russia's share in the world high-tech/scientific production is only 0.3%.⁵⁵ It is significantly less than Russia's share in world population – 2.4% and in the World Gross Product (WGP) – 2.6-2.8% (*in 1989 the share of the USSR and East European countries in WGP reached 12-14%*), in world total investment and world trade - 1.2-1.4% (*in 1989 the share of the USSR was equal to 3-3.5%*).⁵⁶

3.9. The Modified HDI (MHDI, see table A4) reveals that Russia's position on the world scale (28% of the U.S. index) is *substantially 'smaller'* than that shown by Ordinary HDI (50%). It is important to stress that, due to significantly lower indices of Institutional quality (*lower than the average for low income countries*) and of Dissemination of communications (*lower than the average for middle income countries*), Russia's MHDI turned out to be now closer to lower middle income countries.

Main findings and final remarks

Despite considerable social, demographic and economic sacrifices, Russia has achieved a certain, although moderate progress in its economic transformation. Our calculations reveal that output contraction was *substantially* less than is generally believed and Russia is now approaching pre-reform levels of per capita GDP. Liberalization significantly increased factors' flexibility, enhanced cost-effective processes. Calculations suggest that on the whole in 1991-1998 Total Factor Productivity (TFP) might not have diminished: the decline in Total Factor Inputs (TFI) was, perhaps, greater than in GDP.

However, Russia's growth underpinnings are rather shaky, and in 1999-2001 economic recovery was almost totally due to extensive factors. Recovery was brought about mainly by the rise *in price competitiveness* (due to devaluation of ruble during the financial crisis of 1998), increased oil revenues (up to the fourth quarter of 2001, when oil prices began to fall steeply), and only partly by realization of new reforms (tax cuts; land reform, judicial and banking reforms are only

⁵⁴ Izvestia, 04/17/2001; Gorbuntsov Yu. *Nasha Bednost ot Nashego Bogatstva* (available at http://www.ng.ru/printed_ideas/2001-10-27/7poverty.html)

⁵⁵ NG-Nauka. 05/23/2001. P.11

⁵⁶ Calculated from the data of World Bank: World Development Indicators, World Development Report, 2000-2001; Konkurentosposobnost Rossii (2000, p.123).

getting started). Despite some upbeat reports⁵⁷, economic rebound was based mostly on low-tech with practically no TFP growth. Moreover, Russia is now experiencing economic slowdown.⁵⁸ If the relative level of Russia's institutional quality and IT dissemination are factored in, Russia's *overall* comparative performance turns out to be *no better* than for the *lower* middle income countries.

Russia's current and long-term modernization problems stem not only and not so much from its relatively inconvenient geographical position (harsh climate, huge distances, poor communications etc) and unfavorable geopolitical factors. They are mainly *caused by permanent government delay or reluctance to carry out timely restructuring of outdated institutions* as well as by the fact that *Russia has been perpetually under-governed*⁵⁹, *although it was often over-regulated at the same time. Russian governments used to be strong for quelling dissidents and too weak to provide good public goods – benevolent order, reliable infrastructure, as well as predictability and consistency in policies.*

Without effective rule of law and very small accountability of the Russian state to Russian society - this feature is predominant in Russian history – *rent-seeking and perpetual uncertainty* can keep on hampering capital formation and innovations and *cause degradation, massive outflow of financial and human capital.*

After the 20th century Russian hecatomb of nearly 100 million people, Russians actually started to die out. We are now having increasingly unhealthy and shrinking population, with real (quality adjusted) levels of educational attainment that are partly overrated by post-Soviet statistics. Calculations suggest that during the last decade gross outflow of human capital (in the 1990s about 3 million of people – to Western Europe, North America and Israel) has been, possibly, even greater (on my estimate, it is roughly equal to 5-7% of Russian GDP per annum), than of financial capital (2-4% of GDP annually). However, taking into account that repayments of foreign debt amount to about 1.5-2.0% of the measured GDP, total outflow of financial capital is also great. It makes the country extremely vulnerable and dependent on exports of natural

⁵⁷ Dornbusch, 2001.

⁵⁸ Sergeev, 2002.

⁵⁹ French poet Paul Valery seems to have said that 'if the state is strong, it will crush us; if it is weak, we will perish' (See: Tanzi, 1997, p.4).

resources (oil, gas, metals). This factor in itself favors proliferation of rent-seeking and corruption⁶⁰, although some efforts are being made to curtail their dimensions.

What seems imperative now is bringing *more actively* a market-oriented developmental state back in: to realize upgrading of legal and financial institutions (capable of ensuring some palpable stability, rule of law, predictability and flexibility in the economy, as well as consistency in the public policy); improvement of human capital, and rapid dissemination in IT. I think that steady economic growth in Russia cannot be achieved in the near future without substantial and more effective western support for the reforms (for instance, by recognizing market status of the Russian economy and cancellation of various amendments and rules hindering the development of cooperation between the West, and the USA in particular, and Russia).

⁶⁰ The data, collected by D.Kaufmann, A.Kraay, and P.Zoido-Lobaton, suggests that some ingredients of composite index of institutional quality in Russia may have deteriorated in 1997/98 - 2000/01 (see Kaufmann et al, 2002. P.19-24).

Table A1

The Dynamics of Human Development Index¹ in Russia, Large DC and LDC in 1800-2001

Country	1800				1913				1990				2001			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
India	730	23	0.3	5	870	23	0.6	6	1 580	59	5.3	20	2 450	63	7.3	28
China	760	28	0.5	6	650	30	1.2	8	2 420	69	5.9	27	4 120	70	8.3	36
Russia	810	30	0.3	5	1430	34	1.6	11	8 880	69	11.2	50	8 480	65	12.0	50
Old Russia/USSR ²	740	30	0.3	5	1300	34	1.5	11	7 550	69	10.1	46	6 280	66	10.6	44
Japan	920	(36)	1.2	9	1 700	51	5.4	21	23 560	79	14.6	81	26 280	81	16.1	87
Germany	1 410	32	2.4	13	4 120	49	8.4	32	22 030	76	14.2	78	25 060	77	15.3	82
USA	1 320	36	2.1	12	6 600	50	8.3	37	27 240	75	17.6	89	34 330	77	19.9	100
Russia/East, times	1	1.2	0.8	0.9	1.7	1.3	1.7	1.6	4.4	1.1	2.0	2.1	2.6	1.0	1.5	1.6
Russia/West, times	0.5	0.9	0.2	0.4	0.3	0.7	0.2	0.3	0.4	0.9	0.7	0.6	0.3	0.8	0.7	0.6

Notes. 1. Human Development Index (D) is calculated here according to a very simple formula:

$$D_{ij} = \{ (A_{ij}/A_x) * (B_{ij}/B_x) * (C_{ij}/C_x) \}^{1/3}$$

D_{ij} – is the average non-weighted of three indices: A_{ij} – is per capita GDP in PPP (international dollars 2000); B_{ij} – life expectancy at birth; C_{ij} – educational attainment of the adult population, adjusted for quality, - respectively for the country “i” and the time “j”. All the indices are related to the level of the USA in 2001. The denominators are respectively A_x , B_x and C_x .

2. These are the corresponding figures for the Russian Empire/USSR/former USSR

Sources: Maddison, A., 2001, *The World Economy. A Millennial Perspective*, Paris, OECD. P.264; Meliantsev, V., 1996, *Vostok i Zapad vo vtorom tysiacheletii* (East and West in the Second Millennium: Levels, Rates and Factors of Long-Term Comparative Economic Development). Moscow, Moscow State University Press, P.145, 202; Meliantsev, V., 1996, “Rossiia, kroupnie strany Vostoka i Zapada: konturi dolgovremennogo ekonomicheskogo razvitiia” (Russia, Large Countries of the East and West: Contours of Economic Development in the very Long-Run), in *Russia and the Surrounding World: Contours of Development*. Moscow State University, The publishing Center of the Institute of Asian and African Studies, Table 1; World Bank. World Development Indicators, 2001. Washington, D.C.; World Bank. World Development Report, 2002.

Table A2
Changes in the Structures of Total Productive Capital, %

Indicators¹	Advanced Countries				Developing Countries			Old Russia/USSR/Russia		
	1800²	1913³	1990³	1999³	1913⁴	1990⁵	1999⁵	1913⁶	1990⁷	1999⁸
Physical Capital	79.0	68.0	40.0	32.0	93.0	83.0	76.0	77.0	74.0	66.0
Human Capital	21.0	32.0	60.0	68.0	7.0	17.0	24.0	23.0	26.0	34.0

Notes: 1. Calculated using perpetual inventory method, introduced by Raymond Goldsmith, as well as his data for physical non-residential capital. Initial estimates were updated by accumulating fixed investments to the respective capital stocks. Estimates on human (intangible) capital are derived, using the method, introduced by J. Kendrick and D. Jorgenson, by capitalizing expenditures on education, health and 'human oriented' expenditures of R&D. 2. The weighted averages for UK, France, Germany, Italy and USA. 3. The weighted averages for the 5 Large Western countries plus Japan. 4. The weighted averages for Brazil and India. 5. The weighted averages for 6 Large Developing Countries – Brazil, Mexico, China, India, Indonesia, Egypt. 6. Tsarist Russia (without Finland and Poland). 7. USSR. 8. Modern Russia.

Sources: Goldsmith, R.W. "Comparative National Balance Sheets. A Study of Twenty Countries, 1688-1978". Chicago, 1985; World Bank. World Tables, 1976, 1983, 1994; World Bank, World Development Indicators, 1999-2001; UNDP. Human Development Report, 1990-2001; Narodnoye khozaystvo SSSR, 1982-1990; Rossiiskii statisticheskii ezegodnik, 1995, 2000; Russia in Figures, 2001.

Table A3**Russia in the transitional period: growth rates of GDP and its main factors, %**

Indicators/ Variants	GDP¹	Labor²	Physical Capital Stock³	Total Factor Inputs⁴	Total Factor Productivity	Contribution of TFP to GDP Growth
1990-1998						
A 'Official'	-6.7	-2.1	0.7	-1.2	-5.5	82
B Divisia chain index of GDP at production basis	-5.9	-2.5	-7.5	-4.2	-1.7	28-29
C Divisia chain index of GDP at expenditure basis	-4.1	-2.5	-7.5	-4.2	0.1	-2
D Variant C, adjusted for unregistered shadow economy	-2.1	-2.5	-7.5	-4.2	2.1	-100
1999-2001						
E	6.4	5.7	7.5	6.3	0.1	1-2

Notes. 1.For GDP dynamics' estimates see the text. 2.For the variant 'A' growth of Labor is measured as average growth rate of employed. In variants 'B' through 'E' Labor encompasses effects of quantity, utilization and quality, as described in the text. 3.For the variant 'A' we have used official data of the increase in volume of Gross capital Stock (GCS), slightly corrected by the official figures on obsolescence. In variants 'B' through 'E' GCS encompasses effects of quantity, utilization and quality, as described in the text. 4.On our calculations, in 1990-2001 the elasticities of Russian GDP with respect to labor and capital were respectively equal to 2/3 and 1/3 (See text).

Sources: Calculated on IMF. Russian Federation: Selected Issues. IMF. Staff Country Report N 00/150. Washington, D.C. November, 2000. P.5, 29; Russia in Figures, 2001. P.32-33, 175-182, 317, 321; Rossiiskii statisticheskii ezegodnik, 1995. P.119; 2000. P. 14, 16,105,112, 117, 249, 252-257, 270, 314, 316, 546; Ivanov Y., Alekseev A., 2000, Nekotore problemi retrospectivnogo ischislenia VVP Rossii (Some problems of the measurement of the Russian GDP), *Voprosi Statistiki*, 2000, N 5. p.19; RECEP. Russian Economic Trends, vol.9, N 4, 2000. P.74, 117; "Expert", 2002, #6, February, 10.

Table A4
Modified Human Development Index (H), 2001

Country	A	B	C	D ¹	I ²	E ³	F ⁴	G ⁵	H ⁶
India	2 452	63	7.3	28	52	4.5	0.3	0.7	15
China	4 125	70	8.3	36	44	11.9	0.9	2.1	21
<i>Russia</i>	<i>8 478</i>	<i>65</i>	<i>12.0</i>	<i>50</i>	<i>24</i>	<i>31.0</i>	<i>2.8</i>	<i>6.2</i>	<i>28</i>
Germany	25 060	77	15.3	82	101	56.0	42.5	46.6	77
Japan	26 276	81	16.1	87	90	65.9	72.0	69.9	84
USA	34 329	77	19.9	100	100	100.0	100.0	100.0	100
Low Income	1 998	59	(3-7)	22	27	6.1	0.2	0.6	10-12
Middle Income	5 848	69	(8-12)	43	50	36.8	7.1	12.2	33-35
High Income	27 560	78	(12-20)	87	92	73.4	67.3	69.3	83-85
WORLD	7 446	66	(8-10)	44	47	29.8	13.3	17.4	36-38

Notes: 1. Ordinary Human Development Index (D) is calculated here according to a very simple formula:

$$D_{ij} = \{ (A_{ij}/A_x) * (B_{ij}/B_x) * (C_{ij}/C_x) \}^{1/3}$$

D_{ij} – is the geometric non-weighted average of three indices: A_{ij} – is per capita GDP in PPP (international dollars 2000); B – life expectancy at birth, years; C – educational attainment of the adult population (in years), adjusted for quality, - respectively for the country “i” and the time “j”. All these figures are related to the level of the USA in 2001. Respectively the denominators are A_x , B_x , C_x .

2. I_{ij} – is Index of Institutional Quality, calculated as an arithmetic average of 6 component indicators from the data of D.Kaufmann, A.Kraay, and P.Zoido-Lobaton (voice and accountability; political stability; government effectiveness; regulatory quality; rule of law; control of corruption).

3. E_{ij} – is the average non-weighted relative index of dissemination of traditional means of communication (radios, television sets, telephone mainlines).

4. F_{ij} – is the average non-weighted relative index of dissemination of comparatively new means of communication (mobile telephones), internet, computers.

$$5. G_{ij} = (E_{ij}/E_x)^{1/3} * (F_{ij}/F_x)^{2/3}$$

$$6. H_{ij} = \{ (A_{ij}/A_x) * (B_{ij}/B_x) * (C_{ij}/C_x) * (I_{ij}/I_x) * (G_{ij}/G_x) \}^{1/5}$$

Sources: Calculated on the data from table A1; Kaufmann, D., Kraay, A., Zoido-Lobaton, P., 2002, Governance Matters II: Updated Indicators for 2000/01. Washington. P.19-24 (http://econ.worldbank.org/files/11783_wps2772.pdf); World Bank. World Development Indicators, 2000-2001. Washington, D.C.; UNDP. Human Development Report, 2000-2001. N.Y.

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