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STRUCTURAL CHANGE IN RUSSIAN TRANSITION

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Abstract

This paper examines structural change in the Russian economy in 1990-2001, as measured by the changing composition of output and consumption, using international panel data sets as a frame of reference. It calculates a series of indexes to determine the extent to which the Russian economy is converging towards market economies. Although the Russian structure of output is becoming increasingly similar to that of upper-middle and the lower tier of high-income countries, the structure of Russian manufacturing is inconsistent with its income level and the extent of labor reallocation remains inadequate. Russia's pattern of consumption remains distorted due to the incomplete price liberalization.

Planned socialist economies practiced centralized distribution of resources according to the preferences of the dictatorial government ("planners' preferences"). [1] The rigidity of material balance planning ("planning from the achieved level") ensured that deviations from market-like resource allocations persisted, and relative autarky diverted resource allocation from comparative advantage. Consequently, the patterns of resource allocation (as observed in the structure of GDP, consumer budgets, foreign trade, and so on) in the Soviet Union and Eastern Europe differed significantly from those of market economies at similar levels of development. Russia's (the USSR's) deviations from "normal" structures of market economies were substantial, such as the greater shares of heavy industry, the low shares of services, the high shares of food, consumption, and the underutilization of foreign trade (Kuznets, 1963; Gregory, 1970; Ofer, 1973; Schroeder and Edwards, 1981). These structural distortions contributed to the stagnation and decline of the planned economies (Desai, 1987; Rosefielde, 1998; Gregory and Stuart, 2001). Transitional economies, including Russia, started with initial conditions inherited from the their socialist past, which would be expected to be removed in the course of a successful transition. The larger the deviations from normal patterns, the more difficult the transition. Indeed, transition "success" varied inversely with the proximity to and duration of the Soviet core model (Stuart and Panayotopouolos, 1999).

The pace of change in Russia, both structural and institutional, has been rapid since 1991 (World Bank, 1995; Tabata, 1996; Schroeder, 1998; Gregory and Stuart, 2001), but these changes must be evaluated in a comparative context. One such comparative study was recently completed for transition economies using a cross section of market economies to establish benchmarks for changes in the distribution of labor.[2] This paper provides a more comprehensive comparative analysis for Russia

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[1] The term was introduced by Abram Bergson, See, for example: Bergson (1964).

[2] World Bank (2004) is a "benchmarking" study of Russia's changing structure of value added, broken down into four major sectors.

alone using a large panel data set of market economies as a reference point. We study Russian structural changes not only of labor force, but also of output, relative productivity, and consumption.

We study Russian structural change from 1990 to 2001 to determine the extent and speed with which the structure of the Russian economy is converging (or not) towards other country groups ranked according to income levels. This exercise provides a measure of transition "success" which is grounded in quantitative rather than subjective indicators, such as those of the EBRD. Second, this paper points the way to future sectoral growth patterns under the assumption that remaining structural distortions will continue to be removed. Third, it indicates the type of market economy towards which Russia is moving, given the great uncertainty as to the Russian economy's "final" shape and form.

RUSSIAN DATA AND TRENDS

We use data from the period 1990 to 2001 to study Russian structural change. The Soviet Union was disbanded in December of 1991 and the liberalization of prices began in January of 1992. Therefore, the years prior to 1992 establish the base point from which transition began. The data covers Russia's transition recession (or depression) from 1992 to 1997 and the resumption of growth that followed the currency crisis of August 1998. Thus, our data set captures too few years of economic growth to judge its long-term pattern.

The Russian data are calculated from Goskomstat (Russian Statistical Agency) publications. Since the early 1990s, Goskomstat has had to change its accounting system from net material product to the internationally-accepted System of National Accounts.[3] In the turbulent early years of transformation, Goskomstat produced some contradictory figures, and added significant imputations for

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[3] For methodological explanations, see Goskomstat Rossii (1995; 2003). The transition created problems with respect to measurement of depreciation (how rapidly to write off obsolete Soviet-era equipment), profits (which now vary often dramatically by industry rather than being percentage add-ons to prices), and activities (such as business services, small business, and real estate) that did not even exist in Soviet times. The hyperinflation of the early 1990s complicates value calculations.

uncounted wages and for small and underground businesses.[4] We have chosen to use primarily current price data, which combines price and real resource movements, because economic decisions are based upon prevailing prices, not constant prices. We had to largely recalculate current-price data for the period 1990 to 1995, but the data starting in 1995 appears to be calculated on a consistent basis.

Goskomstat provides little data on the breakdown of industry, broadly defined to include mining and electricity. We therefore had to compile our own breakdowns of industry, usually using the more detailed annual input-output tables of Goskomstat.[5] The Russian output data used in this study are summarized in Tables A1 to A3, Appendix 1. Their derivation is explained in a more detailed working paper available from the authors. We do not adjust the value added shares to raise the energy shares and reduce the trade shares as argued by a recent World Bank study. Our reasons are explained in Appendix 2.

THE STRUCTURE OF PRODUCTION (VALUE ADDED AND LABOR FORCE)

Table A1 provides our value added, labor force, and relative productivity data organized into 23 sectors in current ("basic") prices (which adjust for indirect taxes, subsidies, and transportation and trade margins). These data are combined into eight sectors in Table A2 and in Figure 1, which break the economy into "fuels" and the rest of industry (primarily manufacturing), agriculture and forestry, trade, transportation and communication, construction, transportation, trade, business services and public administration, health, science, education, and welfare, denoted as PA-HEAS – services traditionally offered by the state. Hence PA-HEAS serves as a measure of the size and scope of the state sector. It is extremely important that the sector definitions be identical for labor force and for output; otherwise, there can be large errors in the estimation of relative productivity (the value added share

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[4] Goskomstat began including "unreported wages and salaries" starting in 1993 and raised the value of the capital stock much slower than inflation after 1991. Both practices affect the changes in value-added shares in the early 1990s, but they seem like reasonable adjustments. Otherwise, we did not find significant methodological changes.

[5] Goskomstat Rossii (1995).

divided by the labor force share). Presumably errors would be greatest for narrowly defined sectors and least for broadly defined sectors.

Figures 1A and 1B show that the changes in value added shares exceed the changes in labor force shares. This is an expected result in that labor force rigidities that would be prominent in the Russian case.[6] Both manufacturing and agriculture experienced significant and immediate declines in value added shares (manufacturing's was reversed briefly as an apparent consequence of the ruble devaluation in 1998), but agriculture's share remained relatively stable since the mid 1990s after an initial plunge at the start of transition. The generally rising (albeit not monotonically) sectors are trade, business services, and fuels. PA-HEAS experienced a substantial drop in the first two years as a consequence of the collapsing state budget, then increased, suggesting that the share of the state in economic activities has actually been rising. Construction and transportation maintained relatively stable shares.

The employment shares of manufacturing and construction generally fell but less than their output shares, while agriculture's and transportation's labor shares remained remarkably stable. PA-HEAS's employment shares also rose, but the most dramatic increase in employment shares was in trade, suggesting a "real" relative movement of resources into trading activities. New market-oriented service sectors clearly led the expansion with banking and insurance increasing almost four-fold in ten years and the small real estate sector doubling in size every two years. This employment growth in services was fed largely by movement from industry and from traditional services. The resilience of employment in government and social services[7] is surprising. The share of government employment increased from the low of 2.1% in 1992 to 5.0% in 2000 (Figure 2). The number of bureaucrats,

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[6] The extreme geographical concentration of industry, such as the large share of textile enterprises located in the Central Industrial Region or the resource-extracting industries located in remote Eastern regions, and the costs of labor mobility explain the inadequate re-allocation of labor. As Figure 1 shows, light industry's output share fell from 19 percent to 2 percent, but it lost only about one half of its workers. At the same time, the tripling of the share of "fuels" sector was not nearly matched by modest increase in the share of employment.

[7] "State administration" (*upravlenie*) in terms used by *Goskomstat*.

according to some estimates, in Russia today is greater than in the Soviet period and their productivity is lower than in the Soviet period (Larina, 2001). Figure 2 confirms that government administration was the growth employment industry of the second half of the 1990s.

The relative labor productivity chart (Figure 1C) divides sectors into those with higher or lower than average labor productivity (where the economy average equals 100). Those sectors experiencing upsurges in relative productivity – business (commercial, information, financial) services, trade, and fuels made their major gains between 1990 and 1992, after which they either maintained their position (fuels), converged towards the average (trade), or declined to experience another surge after devaluation in 1998 (business services). Business services, which had been absent from the planned economy, proved extremely productive when the transition began, but then declined with the level of real economic activity, only to surge again with the pickup in real economic activity. Notably manufacturing remained near the average throughout the period as did construction; while agriculture and PA-HEAS remained stuck below the average. The rising labor force share of PA-HEAS implies that the labor force in part reallocated inefficiently – to the activities whose relative productivity fell (from 62 percent to 44 percent of the economy average).

Table A3 summarizes value added, labor force, and relative productivity for *manufacturing* sub sectors. Figure 3A captures the dramatic change in manufacturing value added shares as the Russian economy began its transition. The shares of machinery and light industry (textiles and apparel) plunged in the first two to three years, after which they remained relatively stable. Conversely, the value added shares of fuels and electricity soared in the first few years of transition, after which the energy share depended on the world price of oil, and the electricity share dropped after 1998. The shares of metals remained relatively stable until the 1998 devaluation. The manufacturing labor force shares (Figure 3B) moved less than the value added shares. The declines in machinery's and light industry's labor force shares were most prominent among those sectors with declining employment shares.

Trends in relative productivity within manufacturing (Figure 3C) show that, of those that were significantly above average in 1990, fuels and electricity's relative productivities soared during the

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early years of transition, with electricity eventually returning approximately to its initial position. Light industry fell from well-above-average productivity to the lowest productivity manufacturing sector. Other sectors generally maintained their initial positions throughout the transition near or below the economy average.

In the Soviet period, light industry and food products were low-priority branches. Presumably, their shares of manufacturing would be expected to increase in the course of transition. The experiences of light industry and food were notably different. Between 1991 and 1992, light industry's share of value added collapsed from 19 percent to a remarkably low 2 percent, from which its share failed to recover. Its loss of employment share was also substantial but less dramatic resulting in a collapse of relative labor productivity in light industry. Light industry dropped from being 77 percent above the economy-wide productivity average to being 20 percent of the average. On the other hand, food manufacturing more-or-less held its own with a rising share of value added and of relative productivity starting in the mid 1990s as Russian food manufacturers began to compete more effectively with foreign imports. The collapse of light industry's value added and labor force shares suggest an industry coddled by relatively high prices and shielded from foreign competition that collapsed when price were freed and the economy was opened.

The Soviet heavy industry priority was not fully misplaced for an eventual open, market economy. The emphasis on fuels has generally served the Russian transition economy well, although the antiquated infrastructure and lack of technology make it relatively backward as compared to industrialized countries. With a low ruble exchange rate, Russian metals appear to be internationally competitive with the "right" exchange rate. The main burden of the Soviet past has been felt in machinery, whose relative productivity fell from 70 percent to a low of 50 percent of the economy average before staging a slight recovery to 55 percent. Indeed the major adjustments of both value added and labor force have been in the machinery sector, where re-allocations may have weeded out the lowest productivity machinery producers.

INTERNATIONAL COMPARISONS: THE STRUCTURE OF OUTPUT

International comparisons shed light on the extent to which the Russian economy in the course of transition has become more like a market economy, and, if so, more like what type of market economy – a low middle-income country (which is where international organizations peg the current Russian economy), or a higher income country? When it is all over, will Russia be an affluent economy like industrialized Europe, will it be a troubled low to middle income country, such as Turkey, or will it be at the fringes of affluence, such as Greece or Portugal?

To make such comparison, we use panel data on value added and labor force drawn from large databases, such as those of the International Labor Organization (ILO) and the World Bank (World Bank Development Indicators). In Table A2, for example, we have recoded the Russian data to conform to that of the ILO. Unlike the Russian data, where we can calculate simultaneously value added, labor force, and relative productivity data, in international comparisons we must work with either value added or labor force distributions, and we have access to relative labor productivity only for a three-sector (industry, agriculture, services) breakdown.

Aggregate level (Industry, Agriculture and Services)

The empirical literature has established patterns in the relationship between the level of economic development and certain structural parameters. In particular, the share of the service sector (both in terms of value added and employment) grows with per capita GDP in economies past the initial phase of industrialization. [8] Although this relationship holds for any group of countries (for the postwar period) including former Soviet Union and Eastern Europe, the trend for the socialist economies was significantly displaced with respect to the dominant pattern exhibited by the rest of the world. Moreover, the shares of agriculture and industry, especially heavy industry, in centrally planned economies were higher than elsewhere. In other words, these economies were lagging behind market economies in the rate of structural modernization.

Figure 4 shows the relationship between the level of development and the service sector as a share of the total employment for both transition and market economies at the start of transition (1990) and a decade into transition (2000). Trend lines are imposed for market and transition economies separately, which show that transitional economies as a group had smaller service sectors as of 1990. Although the slopes of the trend lines are essentially the same, the transitional-economy trend line is characterized by a downward shift.[9] After a decade of transformation, the difference in the relationship had been removed on average, even though East and Central Asian transitional economies still fall below the general trend. The Russian economy, denoted by a larger gray square followed the general restructuring pattern. A typical centrally-planned economy with a deficient service sector in 1990, Russia becomes "normal" ten years later despite the decline of total output. Similar patterns of change characterize the contribution of the service sector to value added (not shown here).

Table 1. The Structure of Value Added, Labor Force, and Relative Productivity, Russia and Country Groups (by income level)

Year	Country Group	Value added, % of total			Employment, % of total			Productivity index (total economy =1)		
		Agriculture	Industry	Services	Agriculture	Industry	Services	Agriculture	Industry	Services
1990	H	4.6	33.0	62.4	8.3	29.6	61.8	0.55	1.11	1.01
2001		2.4	30.3	67.3	5.1	26.9	67.9	0.48	1.13	0.99
1990	LH	8.4	34.6	57.0	12.5	29.8	57.6	0.67	1.16	0.99
2001		3.9	33.9	62.2	8.8	27.4	63.6	0.45	1.24	0.98
1990	UM	8.6	39.4	52.0	18.2	26.4	54.4	0.47	1.50	0.96
2001		6.0	36.3	57.7	15.6	23.3	60.6	0.38	1.56	0.95
1990	LM	17.3	32.6	50.1	31.1	22.9	44.6	0.56	1.43	1.12
1999		13.9	31.3	54.8	30.4	20.8	48.8	0.46	1.50	1.12
1990	CEE	14.0	45.1	40.8	20.2	40.2	39.3	0.69	1.12	1.04

[8] See, for example: Chenery et al. (1986).

[9] Regression equation for transitional economies, $S_s = 12.3 \ln (Y) - 73.5$, differs significantly from the regression for market economies, $S_s = 12.6 \ln (Y) - 58.9$, only in the intercept. The slopes do not differ significantly. In the equations above, S_s denotes the share of service sector in the total employment and Y denotes GDP per capita in 1990 USD measured at purchasing power parity.

2000		7.3	33.1	59.7	12.6	31.0	56.5	0.58	1.07	1.06
1990	Russia	16.5	48.6	34.9	13.9	40.1	41.0	1.19	1.21	0.85
2001		7.0	37.8	55.2	13.0	31.6	55.4	0.54	1.20	1.00

Notes: 1) H, UM, LM stand for high, upper-middle, and lower-middle income groups respectively as defined by World Bank. LH – "lower high" – is a lower subdivision of high-income group that includes countries such as Spain, Greece, and South Korea. CEE includes transitional economies of Central and Eastern Europe (CIS is not included). 2) The numbers in the table are imprecise due to changing availability of data for separate countries and intended only to show principal trends. 3) Employment data for high-income countries are for the year 2000.

Sources: WDI, Goskomstat.

Table 1 covers an eleven-year period for five groups of countries and for Russia. In all countries, agriculture's and industry's shares of value added and labor force declined while the shares of services rose. In all countries, agriculture's relative productivity fell and stood at around half the economy-wide productivity level. In all countries, the service sector had a relative productivity that did not deviate significantly from the economy average. The more developed the country, however, the closer the relative productivities of industry and services, suggesting that affluent countries produce "high end" services.

The structural changes in the transition economies of Central and Eastern Europe (CEE) and Russia, were more pronounced than in other countries and followed the general trend of rising services and falling industry and agricultural shares. Russia's transformational changes were percentage-wise about the same as in CEE, but Russia started from more "backward" initial conditions (relatively high shares of agriculture and industry).

The transition economies underwent much more significant change over the studied 11 year period, while moving in the expected direction. The extent of reallocation of labor force across the three aggregate sectors is lower in Russia than in CEE, particularly in agriculture, reflecting lower labor mobility due to much larger size of the country, higher concentration of labor, and less flexible labor marker institutions. It should be added that employment shares in Russia remained virtually unchanged until about 1994. The resistance of the agricultural sector to change appears to contradict the general modernization trends in the Russian transitional economy. However, it serves as another piece of evidence that the structure of the Soviet economy was driven by central planners rather than by

individuals. The removal of artificial labor incentives combined with economic disorganization could explain the slow change. It is reasonable to expect, given the comparative patterns of change presented in Table 1 and the relative decline of agricultural productivity in Russia, that the outflow of labor from agriculture is about to resume.[10]

We summarize the dynamic of structural change in the Russian economy with respect to other economies using an "index of structural deviation," which we define as follows:

$$D_k = \Sigma_i \, (S_{Ri} - S_{ki})^2,$$

where S_{Ri} is the share of ith sector in the Russian economy and S_{ki} is the average share of ith sector in the economies of country group k.

This index measures the "distance" between the Russian economy and other economies taking into account all the components of value added (or labor force) simultaneously. Proximity of D to zero would mean that the Russian economy is insignificantly different from the economies of country group k. Aggregate value-added and employment indices are presented in Figure 5A and 5B, respectively.[11]

Figure 5A shows that the composition of Russian value added (by industry, services, and agriculture) differed greatly from that of any other group of market economies at the start of transition. The structural distortions (deviations) were eliminated rapidly during the early phase of transition, 1992-95, and stabilized thereafter. Until the ruble crisis of 1998, the upper-middle and lower-high income countries were closest to the Russian pattern, but after the currency crisis, the lower-middle income countries are slightly closer to Russia. This means that the crisis caused a structural adjustment that pushed the Russian economy closer to its reference income group. Figure 5B shows that the

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[10] New data (*Russian Statistical Yearbook 2003*) suggest that this process is already under way: the share of agricultural employment proper (without forestry and fishing) declined from 13% to 11.8% in 2000-2.

[11] Index of structural deviation, D_k, measures only the relative distance between the Russian economy and that of a corresponding country group. Absolute values of the index, as well as position of various country group curves in the graph bear no meaning. In particular, the nearly equal values of the indices for the lower-high and lower-middle countries do not mean that these are countries similar, only that the Russian economy is equidistant in structural terms from both groups.

employment shares follow a different path, as might be expected from the slower movement of employment. On the eve of transition in 1990, the Russian labor force distribution closely resembled that of lower-middle income countries despite a significantly higher level of income, while deviations from closer income groups were relatively large. The first few years of transition had a small effect on the labor force distribution. The general tendency in the subsequent years is toward convergence with upper-middle and lower-high income country groups.

International Comparisons: Nine Sectors

The aggregate (agriculture, industry, services) patterns show rapid adjustment of value-added shares, lagged and less pronounced reallocation of labor shares, with subsequent stabilization of both processes. Table 2 uses a nine-sector ILO classification (1-digit ISIC Rev.3) to compare Russia's labor force distributions with those of a large number of countries again aggregated into income groups.

Table 2. Employment Shares, Eight Economic Branches (ILO categories)

Year	Country Group	Agriculture, Forestry and Fishing	Community, Social and Personal Services	Construction	Electricity, Gas and Water	Financing, Insurance, Real Estate and Business Services	Manufacturing	Mining and Quarrying	Transport, Storage and Communication	Wholesale and Retail Trade and Restaurants and Hotels
1990	H	5.7	28.0	7.3	1.0	9.2	20.8	0.5	6.9	20.0
2001		3.8	31.1	7.2	0.7	12.7	16.8	0.4	7.2	20.0
1990	LH	15.1	23.4	7.4	0.8	6.0	22.9	0.5	5.7	17.9
2001		8.9	24.6	8.8	0.7	9.9	17.5	0.2	6.0	22.4
1990	UM	15.6	31.5	6.6	1.0	4.4	18.0	1.8	5.6	18.9
2001		9.3	29.5	8.0	0.7	6.1	17.0	0.5	6.8	22.1
1990	LM	28.1	24.9	5.3	0.6	2.7	15.3	1.0	4.9	16.9
2001		22.1	22.4	6.5	0.6	4.5	13.9	0.8	6.0	23.0
1990	Russia	13.2	21.9	13.4	0.8	0.8	29.2	1.5	7.7	7.8
2001		13.4	28.1	8.8	1.5	2.4	20.2	1.3	7.8	14.6

Source: ILO, Goskomstat. Calculations by the authors.

Trends in the nine-sector classification are less pronounced than those in the three sector classification. In all country groups, the employment shares of agriculture (including fishing and forestry) fell, the share of utilities (electricity, gas, and water) was roughly stable, the share of financing, insurance, and real estate rose, the share of manufacturing fell, the share of transportation and communication rose modestly, and the shares of trade rose in all groups except the high income countries. Russian employment shares moved in the same direction for those sectors where trends were evident, although Russia's trends were more pronounced given its more "backward" initial employment shares. Even after eleven years of adjustment, Russia's 13 percent employment share in agriculture (broadly defined) places it above all country groups except lower-middle income countries. Even after a tripling of employment shares in financing, insurance and real estate and a doubling of employment shares in trade, Russia still remains far behind other country groups including even lower-middle income countries.

Figure 6 quantifies these employment share changes in terms of the index of structural deviation. The four curves show a clear pattern of convergence of the Russian 9-sector labor force distribution toward that of market economies. Market adjustment process has made the Russian economy more similar to all other groups, although the rate and degree of convergence is the highest for the upper-middle income country group. The lower-high income group is next closest to that of Russia. Again, the upper-middle income and the lower-high income countries appear to constitute the reference group for the contemporary Russian economy. Much of the convergence tendency, it appears, can be explained by the contraction of the oversized Russian manufacturing sector. However, the largest contribution to the reduction of the deviation from Russia's nearest counterparts is made by the service sector category denoted in ILO classification as "Wholesale and Retail Trade and Restaurants and Hotels". In particular, this category is responsible for 50% of the reduction in the "distance" between the Russian economy and the lower-high income group between 1990 and 2000.

The behavior of the right tails of the index curves in Figure 6 suggest that Russian economy might have settled on a convergence path with the upper-middle group after 1998. However, the robustness of this trend cannot be established given the relatively few observations. It is apparent, however, that the rate of structural change in the Russian economy slowed down in the late 1990s, although it had not yet reached adequate proportions. Future development will show whether this was a transitory slowdown, related to the recession of 1998-9, or a permanent stabilization at a state removed from the Soviet point of origin but not fully consistent with the parameters of a "normal market" economy.

Table 3. Manufacturing value added by sector, percent total.

Year	Country Group	Chemicals	Food, beverages and tobacco	Machinery and transport equipment	Textiles and clothing	Other manufacturing
1990	H	9.9	15.6	27.8	7.2	40.8
2000	H	9.0	14.9	29.9	7.6	38.6
1990	LH	7.7	16.0	18.5	11.5	46.4
2000	LH	8.2	18.4	22.1	10.8	40.5
1990	UM	11.7	28.5	11.0	7.9	41.0
2000	UM	7.9	30.8	14.1	5.8	41.4
1990	LM	9.2	26.1	13.9	16.0	39.4
2000	LM	7.4	30.1	7.2	17.5	38.3
1990	Russia	3.7	7.5	34.6	20.8	33.4
2001	Russia	6.6	13.9	28.3	1.6	49.7

Source: WDI.

Unlike earlier comparisons that included both labor force and value added shares, we can present only value added analysis for manufacturing (Table 3). There are few distinctive trends within manufacturing. Food, Beverages and tobacco increased its share in all but the highest income group; machinery and transport equipment increased its value added shares except in the lower-middle income group. What stands out is Russia's peculiar initial conditions – an extremely low share of food,

beverages and tobacco, an extraordinarily high share of machinery, a very high initial share of textiles, and a low initial share of chemicals.

Trends in Manufacturing

Figure 7 again applies our structural convergence index measure to the structure of manufacturing value added. It shows that the Russian manufacturing structure on the eve of transition was most like that of high and lower-high income countries, inconsistent with Russia's level of economic development. In the first few years of transition, Russia became even closer to these two income groups. The Russian distance from upper-middle and lower-middle income countries was much greater. In the course of transition, however, Russian manufacturing did not exhibit strong convergence trends.[12] The convergence trend with respect to upper-middle income countries is notable, but the structure of Russian manufacturing remained far removed from its usual reference group.

In sum, Russian industry has moved slower toward "normal" proportions than the economy as a whole. This may be a result of the higher degree of regulation of industry than service sectors. Whereas price liberalization and demonopolization of international trade led to significant changes in the composition of the value of industrial output, labor market rigidity produced less adequate labor force reallocation. While assessing trends in Russian industry, we should also take into account that implicit subsidization of inefficient enterprises may further distort data: the effect of so called "virtual economy" (concept introduced by Ickes and Gaddy (1998)), which implies that only a few resource-extracting sectors generate value added, while the rest of the industry effectively destroys the value. The most recent research, however, suggests that one of the supposed "value creating" sectors – electricity – itself may be operating at a loss (Ivanenko, 2004). Given the publication of a complete list of annual input-output tables, the effect of subsidies can be removed from the picture, insofar as the

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[12] The only large drop in the indices between 1990 and 1991 obviously cannot be attributed to the effect of transformational reforms and therefore bears no significance. This may have been the consequence of a "pre-transformation" transformation as a consequence of the collapse of the planning and ministerial system after 1989.

input-output tables provide rather detailed sectoral data on subsidies,[13] but such research remains to be done.

THE STRUCTURE OF END USE

We can measure the structure of an economy either by its production structure or by how it uses that production in the end uses of private consumption, public consumption, investment, and net exports. The comparative literature on the Soviet system showed that the end-use structure was distorted relative to market structures by its relatively low personal consumption shares, its high investment rates and, within personal consumption, by high food expenditures and low services expenditures. We would expect therefore the private consumption share to rise and the investment rate to fall reaching the "normal" levels in the course of transition. Available data, however, show a more complicated dynamics.

Russia and the USSR (1990) were participants in the International Comparison Project (ICP), which compares the end-use structures of a large number of countries using a common methodology. In the ICP, GDP by end use is valued both in local (domestic) prices and in "international" prices, stated usually in dollars. The Russian ICP data are complicated by the fact that the 1990 data are for the USSR. However, we can use a study from the early 1990s that compares the GDP structures of Russia and the USSR to adjust the 1990 ICP data for the USSR to reflect Russia (Tretyakov and Kostinsky, 1992). Table 4 provides the adjusted Russian ICP data.

The most salient feature of the data in Table 4 is the relative decline of fixed investment. This is an entirely expected result, although its decline to the unusually low level of less than 15% of GDP is the result of extreme uncertainty in the first seven years of transition. The international price and domestic price figures show different trends with respect to other components of GDP. There are

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[13] In fact, the whole subsidy issue may not affect these tables and figures insofar as they are supposed to be in "basic" prices which eliminate subsidies as well as indirect taxes.

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clearly remarkable differences in relative prices between Russia and the international price system. The higher shares of government consumption in international prices suggests that government services are "very cheap" in Russia; the lower shares of gross fixed capital in international prices suggests that capital goods are "relatively expensive" in Russia. The latter result is perhaps the consequence of the fact that capital goods are increasingly imported. The higher share of net exports in domestic prices suggests that Russians are paying relatively more for foreign imports than residents of other countries.

Table 4. Components of GDP, per cent.

	International prices				Domestic prices			
	1990	1993	1996	1999	1990	1993	1996	1999
Consumption	55	65	63	60	58	52	61	60
Government Consumption	15	17	25	27	10	9	11	9
Gross Fixed Capital	32	11	11	9	39	23	20	14
Imports/Exports	0	2	2	4	-1	8	4	17

Table 5 shows the combined effect of the changes in the Russian pricing system and domestic demand on the composition of personal consumption. The general pattern is that goods freely bought and sold (such as food, beverages, and tobacco and clothing and footwear) are expensive in Russia by international standards (the domestic-price share exceeds the international price share). On the other hands, goods provided by government, by utilities, or necessities (such as medical care) are very cheap by international standards. The remarkable feature is that discrepancies between the domestic price system and international prices have been even growing over time, suggesting the continuation of price controls. For example, the discrepancy between gross rents, fuel and power was 7 percentage points in 1990, while it was 24 percentage points in 1999. These figure underscore the urgency of further deregulation of the power sector, education, and medical care. In effect, the low (sometimes virtually zero) prices of some products placed little or no downward pressure on consumption of those items; so that Russian households consumed virtually equal shares of food, beverages and tobacco, rent and power, medical care and education measured in international prices, but relatively small shares of the

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last three measured in domestic prices. The large discrepancies between domestic and international prices with respect to housing, power, rents, medical care and education impede the development of Russian consumption to a more normal pattern.

Table 5. Personal consumption, per cent (revised numbers)

	International prices				Domestic prices			
Year	1990	1993	1996	1999	1990	1993	1996	1999
Clothing & Footwear	15	13	11	11	8	6	7	4
Food, Beverages, Tobacco	37	35	34	39	26	21	18	18
Gross Rents, Fuel & Power	6	10	9	6	14	22	24	28
Household Equipment & Operation	7	4	5	1	6	3	2	0
Medical Care	6	6	8	7	13	23	23	21
Miscellaneous Goods & Services	11	11	9	7	12	6	5	5
Transport & Communication	6	6	11	11	5	5	5	7
Recreation, Education	12	12	12	10	18	19	23	18

Additional perspective at the composition of household expenditures is provided by the data from the Russian Longitudinal Monitoring Survey (RLMS), the annual household survey conducted by the University of North Carolina in a number of Russian territories (Mroz et al., 2003). Unfortunately, the first round of this survey study was conducted only in Fall 1992, when the structure of consumption had been already modified significantly by the hyperinflation. It does, however, show the trends through the rest of the 1990s.

RLMS data (Figure 8) show that food, beverage, and tobacco remain the largest expenditure category of Russian households, although the downward trend is apparent here, too. The major difference between the patterns of total and private final consumption of households lies with rent and utilities. Continuing subsidization of utilities and residential maintenance coupled with mass housing privatization produced the result, whereby this category still plays marginal, albeit growing, role in

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private expenditure. Thus RLMS, which of course is denominated in Russian domestic prices, paints the same picture of price-induced distortions in Russian household consumption derived from a source that is independent of Goskomstat.

Composition of GDP and Household Consumption in International Comparisons

Country data analyzed here in conjunction with the Russian trends are divided into three income groups. The lower-middle income group is dropped due to lack of data availability in the ICP.[14] In Figure 9 we calculate the index of structural deviations for Russia vis-à-vis high, lower-high, and upper middle income countries using international prices. This figure shows how the structure of end use of GDP in Russia differs from that of other groups of countries assuming that all countries use "international" prices rather than their own domestic prices. Thus the relative overpricing of Russian consumption goods and the relative underpricing of government consumption are removed from this comparison.

The index of structural deviations shows that, although the Russian structure by end use categories converged during the early or mid 1990s towards that of the three country groups, it was about as far from any of the three country group averages in 1999 as it was before the start of transition. We hope that a new wave of ICP results will be soon published for a later year (2003), which will allow us to determine whether Russia converges towards other groups of countries. 1999 is far removed from an ideal year for study in that it immediately follows the currency crisis of August 1998.

The lack of convergence in the composition of Russian GDP by end use in international prices does not necessarily imply a reversal of structural adjustment. In fact, the structure of Russian GDP has moved from one extreme to another. The major contribution to this pattern is made by the rapidly declining share of investment. Figure 10 shows that investment declined in Russia by 1993 temporarily bringing its share in GDP down to more "normal" rates, but the continuing decline thereafter led to

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[14] The lower-middle income countries represented in ICP are mostly transitional economies that cannot be included with the reference market economies.

increasing deviations. The investment collapse may be explained by overlapping transformational and recessionary effects. The lack of commitment of the Russian government of the 1990s to the creation of a secure business environment meant that the collapse of domestic investment could not be partially offset by increasing foreign direct investments as in Central and Eastern Europe. From the available data, we cannot tell which of the two factors dominated and whether Russian investment will settle at a "normal" level after recovers to the pre-transitional level.

Another factor responsible for the lack of convergence between Russian and market economies is Russia's large and growing government. Figure 11 shows that the share of government consumption in Russian GDP exceeded the averages for all reference groups. As in the case of investment, there is no reason to believe that government consumption is going to be reduced soon leading to normalization of GDP use proportions.

Figure 12 presents the structural deviation index for the end-use categories in terms of nominal *domestic* prices to capture both domestic relative scarcities and distortions introduced by subsidies or other distorting practices. These data are drawn from World Bank databases and should be conceptually the same as the ICP data in domestic prices for the benchmark years (1990, 1993, 1996, 1999); the advantage of the World Bank data is that they are annual. It should be noted that economic decisions in countries are not based on international prices but on domestic prices. Hence, ICP domestic price data may be a better test of structural convergence.

Figure 12, consistent with an earlier similar diagram (Figure 9), shows a substantial convergence between 1991 and 1993 towards all three country groups. Thereafter followed periods of slight divergence and convergence. From 1993 to 2000, Russian end-use patterns were most like those of the lower-high countries. After 1998, there was a reversal of convergence as a consequence of the currency crisis of 1998.

Table 6. Components of final household consumption**,** percent. 1999, International Prices (Revised Numbers), per cent.

	High	Lower high	Upper middle	Lower middle	Russia
Food, beverages, tobacco	12	16	18	18	18
Clothing and footwear	4	4	2	4	4
Gross rents, fuel and power	19	17	28	25	28
Household equipment and operation	3	3	2	3	0
Medical care	17	15	22	15	21
Transport and communication	11	10	6	9	7
Recreation, education	20	24	32	24	18
Miscellaneous goods & services	16	15	9	9	5
Net purchases abroad	-1	-3	-1	0	0

General tendencies in Russian final household consumption in comparison with market economies are summarized in Table 6 for the year 1999. Figure 13 provides the index of structural deviation with 1999 as the end point. Both the table and the figure show that Russia is close to an average upper-middle income country in its structure of final household consumption, although Soviet consumption patterns were characterized by abnormally high proportion of goods (more than two thirds) and in particular by a high share of food expenditure, up to 47 per cent (Schroeder, 1992). At the same time, the gap between Russia and the more developed countries seems to be increasing. When assessing the vector of change, we should take into account that some of the features of Russian consumption pattern may reflect transitory effects of the 1998 crisis rather than a turn of the trend. The new round of ICP, for the year 2003, should be expected to provide a better picture of the direction of change in Russian GDP use structure.

CONCLUSIONS

Our analysis presents a picture of an economy that has been subjected to three shocks: price deregulation, the opening of the economy to trade and hence to world prices, and the ruble devaluation of 1998. The first two shocks meant that branches, whose outputs had been highly valued under planning, would now receive relatively low valuations in a market setting and vice versa. The most

notable case of an industry that virtually collapsed when confronted with the first two shocks was light industry manufacturing. Moreover, the transition to a market economy created a demand for activities not present in the planned economy, the supply of which could not be created over night – examples being real estate and business, finance, and information services. Those factors with "new" skills would be among the most valued and productive resources in the transition economy. As might be expected, the "rents" from scarcity appeared to decline over the years, such as in trade whose relative productivity declined from almost four times the economy's average in 1992 to only 75 percent above the average in 2001.

International comparisons show that Russia is becoming increasingly similar in terms of sector-of-origin structure to upper-middle and to the lower tier of high-income countries (such as Greece, Portugal, Cyprus, and South Korea) despite the fact that Russian per capita GDP is well below these groups. However, the structure of manufacturing still bears the strong imprint of initial Soviet conditions. Russia's industrial structure is not consistent with its income level, resembling the structure of high-income countries, a fact that works against successful restructuring.

Whereas the shifts in output shares took place quickly (within the first two to three years of transition), the shifts in labor force shares were slow to materialize given the initial lack of organized labor markets, barriers to movement, and the continuation of paternalistic behavior by large enterprises. Nevertheless, the labor force did generally redistribute itself according to relative productivity. The charts also show the large, albeit transitory, impact of the exchange rate on economic activity. The ruble devaluation of 1998 caused a reversal of the decline in manufacturing (particularly of metallurgy) as Russia's industrial products became more competitive in world markets. Sectors of industry that were more productive on average (in terms of value added per worker) in 1990 remained so a decade later. The exception is "light industry" which fell from a higher than average position to the lowest one. It can be concluded therefore that, despite the significant restructuring of industry, efficiency losses resulting from misallocation of resources in the previous-period Soviet economy were not eliminated but

probably were made even higher due to governmental policies that failed to make labor markets more flexible.

Unlike patterns of production structure and labor force distribution, which have been changing in the direction of reference countries, the Russian pattern of consumption remains difficult to characterize. It has moved from being an over-investor and under-consumer to an over-consumer and under-investor. These over-adjustments result in a remarkable lack of convergence in the major end-use shares to the benchmark economies. Patterns of household consumption behave even more erratically with domestic prices deviating significantly from international prices. If anything, Russian household consumption resembles the pattern of lower-middle and upper-middle income countries, but changes have been erratic. The apparent culprit is the lack of price reform in housing, education, medicine, and utilities, which means that Russian households are still operating under a system of non-scarcity prices. Since recent and current Russian policy-makers show no commitment to further price liberalization, we can expect the structure of Russia consumption to remain atypical in the near future.

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FIGURES
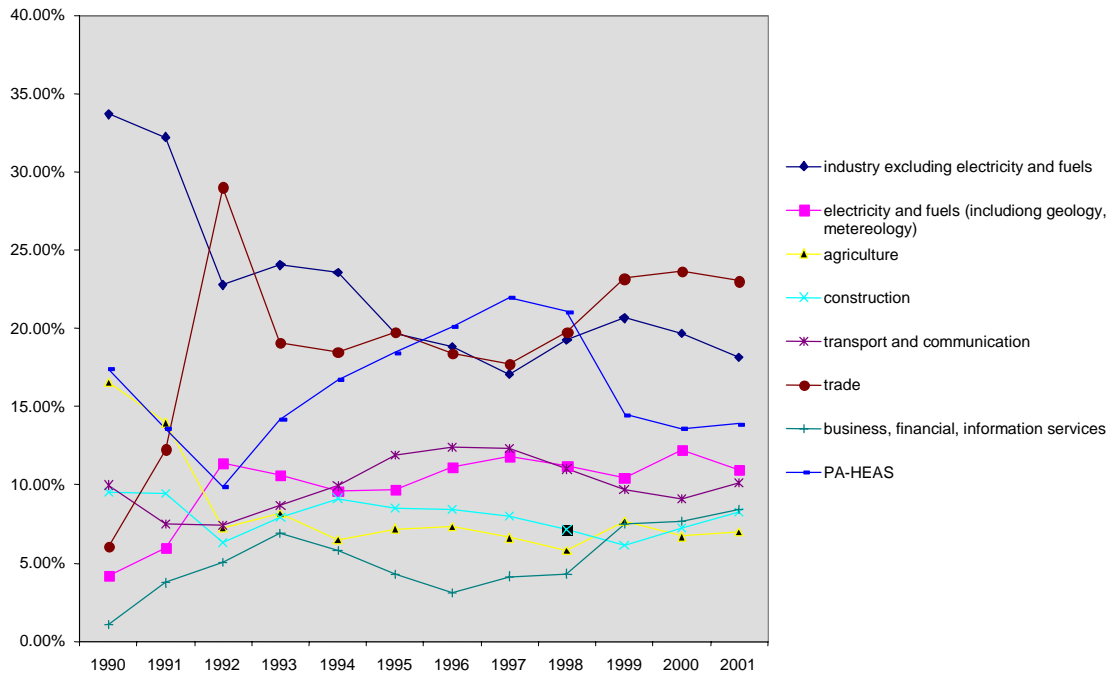
Figure 1A. Shares of Value Added. Russia, 1990-2001.
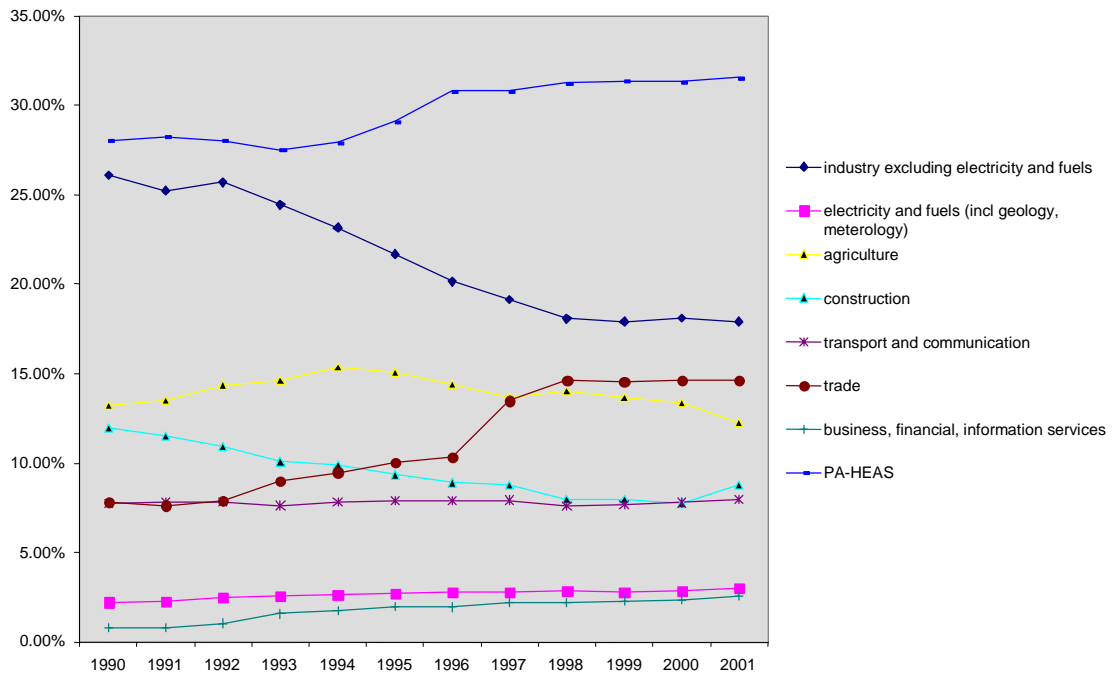
Figure 1B. Shares of Labor Force. Russia, 1990-2001.
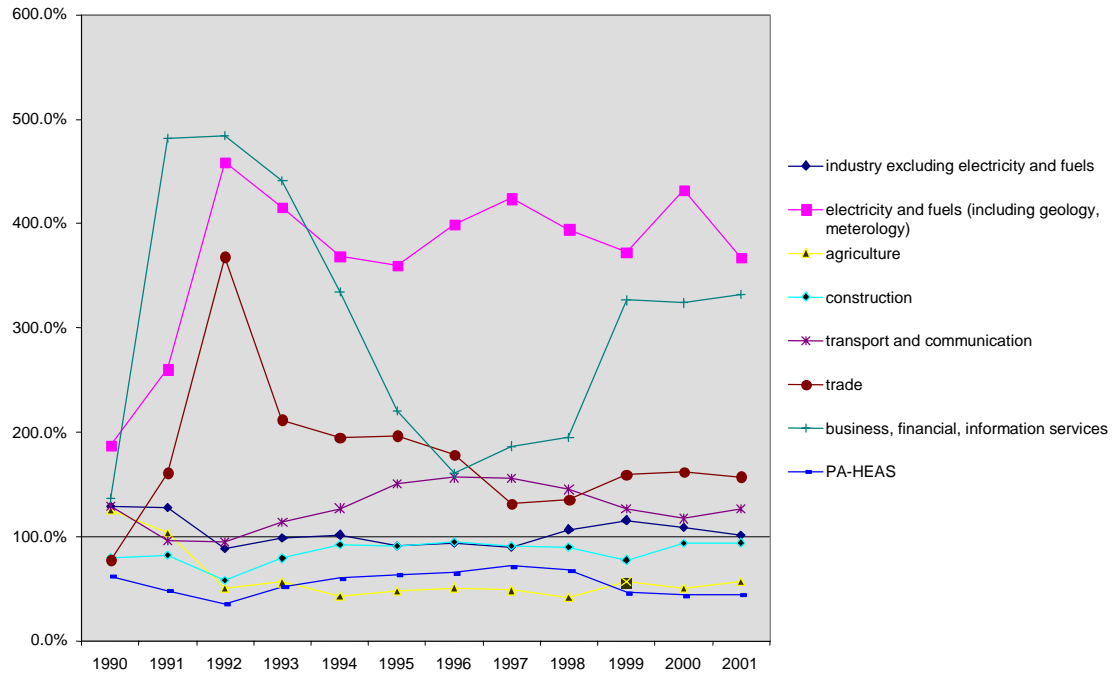
Figure 1C. Relative Labor Productivity. Russia, 1990-2001.
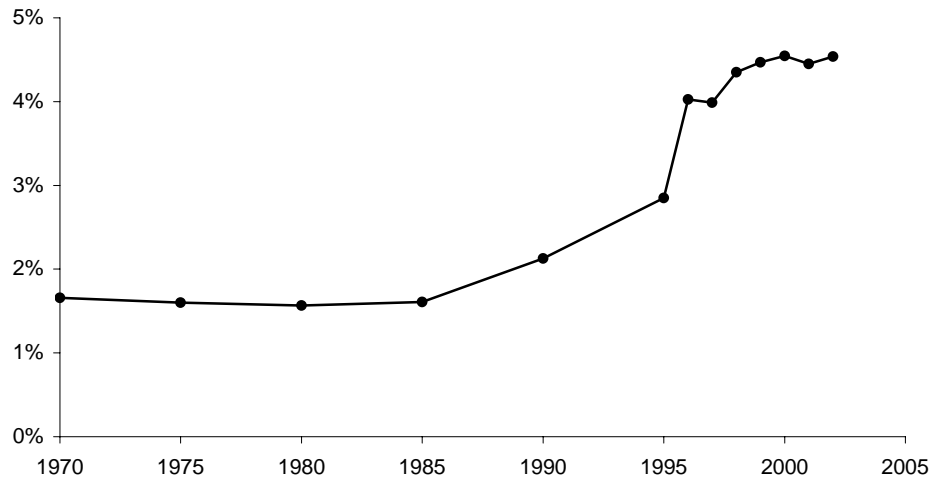
Figure 2: Government Employment as Share of Total. USSR, 1970-90; Russia, 1990-2002.
Source: CIS Statistical Committee. CISTAT database. 2001.
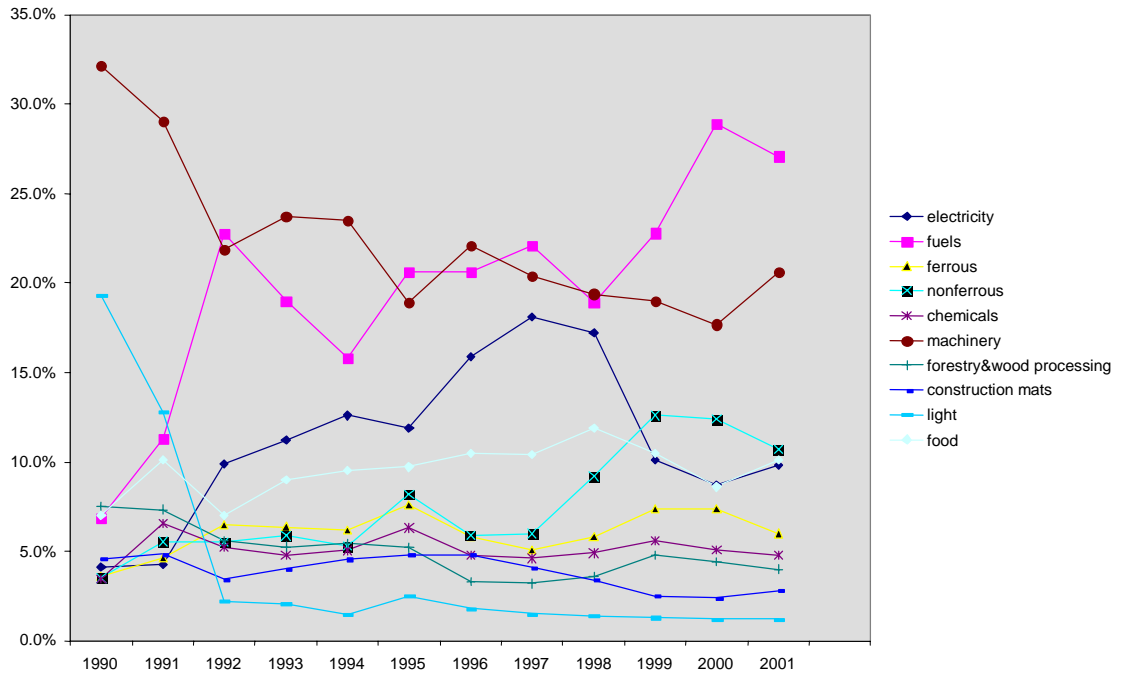
Figure 3A. Manufacturing Value Added Shares. Russia, 1990-2001.
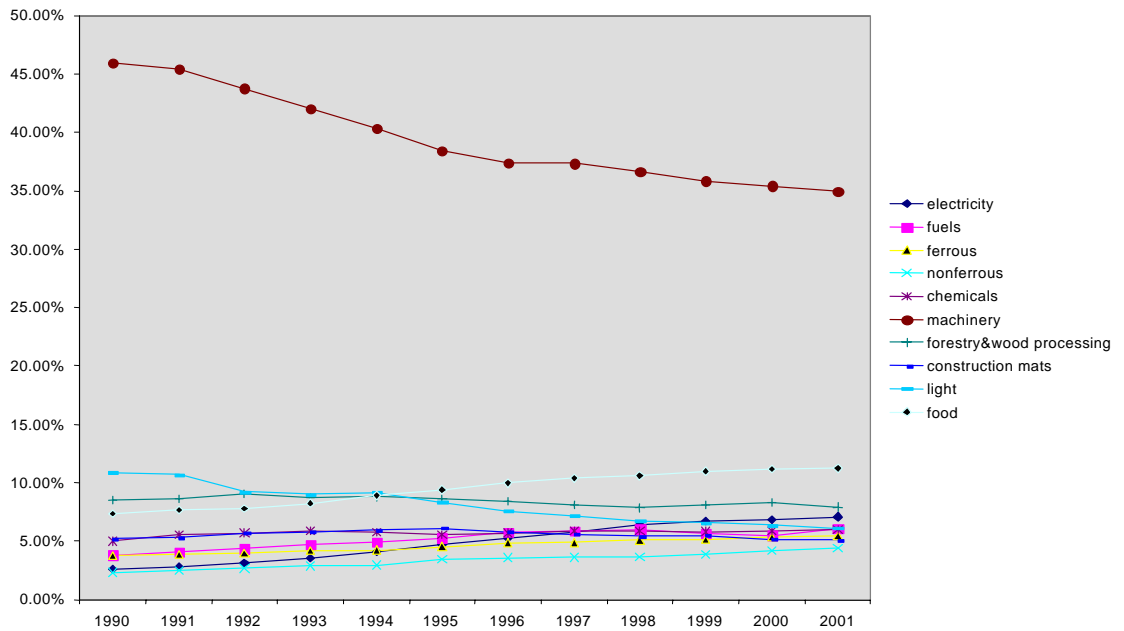
Figure 3B. Manufacturing Labor Force Shares. Russia, 1990-2001.
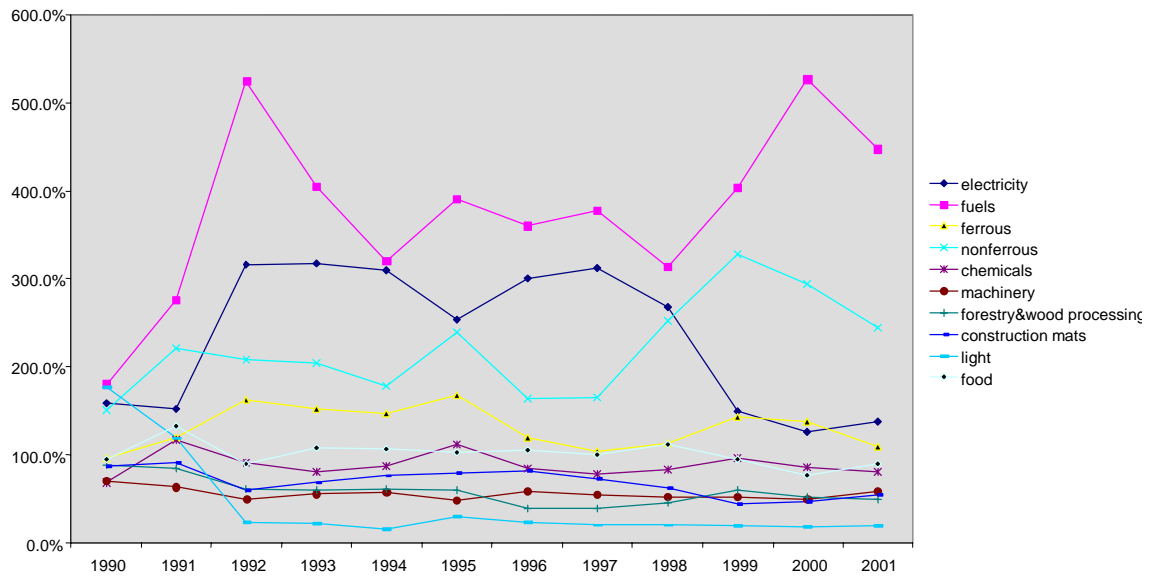
Figure 3C. Manufacturing Relative Productivity. Russia, 1990-2001.
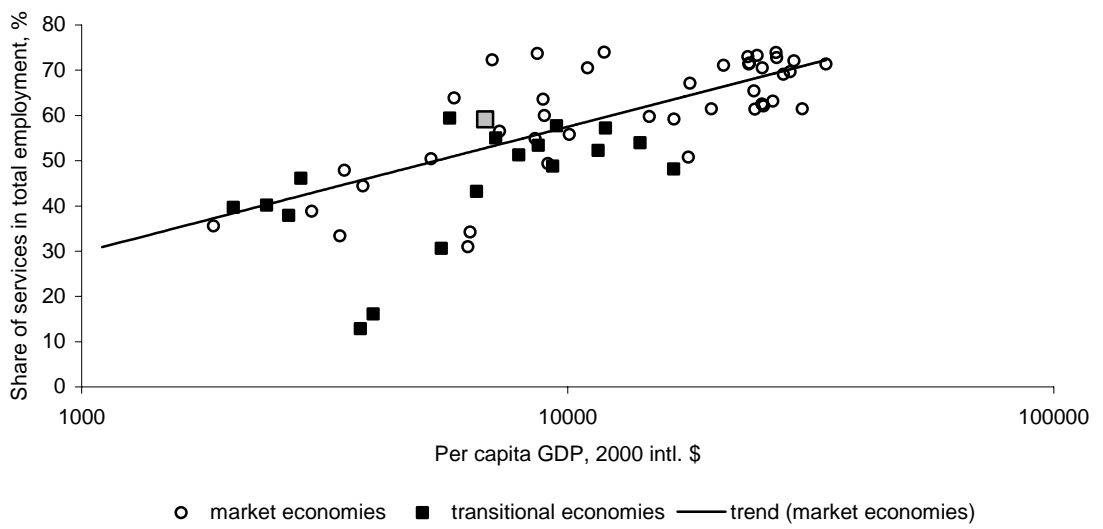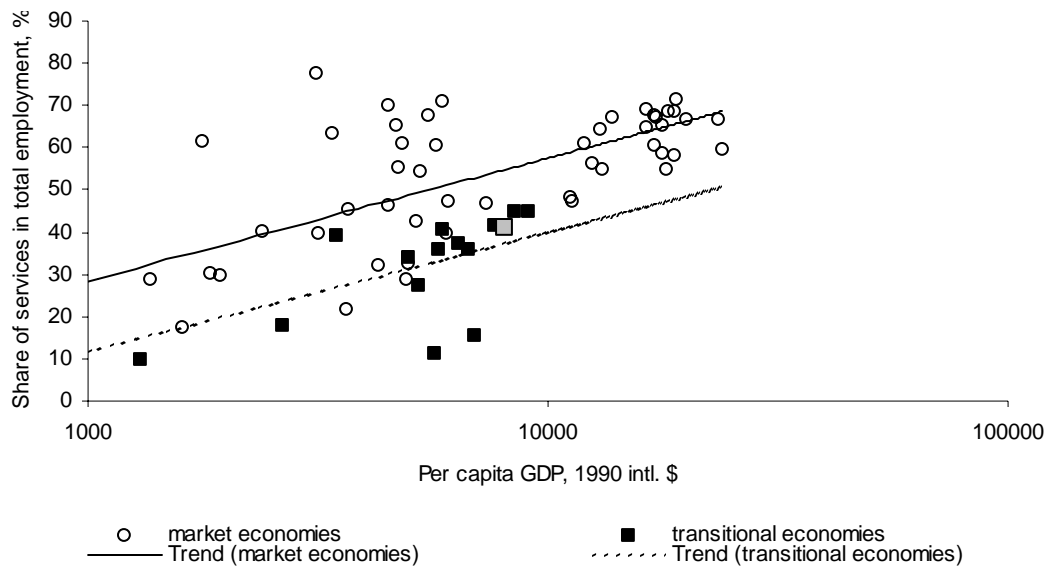
Figure 4. Level of development and service sector employment, 1990 and 2000.

Source: WDI.
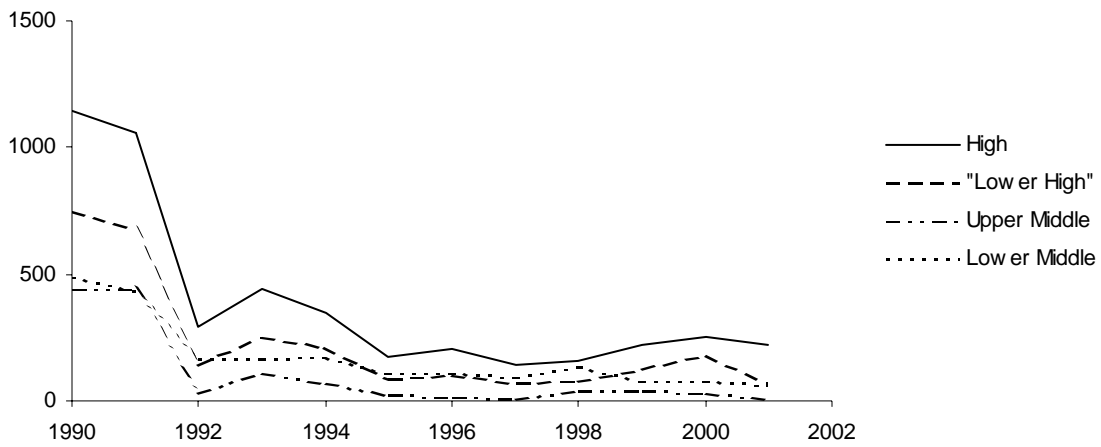
Figure 5A. Indices of structural deviation. Value-added shares of Agriculture, Industry and Services

Source: WDI, Goskomstat. Calculations by the authors.
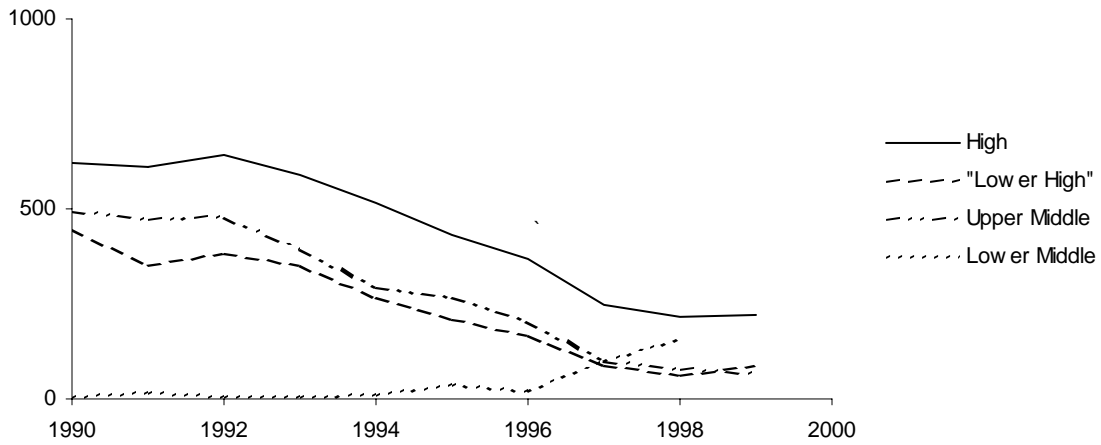
Figure 5B. Indices of structural deviation. Employment. Shares of Agriculture, Industry, and Services

Source: WDI, Goskomstat. Calculations by the authors.
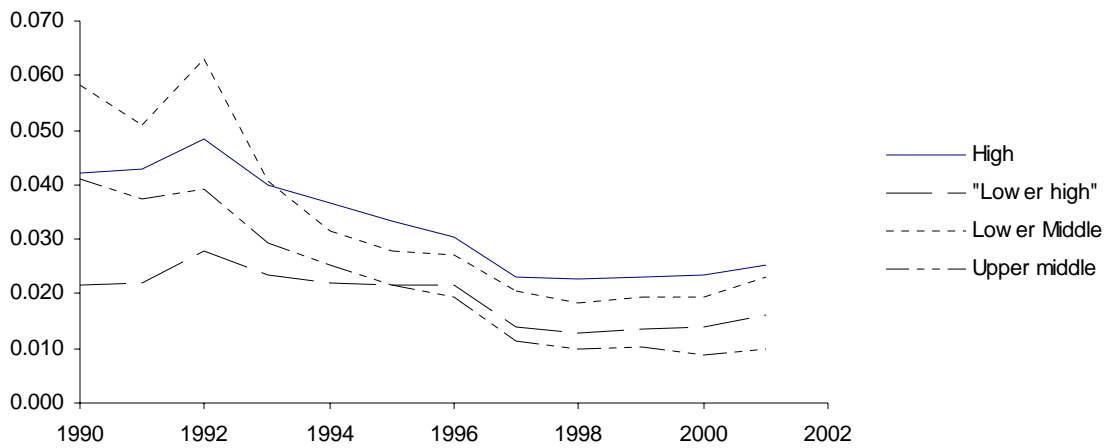
Figure 6. Indices of structural deviation. Nine-sector distribution of labor.

Source: ILO, Goskomstat. Calculations by the authors.

Figure 7. Indices of structural deviation. Manufacturing value added.

Source: WDI. Calculations by the authors.
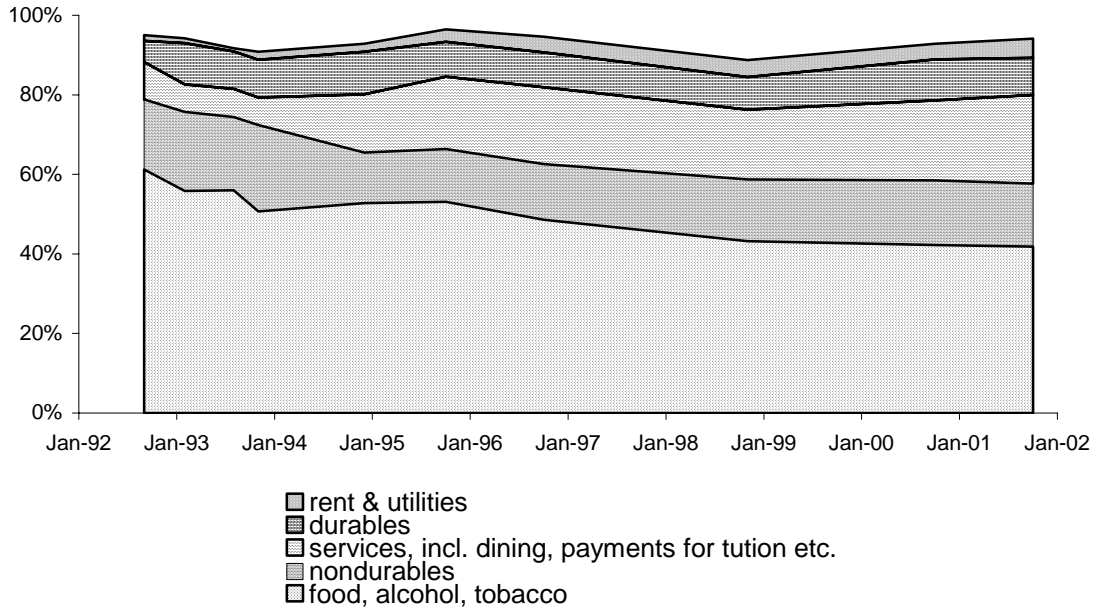
Figure 8. Structure of private household expenditure in Russia. RLMS data.

Source: Mroz et al. 2003.
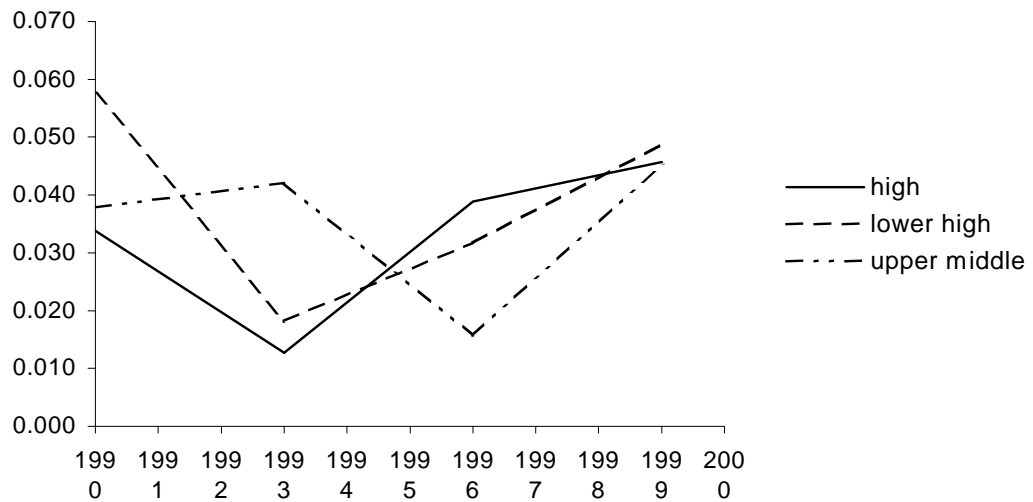
Figure 9. Indices of structural deviation for Russia. End use of GDP, international prices.
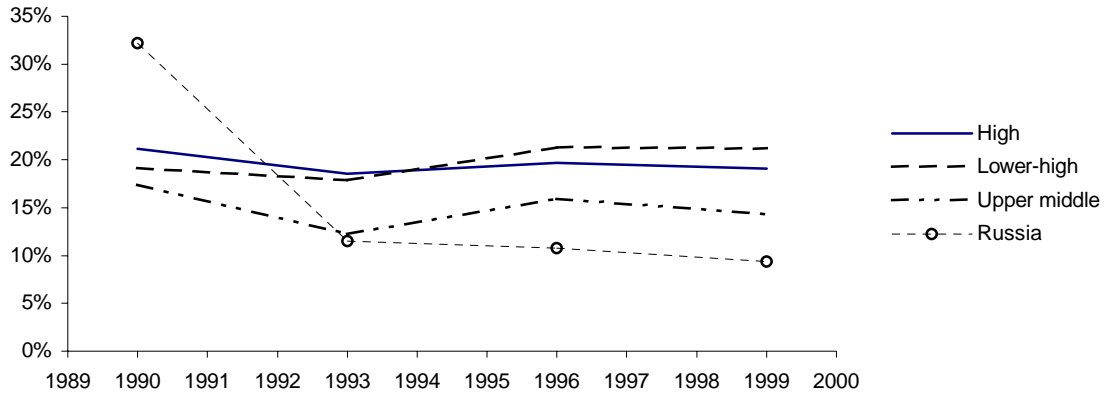
Source: ICP.

Figure 10. Shares of gross capital formation in GDP, international prices.

Source: WDI.
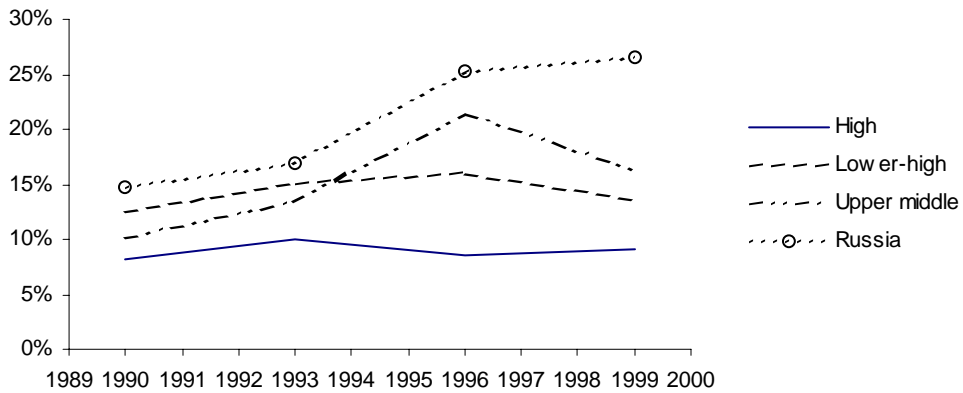
Figure 11. Shares of government consumption in GDP, International Prices

Source: ICP.

Figure 12. Indices of structural deviation for Russia. End use of GDP, domestic prices.
Source: WDI.
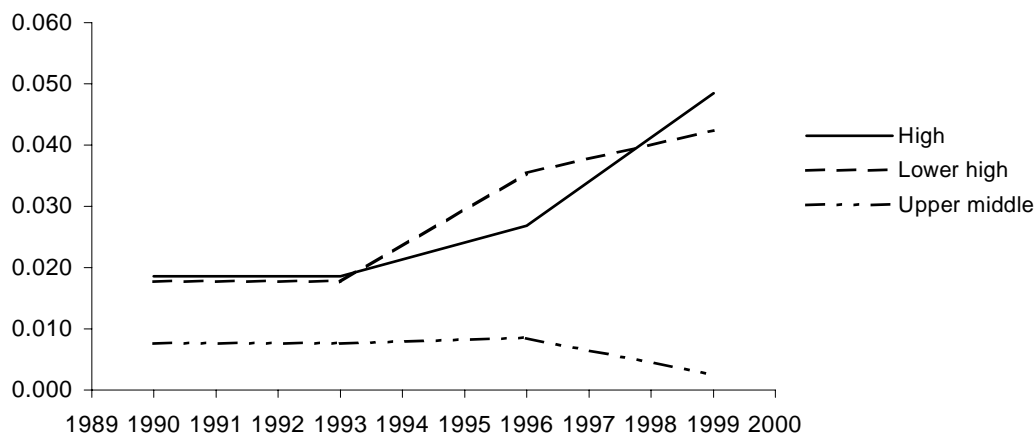
Figure 13. Indices of Structural Deviation for Russia. Structure of Household Consumption, international prices

APPENDIX 1. DATA TABLES

Table A1a. Distribution of Gross Value Added, percent

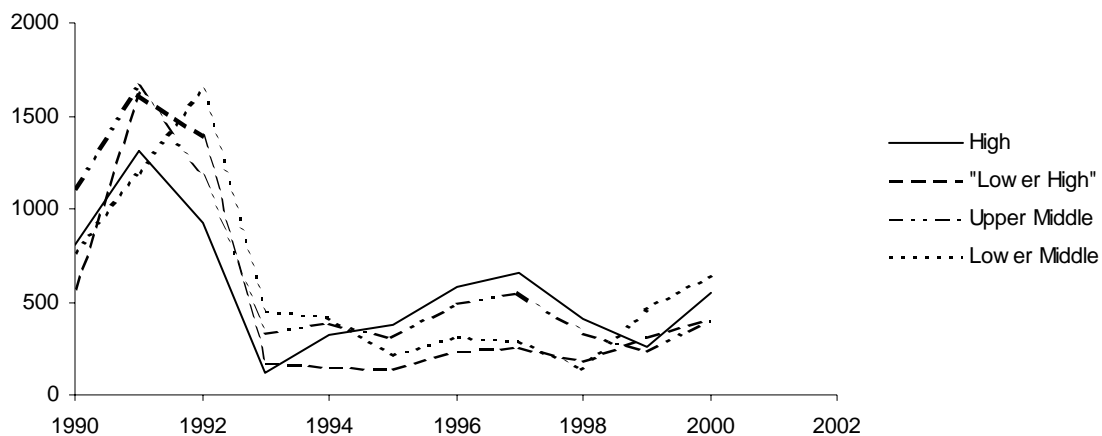|	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Electricity	1.56	1.63	3.34	3.86	4.15	3.46	4.72	5.17	5.19	3.11	2.74	2.82
Fuels	2.60	4.30	7.70	6.54	5.21	6.00	6.12	6.32	5.70	7.02	9.10	7.80
Ferrous metals	1.37	1.78	2.19	2.19	2.04	2.21	1.72	1.46	1.75	2.28	2.33	1.73
Nonferrous metals	1.32	2.12	1.87	2.02	1.74	2.39	1.75	1.72	2.78	3.88	3.91	3.08
Chemicals	1.30	2.50	1.77	1.65	1.66	1.83	1.42	1.31	1.48	1.72	1.61	1.38
Machinery	12.18	11.08	7.40	8.16	7.73	5.50	6.56	5.83	5.85	5.85	5.58	5.93
Wood processing	2.85	2.80	1.90	1.81	1.79	1.51	0.98	0.91	1.09	1.48	1.39	1.15
Construction materials	1.73	1.85	1.16	1.38	1.50	1.40	1.42	1.17	1.03	0.77	0.76	0.81
Light	7.32	4.88	0.74	0.70	0.48	0.73	0.53	0.43	0.42	0.40	0.38	0.35
Food	2.65	3.86	2.36	3.10	3.13	2.82	3.12	2.97	3.59	3.23	2.71	2.91
Other industry	2.95	1.37	3.38	3.02	3.47	1.25	1.34	1.29	1.30	1.05	1.01	0.83
Agriculture	16.44	13.87	7.14	8.02	6.32	7.04	7.14	6.48	5.68	7.56	6.60	6.87
Business services	0.00	1.36	0.13	1.29	0.69	1.27	1.19	1.56	0.95	3.07	3.16	2.91
Construction	9.51	9.43	6.30	7.94	9.13	8.53	8.45	7.99	7.13	6.15	7.24	8.24
Education, culture and art	5.36	3.82	2.88	3.78	3.95	3.80	4.29	4.76	4.42	2.94	2.75	2.86
Finance/credit/insurance	0.85	2.21	4.61	5.16	4.44	1.57	0.57	0.73	0.52	0.90	1.25	1.92
Forestry	0.08	0.11	0.12	0.15	0.18	0.15	0.18	0.14	0.13	0.11	0.11	0.11
General government	2.82	2.45	2.14	3.14	4.74	5.26	5.22	6.25	6.83	4.93	4.72	4.83
Geology and meteorology	0.00	0.00	0.31	0.19	0.24	0.24	0.28	0.35	0.32	0.31	0.35	0.36
Health, physical culture social security	2.75	2.75	1.68	2.70	3.22	2.93	3.20	3.77	3.10	2.42	2.15	2.21
Housing, communal, and personal services	3.77	2.50	1.94	3.27	3.59	5.41	6.08	5.95	5.51	3.07	2.73	2.83
Information and computer services	0.22	0.09	0.07	0.07	0.10	0.07	0.08	0.07	0.09	0.08	0.08	0.10
Real estate	0.00	0.07	0.23	0.39	0.56	1.38	1.25	1.78	2.75	3.46	3.18	3.53
Science and scientific services	2.72	2.07	0.94	1.11	0.98	0.81	1.04	0.92	0.89	0.82	0.90	0.81
Trade, catering, supply and procurement	6.02	12.27	29.01	19.06	18.46	19.78	18.40	17.70	19.76	23.19	23.64	23.02
Transport and communication	9.99	7.47	7.42	8.66	9.92	11.92	12.38	12.32	11.01	9.71	9.12	10.12
"Other industries of material production sphere"	1.26	1.18	1.26	0.63	0.56	0.72	0.56	0.63	0.74	0.50	0.53	0.53
Social organizations (no match in labor data)	0.37	0.19	0.18	0.21	0.41	0.37	0.39	0.78	0.99	0.18	0.15	0.19

Table A1b. Distribution of Gross Value Added, percent

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Electricity	0.72	0.76	0.87	0.94	1.04	1.13	1.20	1.25	1.32	1.38	1.42	1.46
Fuels	1.06	1.10	1.21	1.25	1.26	1.27	1.30	1.27	1.24	1.15	1.13	1.25
Ferrous metals	1.04	1.05	1.10	1.11	1.08	1.09	1.10	1.06	1.05	1.06	1.11	1.13
Nonferrous metals	0.65	0.68	0.74	0.76	0.75	0.83	0.81	0.79	0.75	0.79	0.87	0.90
Chemicals	1.39	1.51	1.59	1.57	1.48	1.35	1.29	1.27	1.21	1.19	1.22	1.23
Machinery	12.80	12.31	12.16	11.20	10.26	9.25	8.48	8.09	7.57	7.33	7.32	7.21
Wood processing	2.38	2.34	2.52	2.32	2.24	2.08	1.91	1.76	1.62	1.65	1.71	1.64
Construction materials	1.46	1.44	1.58	1.55	1.52	1.46	1.32	1.21	1.12	1.12	1.06	1.05
Light	3.04	2.90	2.56	2.40	2.34	2.00	1.72	1.56	1.39	1.35	1.32	1.26
Food	2.05	2.08	2.16	2.20	2.27	2.27	2.25	2.25	2.19	2.25	2.31	2.32
Other industry	1.29	0.93	1.30	1.34	1.24	1.35	1.26	1.16	1.17	1.18	1.19	1.17
Agriculture	12.91	13.18	14.03	14.26	15.01	14.67	14.04	13.28	13.67	13.28	13.01	11.90
Business services	0.00	0.00	0.19	0.61	0.51	0.57	0.57	0.75	0.78	0.79	0.78	0.80
Construction	11.98	11.49	10.94	10.08	9.91	9.34	8.91	8.76	7.98	7.95	7.78	8.79
Education, culture and art	0.53	0.60	0.68	0.82	1.09	1.23	1.21	1.20	1.15	1.16	1.15	1.27
Finance/credit/insurance	9.60	9.85	10.44	10.22	10.78	11.01	11.09	11.04	11.02	11.04	10.91	11.44
Forestry	0.32	0.32	0.33	0.34	0.36	0.39	0.37	0.37	0.37	0.38	0.37	0.38
General government	2.40	2.33	2.11	2.33	2.42	3.03	4.24	4.26	4.68	4.89	5.00	4.87
Geology and meteorology	0.43	0.41	0.40	0.36	0.31	0.29	0.29	0.27	0.28	0.27	0.27	0.27
Health, physical culture social security	5.63	5.83	5.87	5.99	6.42	6.69	6.87	6.83	6.99	7.03	7.00	7.05
Housing, communal, and personal services	4.27	4.28	4.15	4.21	4.41	4.48	4.86	5.19	5.34	5.26	5.16	5.28
Information and computer services	0.24	0.18	0.16	0.13	0.11	0.12	0.10	0.18	0.16	0.17	0.19	0.19
Real estate	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.09	0.12	0.18	0.25	0.29
Science and scientific services	3.72	3.75	3.20	3.16	2.68	2.54	2.30	2.21	2.04	1.89	1.87	1.91
Trade, catering, supply and procurement	7.79	7.62	7.88	9.00	9.47	10.05	10.30	13.49	14.59	14.57	14.65	14.64
Transport and communication	7.72	7.79	7.81	7.63	7.82	7.91	7.92	7.92	7.60	7.69	7.79	7.98
"Other industries of material production sphere"	2.17	2.03	2.13	1.50	1.11	1.23	1.36	1.12	1.03	1.10	1.23	0.81
Industrial labor not included in the 11 sectors	2.40	3.24	1.81	2.74	1.66	1.77	2.17	1.39	1.55	1.91	1.94	1.51

Table A1c. Relative Productivity (economy average = 100)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Electricity	216	214	385	410	400	307	394	413	393	226	193	193
Fuels	245	390	638	523	415	471	471	498	458	608	802	623
Ferrous metals	131	170	198	197	190	202	156	138	166	216	211	153
Nonferrous metals	205	311	253	264	231	289	215	218	369	493	449	341
Chemicals	93	166	111	106	113	136	110	103	122	145	132	112
Machinery	95	90	61	73	75	59	77	72	77	80	76	82
Wood processing	120	120	75	78	80	73	51	52	67	89	81	70
Construction materials	119	128	74	89	99	95	108	97	92	69	71	77
Light	241	168	29	29	21	36	31	28	30	30	29	27
Food	129	186	110	141	138	125	138	132	164	144	117	125
Other industry	229	147	260	225	281	93	106	111	111	89	85	72
Agriculture	127	105	51	56	42	48	51	49	42	57	51	58
Business services			70	213	135	222	208	208	122	390	407	365
Construction	79	82	58	79	92	91	95	91	89	77	93	94
Education, culture and art	1005	642	420	461	363	307	354	396	383	252	239	226
Finance/credit/insurance	9	22	44	50	41	14	5	7	5	8	11	17
Forestry	26	34	37	45	50	39	48	38	35	30	29	30
General government	118	105	101	135	196	174	123	147	146	101	94	99
Geology and meteorology	0	0	79	53	77	83	99	128	116	114	130	130
Health, physical culture social security	49	47	29	45	50	44	47	55	44	34	31	31
Housing, communal, and personal services	88	59	47	78	82	121	125	115	103	59	53	53
Information and computer services	89	52	42	56	88	59	78	40	57	45	45	53
Real estate				3762	3019	4919	2610	1974	2342	1896	1265	1208
Science and scientific services	73	55	29	35	37	32	45	42	43	44	48	42
Trade, catering, supply and procurement	77	161	368	212	195	197	179	131	135	159	161	157
Transport and communication	129	96	95	113	127	151	156	156	145	126	117	127
"Other industries of material production sphere"	58	58	59	42	51	59	41	56	72	46	43	65

Table A2. Value Added, Labor Force, and Relative Productivity, 8 major sectors

Value added	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Industry excluding electricity and fuels	33.68	32.23	22.77	24.04	23.56	19.65	18.85	17.09	19.28	20.66	19.66	18.15
Electricity and fuels (incl.geology, meteorology)	4.16	5.93	11.36	10.59	9.60	9.71	11.12	11.84	11.21	10.43	12.19	10.97
Agriculture	16.53	13.98	7.27	8.17	6.50	7.19	7.32	6.62	5.81	7.67	6.70	6.98
Construction	9.51	9.43	6.30	7.94	9.13	8.53	8.45	7.99	7.13	6.15	7.24	8.24
Transport and communication	9.99	7.47	7.42	8.66	9.92	11.92	12.38	12.32	11.01	9.71	9.12	10.12
Trade	6.02	12.27	29.01	19.06	18.46	19.78	18.40	17.70	19.76	23.19	23.64	23.02
Business, financial, information services	1.06	3.74	5.04	6.92	5.79	4.29	3.10	4.15	4.31	7.50	7.67	8.46
PA-HEAS	17.42	13.59	9.89	14.18	16.72	18.45	20.12	22.01	21.07	14.49	13.60	13.89

Shares of labor force	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Industry excluding electricity and fuels	26.09	25.24	25.70	24.43	23.17	21.69	20.15	19.13	18.08	17.91	18.11	17.91
Electricity and fuels (incl.geology, meteorology)	2.22	2.28	2.47	2.55	2.60	2.70	2.78	2.79	2.84	2.80	2.82	2.99
Agriculture	13.23	13.50	14.36	14.60	15.37	15.05	14.42	13.65	14.05	13.66	13.38	12.28
Construction	11.98	11.49	10.94	10.08	9.91	9.34	8.91	8.76	7.98	7.95	7.78	8.79
Transport and communication	7.72	7.79	7.81	7.63	7.82	7.91	7.92	7.92	7.60	7.69	7.79	7.98
Trade	7.79	7.62	7.88	9.00	9.47	10.05	10.30	13.49	14.59	14.57	14.65	14.64
Business, financial, information services	0.78	0.78	1.04	1.57	1.73	1.95	1.94	2.22	2.21	2.30	2.37	2.55
PA-HEAS	28.03	28.25	28.05	27.53	27.93	29.10	30.81	30.83	31.25	31.38	31.35	31.56

Relative productivity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Industry excluding electricity and fuels	129.1	127.7	88.6	98.4	101.7	90.6	93.6	89.3	106.6	115.3	108.5	101.3
Electricity and fuels (incl.geology, meteorology)	187.5	260.3	459.2	415.2	368.5	360.1	399.5	424.0	394.6	373.0	431.7	367.0
Agriculture	124.9	103.5	50.6	56.0	42.3	47.8	50.8	48.5	41.4	56.2	50.1	56.9
Construction	79.4	82.0	57.6	78.8	92.1	91.2	94.8	91.3	89.3	77.3	93.2	93.8
Transport and communication	129.3	95.9	94.9	113.5	126.9	150.8	156.4	155.6	144.8	126.3	117.0	126.8
Trade	77.3	161.1	368.2	211.9	195.0	196.8	178.6	131.2	135.4	159.1	161.4	157.2
Business, financial, information services	136.8	481.5	484.5	440.8	334.4	220.1	160.1	186.7	195.1	326.4	323.9	332.3
PA-HEAS	62.1	48.1	35.3	51.5	59.9	63.4	65.3	71.4	67.4	46.2	43.4	44.0

Table A3, Value Added, Labor Force, and Relative Productivity, per cent industry total

Value added	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
electricity	4.1	4.3	9.9	11.2	12.6	11.9	15.9	18.1	17.2	10.1	8.7	9.8
Fuels	6.9	11.3	22.8	19.0	15.8	20.6	20.6	22.1	18.9	22.8	28.9	27.1
Ferrous	3.6	4.7	6.5	6.4	6.2	7.6	5.8	5.1	5.8	7.4	7.4	6.0
nonferrous	3.5	5.5	5.5	5.9	5.3	8.2	5.9	6.0	9.2	12.6	12.4	10.7
chemicals	3.4	6.6	5.2	4.8	5.1	6.3	4.8	4.6	4.9	5.6	5.1	4.8
machinery	32.2	29.0	21.9	23.7	23.5	18.9	22.1	20.4	19.4	19.0	17.7	20.6
Forestry&wood processing	7.5	7.3	5.6	5.3	5.4	5.2	3.3	3.2	3.6	4.8	4.4	4.0
construction mats	4.6	4.8	3.4	4.0	4.6	4.8	4.8	4.1	3.4	2.5	2.4	2.8
Light	19.3	12.8	2.2	2.0	1.5	2.5	1.8	1.5	1.4	1.3	1.2	1.2
Food	7.0	10.1	7.0	9.0	9.5	9.7	10.5	10.4	11.9	10.5	8.6	10.1
Other	7.8	3.6	10.0	8.8	10.5	4.3	4.5	4.5	4.3	3.4	3.2	2.9

Labor Force Shares	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
electricity	2.60	2.81	3.13	3.53	4.07	4.69	5.29	5.78	6.39	6.73	6.87	7.09
Fuels	3.81	4.07	4.35	4.70	4.93	5.29	5.73	5.86	6.03	5.64	5.49	6.07
Ferrous	3.74	3.86	3.97	4.18	4.23	4.54	4.87	4.88	5.11	5.17	5.35	5.47
nonferrous	2.32	2.51	2.66	2.87	2.96	3.43	3.60	3.63	3.64	3.85	4.21	4.38
chemicals	5.00	5.57	5.71	5.88	5.80	5.59	5.71	5.87	5.88	5.82	5.90	5.99
machinery	45.90	45.43	43.79	42.05	40.30	38.42	37.43	37.34	36.69	35.85	35.42	34.95
Forestry&wood processing	8.53	8.62	9.06	8.70	8.80	8.64	8.44	8.12	7.85	8.08	8.29	7.94
construction mats	5.22	5.33	5.67	5.80	5.96	6.08	5.81	5.59	5.41	5.49	5.15	5.10
Light	10.90	10.72	9.22	9.01	9.17	8.32	7.59	7.18	6.74	6.60	6.39	6.13
Food	7.36	7.66	7.76	8.25	8.91	9.41	9.96	10.38	10.60	11.00	11.16	11.23
Other	4.62	3.43	4.69	5.03	4.85	5.60	5.58	5.38	5.66	5.77	5.77	5.65

Relative Productivity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
electricity	158.9	152.3	316.1	317.3	309.6	254.0	300.6	313.0	269.1	150.1	126.7	138.2
Fuels	180.2	276.7	524.1	404.5	320.8	389.7	359.4	377.1	313.6	404.0	526.3	446.6
Ferrous	96.5	120.7	163.1	152.3	146.6	167.3	119.1	104.6	113.5	143.2	138.4	109.6
nonferrous	150.8	221.2	207.8	203.9	178.6	239.1	164.1	165.5	252.5	327.6	294.4	244.2
chemicals	68.7	117.8	91.5	81.6	87.2	112.7	84.1	78.4	83.3	96.2	86.4	80.2
machinery	70.1	63.9	49.9	56.4	58.3	49.2	59.0	54.6	52.9	53.0	50.0	58.9
Forestry&wood processing	88.3	85.0	62.0	60.4	61.9	60.2	39.1	39.4	45.9	59.4	53.1	50.4
construction mats	87.7	90.8	60.7	69.1	76.4	79.0	82.6	73.4	62.8	45.5	46.6	54.9
Light	177.5	119.4	23.9	22.6	16.1	30.0	23.7	20.9	20.8	19.7	18.8	19.6
Food	95.3	132.0	90.0	109.2	106.9	103.1	105.5	100.2	112.3	95.4	77.0	89.9
Other	168.9	104.3	213.3	174.3	217.2	76.8	80.7	83.7	76.0	59.0	55.5	51.3

APPENDIX 2. *The World Bank Critique*

The tables and figures cited in this paper are based upon official Goskomstat statistics, whose validity has been disputed by World Bank studies (World Bank, 2004). Two related World Bank studies argue that Goskomstat's distribution of value added between the oil and gas sector (which accounts for the bulk of the electricity and fuel sector above) grossly overstates the trade share and grossly understates the oil and gas value added share. The World Bank studies do not alter the distribution of labor force shares; hence, they suggest very substantial upward revisions of the relative productivity of oil and gas and substantial downward revisions of trade's relative productivity.

The crux of the World Bank argument is that Russian oil and gas firms use low transfer prices (either to conceal their true income and to reduce their tax burdens) and thereby shift value added to trade and to transportation. By selling energy at transfer prices that are "too low", value added that truly belongs to oil and gas is shifted to trade in the form of inflated profits, which are the primary component of trade's value added. Empirical support for this conclusion is found in (what the World Bank considers to be) inflated trade and transport margins relative to other energy producers. The World Bank compares transport and trade margins in Russia with those of the UK and the Netherlands (where transport and trade margins are calculated together) and with trade margins in Canada (where trade margins are given separately). The key trade margins for the year 2000 are recorded in Table A2-1.

Table A2-1. Trade Margins, Oil and Gas Sectors, Russian and Canada, 2000

	Russia	Canada
Oil extraction	30.7%	0.0%
Oil refining	36.6%	17.2%
Gas	63.1%	0.0%

Source: World Bank, From Transition to Development, p. 62.

The discrepancy between Russian oil and gas trade and transport margins are even larger as compared to those of the UK and Netherlands, but the World Bank recognizes that their trade and

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transport conditions are quite different from Russia and that Canada serves as a better benchmark. Another notable proof of Russia's exaggerated oil and gas margins is said to be that margins for other branches of the economy are similar to those of Canada, UK, or the Netherlands. Table A2-1 does raise the interesting puzzle of zero margins for oil extraction and natural gas, products that are traded across borders and transported long distances. It would be advised to examine definitions to determine how the zero rate is arrived at.

When World Bank specialists shifted the "excess" of the trade (or trade and transport margins) from profits in trade to profits in oil and gas, the result is a substantial change in the distribution of value added in favor of oil and gas and away from trade, as is shown by Table A2-2. This adjustment results in changes in other sector shares, but such changes are modest and are ignored in the following discussion.

Table A2-2: Goskomstat and World Bank Estimates of Value Added Shares, 2000

|	Goskomstat	Canadian margins	UK margins	Netherlands margins
Oil and gas	7.8	19.2	25.2	24.9
Trade	27.3	14.6	11.0	9.4

Source: Ibid., p.63; Russian Economic report, February 2004, p. 15.

Figure A2-1 shows the effects of the World Bank value added adjustments on the official estimates of *relative labor productivity* by sector. Insofar as the World Bank adjustments affect primarily trade and fuels, the relative productivities of the other branches remain relatively unchanged. Manufacturing, transport and construction remain near the economy average, agriculture and PA-HEAS remain well below the economy average.

World Bank specialists have used these figures to argue that Russia's industrial sector is still more productive than its service sector and implicitly that resources should flow to "industry" rather than to "services." The benchmark year 2000 may not be representative given that the positive effects of devaluation on manufacturing and metals were still being felt. However, the validity of the argument

does not really rest on the choice of benchmark year. Figure A2-1 shows that the relatively low productivity of services (under the World Bank variant) is the consequence of exceptionally low productivity in public administration, health, education and science, which is compensated in the combined service figure by the very high productivity of market service sectors. As a guide to resources allocation, Figure A2-1 suggests that resources should flow into mining and market services and perhaps transportation infrastructure and not into manufacturing. Moreover, in what is largely a market economy, resources will likely flow spontaneously to the sectors with higher returns. Moreover, remaining Russian subsidies are largely for manufacturing; so economic policy already favors manufacturing over services. The gradual decline of manufacturing employment provides a rather clear signal that its productivity is low relative to other pursuits.

Figure A2-1: Sector Productivity Comparisons: World Bank vs. Goskomstat Estimates
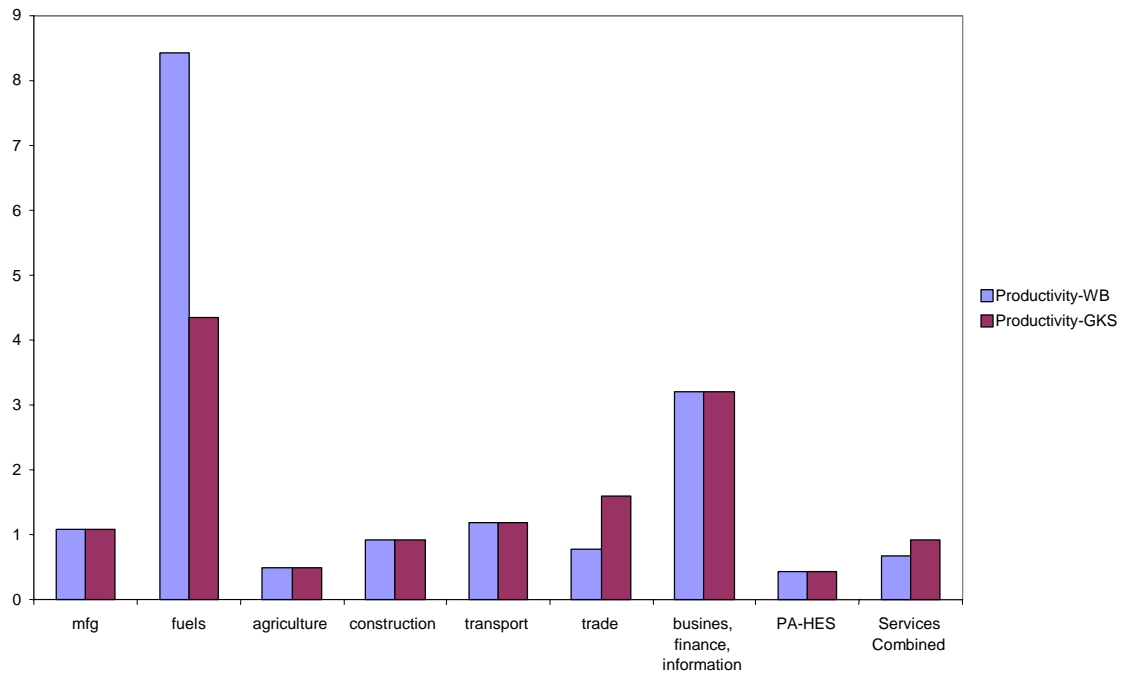
The basic assumption of World Bank analysts is that the high oil and gas transport and trade margins are pure tax avoidance (or worse) schemes without economic foundations. In the Russian context, however, one must ask, to the contrary, whether high trade and transport margins are the

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consequence of natural economic processes. A number of sources suggest that it is difficult to distinguish between value added attributed to trade and to transport. Those marketing and transporting the product can attribute the revenue either to trading activities or to transport activities. Therefore it makes sense to combine trade and transport margins in the discussion that follows.

Figure A2-2: Payments for Trade and transport for oil and gas exports and for total product, 2000 (bil rubles)
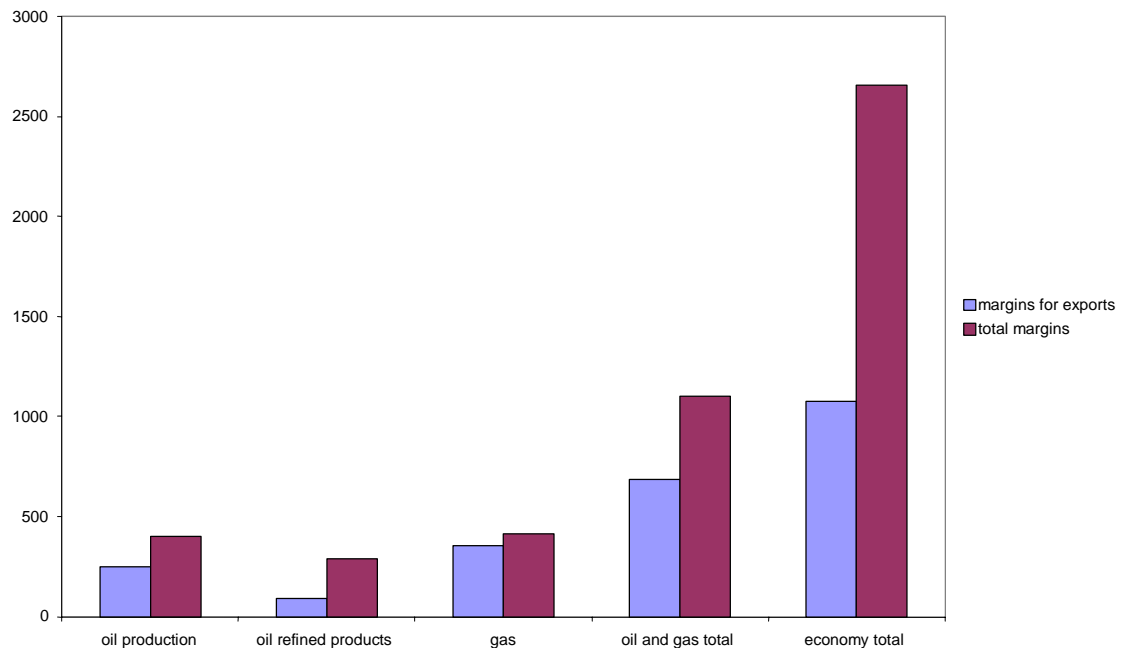

Figure A2-2 shows the combined Russian trade and transport payments for oil and gas products and for the entire economy in 2000 broken down into payments for exported products and for the product as a whole (domestic uses plus exports). It shows that, except for refined oil products (gasoline, jet fuel, heating oil), which are used primarily domestically, more than half of the trade and transport fees are paid on oil and gas products that were exported. Does this make any economic sense, or does it suggest simply a device to avoid taxes?

The answer depends, to a degree, on where scarcity lies in an economy. Is the scarce resource oil and gas as natural resources or is it marketing knowledge and/or the transportation infrastructure? In Russia, the natural gas monopoly (Gazprom) both produces gas and owns the transportation system, but its export pipelines go through two sovereign nations before reaching their ultimate export markets. In

the oil sector, most export pipeline capacity is controlled by a state-controlled entity (Transneft), which is in a position to extract rents in the form of marketing or transportation fees from oil producers. In Russia, where domestic prices of energy are well below world prices, those who are in a position to extract rents between the well head and the final distribution point are those who control access to export markets, through their control of export licenses, access to pipelines, ability to gain official permissions and so on. Assuming that domestic energy prices roughly equal the cost of production plus a normal profit, the economic rents in the energy market (per physical unit of product) roughly equal the difference between the world and domestic prices, which, in the case of natural gas, is a ratio of four to one. The margins in Figure A2-2 may simply reflect the relative scarcities of modern Russia in which wellhead oil or natural gas is not a particularly valuable resource compared to other resources required to get it to market.

One way to judge whether the pattern of trade and transport margins make economic sense is to examine trends over time. Figure A2-3 compares the 1991 trade and transport margin (combined) (Goskomstat 1995) with that of 2000 and reveals that the 2000 margin for oil and gas combined was only slightly above that of 1991. Given that the year 1991 counts as a pre-transition year, we would expect tax-avoidance and other value-added-redistributing activities to differ from those of 2000; therefore, it is remarkable that margins were about the same in the two years. Figure A2-3 also shows that margins remained relatively stable although payments for export margins increased dramatically as a percent of total margin payments, which itself is explained by the fact that exports as a percent of total energy expanded substantially as well. [15]

It would require a detailed study to determine how trade and transport margins are calculated by Goskomstat given that domestic energy prices differ from export prices. According to Goskomstat, the margins are calculated as a percent of their "full cost" in the prices paid by the user (Goskomstat 1995: 127). This definition raises conceptual issues: For example, in 1991, the trade and transport

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[15] Note that the above figures measure export and production in value terms. We do not know how these calculations are made in light of the large differences in domestic and world prices.

margin paid by the electricity sector in acquiring oil and gas products was 49%, the economy average was 36%, and the export margin was 33 percent (Goskomstat 1995: 126-9). The higher margin paid by electricity for oil and gas may therefore be the result of a higher margin payment (in rubles) or it may be the result of a lower price. In fact, given that the export price of natural gas is currently some four times that of the domestic price, a 48 percent margin on the low domestic price may represent a relatively small payment. This technical issue requires considerable study beyond the scope of this paper.

A final skeptical word on the World Bank criticism: The industrial structure of any country reflects its institutions, including how its enterprises organize themselves (into conglomerates or by product divisions), their tax systems, and the degree of price controls. U.S. economic statistics, for example, will likely show a relatively low percentage of corporate dividends (due to their double taxation) and a relatively large home building sector (due to mortgage interest deduction). If the Russian tax system encourages energy concerns to separate trading and transport functions from the functions of production and refining, this fact should be reflected in Russian production statistics. If the Russian state dictates that domestic prices be well below world prices, this creates opportunities to earn economic rents and makes those with the skills and knowledge to capture such rents. Buyers of refined products or of natural gas would be willing to share rents with intermediaries in order to buy at the low domestic price. Sellers would be willing to share rents with intermediaries in order to sell at the world price. Given that such pricing policies are part of Russian institutions, they should be reflected in the structure of Russian production.

Economic theory also underscores the ambiguity of this issue. In an economy dominated by monopolistic structures, the distribution of rents/profits is the outcome of a bargaining process, the results of which depend upon time and circumstances. Thus, in the Russian economic environment of the period 1990 to present, virtually any distributional result is possible, based purely on economic considerations.

Figure A2-3: Export margin payments, total margin payments and reported trade and transport margins, 1991 and 2000
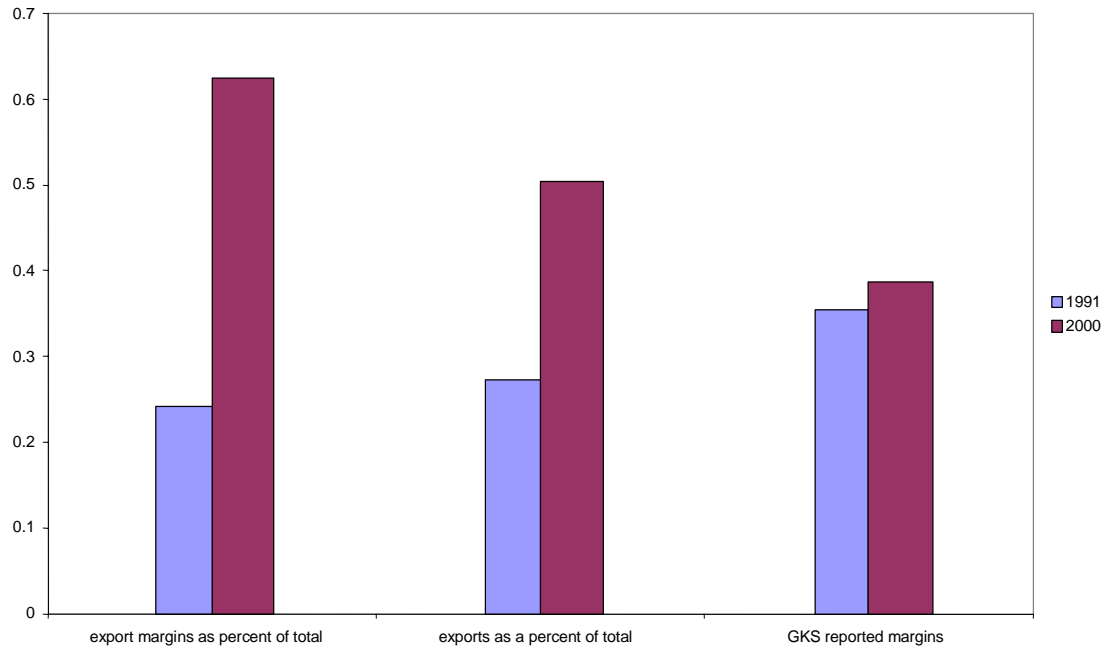
For these reasons, and until further detailed studies of the above issues are completed, we should continue to use the official Goskomstat statistics to represent the "true" structure of the Russian economy.