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How Large Was the Output Collapse in Russia?
Alternative Estimates and Welfare Implications

Prepared by Evgeny Gavrilentov and Vincent Koen*

Authorized for Distribution by David T. Coe

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Abstract

The divergence between production and consumption indicators in Russia suggests that the magnitude of the output collapse in the course of the transition is overstated by the official statistics. Alternative estimates for real GDP are derived, which reconcile the official production and consumption data. Based on cautious assumptions, real GDP appears to have declined cumulatively by no more than one third rather than by one half. The drop in household welfare is much smaller still, as the output mix shifts and deadweight losses are sharply reduced.

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*Evgeny Gavrilentov is First Deputy Director of the Center for Economic Analysis under the Government of the Russian Federation. This paper was written while he was a visiting scholar at the Research Department of the IMF. Comments from David Coe, François Lequiller, Bryan Roberts, Doris Ross and participants in an IMF Seminar are gratefully acknowledged. However, the authors remain responsible for any judgements formulated in the paper as well as for any remaining errors.

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Summary

While production has indeed collapsed in many sectors of the Russian economy since the late 1980s, the official figures seem to exaggerate the size of the fall in aggregate output that has occurred so far in the course of the transition. In addition to strong anecdotal evidence, this presumption is based on the recognition by the statistical authorities themselves that, as in other transition economies, the tools at their disposal fail to capture a significant component of economic activity; on the relative resilience of household consumption and electricity use; and on discrepancies between financial and production indicators.

Official real GDP data in Russia are derived only from the production side. Real GDP is re-estimated here from the demand side using a set of very conservative assumptions that deliberately minimize the size of the revision. A lower bound for real GDP is thus computed. In cumulative terms, it turns out that real GDP declined by no more than one third between 1989 and 1994, rather than by one half as implied by the official data.

For a number of reasons, the severe depression in output did not have a commensurate negative impact on household welfare. First, investment declined much more than consumption, partly as a reflection of prior overaccumulation of capital. Second, much of the consumer goods that are no longer produced were not desired by consumers. Third, price liberalization reduced searching and queuing costs and improved the variety and quality of supply. Last, the demise of central planning and the gradual hardening of budget constraints on enterprises cut down on waste and other forms of inefficient resource use.

I. Introduction

Since the onset of economic transition in Russia, the perception has become increasingly widespread that output and living standards are highly unlikely to have dropped as much as the official numbers indicate. 1/ Many observers find it hard to believe that the size of the Russian economy really halved between the late 1980s and 1994. This judgement, however, remains very much an impressionistic one, relying on anecdotal or partial evidence rather than on a documented set of alternative estimates. The ambition of this paper is to show that the output decline was much less than what is recorded in the national accounts data published by the Russian State Committee for Statistics (Goskomstat). The paper also discusses some of the welfare implications of the fall and recomposition of output. It concludes that too many tears have been shed on measured output losses, and that the transition process itself should not be blamed for the dismal heritage it was endowed with.

Output of course really did collapse in many sectors, due inter alia to the breakdown of internal and external trading arrangements; to the contraction in demand (e.g., military procurement and investment programs); to the compression of imports of some intermediate goods; to price liberalization, insofar as changes in relative prices rendered some activities inviable; to an archaic financial system which limits enterprises' ability to engage in intertemporal substitution and hampers settlements; and to domestic and cross-border domino or contagion effects. It cannot be ruled out a priori that the cumulative fall in production was even larger than the one experienced in the United States during the Great Depression of 1929-33 (Table 1), 2/ and larger than any downturn registered in Russia during the previous 70 years. 3/

There are a number reasons, however, to suspect that the official real GDP statistics are overstating the output collapse. 4/ The traditional statistical apparatus, based on a census rather than a sampling approach, is obviously missing an increasingly large portion of economic activity, as

1/ See for example "Russian Agency Tracks Soviet-Style Economy as Free Market Thrives", *Wall Street Journal*, July 6, 1994 and "Services Take the Lead in Russia", *Financial Times*, July 14, 1994.

2/ In Table 1, published yearly rates of change are chained to derive cumulative declines. As these rates of change are computed in different ways across countries, the resulting cumulatives are not strictly comparable but they are nevertheless relevant as a first approximation (see the discussion of valuation base effects below).

3/ See Gavrilentov (1994c). Consumption, however, fell much more in 1941-42 than output, and much more than in the course of the transition.

4/ There are also reasons to doubt the accuracy of real GDP data that for the last few years have been published monthly two weeks after the end of the period to which they relate, without any subsequent revisions (the only revision published so far was for 1991 as a whole, from an original decline of 9 percent to a decline of 13 percent).

Table 1. Selected Countries in Transition:
Cumulative Officially Registered Real Output Declines 1/

(Percent change compared to base year)

Base year = 1989		1990	1991	1992	1993
Albania	GDP	-10	-35	-41	upturn
	Industry <u>2/</u>	-13	-50	-65	upturn
Bulgaria	GDP <u>3/</u>	-12	-32	-36	-39
	Industry	-15	-37	-47	...
Czech Republic	GDP	-1	-15	-21	-21
	Industry	-3	-27	-37	-42
Slovak Republic	GDP	-2	-17	-22	-26
	Industry	-4	-21	-32	-39
Poland	GDP	...	-12	-18	upturn
	Industry	...	-24	-33	upturn
Romania	GDP	-6	-18	-29	upturn
	Industry	-18	-34	-49	...

Base year = 1990		1991	1992	1993	<u>Projection</u> 1994
Belarus	GDP	-1	-11	-19	-40
	Industry	-2	-11	-21	-40
Estonia	GDP	-12	-28	-31	upturn
	Industry	-10	-45	-65	...
Kazakhstan	GDP	-12	-23	-33	-50
	Industry	-1	-14	-28	-50
Latvia	GDP	-8	-42	-49	upturn
	Industry	-1	-35	...	...
Lithuania	GDP	-13	-46	-55	upturn
	Industry	-5	-54	...	...
Russia	GDP	-13	-30	-38	-47
	Industry	-8	-25	-37	-50
Ukraine	GDP	-12	-27	-37	-50
	Industry	-5	-11	-18	-45

Memorandum items:

Great Depression in the United States (GNP)				
Base year = 1929	1930	1931	1932	1933
	-10	-17	-29	-31
World War II in the U.S.S.R. (industrial output)				
Base year = 1940	1941	1942	1943	
	-2	-23	upturn	

Sources: Central Statistical Administration of the U.S.S.R.; Statistical Committee of the Commonwealth of Independent States; Russian Federation Goskomstat; Rajewski (1993); U.S. Bureau of Census (1975); 1994 World Bank Statistical Handbook of the States of the Former U.S.S.R.; Albanian, Polish, Rumanian, Bulgarian, Czech, and Slovak Statistical Offices; and authors' calculations.

1/ In some cases, pre-transition output peaked before 1989-90.

2/ Gross sales; for the other countries, gross output.

3/ The figures shown do not reflect the large upward revision of the real GDP series for 1990-91 implemented by the statistical authorities in 1992.

publicly acknowledged by both the former head of Goskomstat (Guzhvin, 1992) and by his successor (Yurkov, 1994). 1/ Furthermore, the official data show an increasing discrepancy between output and consumption in many sectors, with the latter falling much less (or rising more) than the former. Likewise, the official data imply a puzzling divergence between a seemingly bottomless decline in output and the much more resilient behavior of household incomes, which have tended to recover and by late 1994 had reverted to the level of the late 1980s. Other indications supporting the presumption that output is higher than reported by Goskomstat include evidence from other transition economies: for example, Rajewski (1993) shows that the cumulative fall in real GDP in Poland from 1989 to 1991 was probably of the order of 5 to 10 percent, in stark contrast to the officially registered 18 percent drop, and that actual consumption also fell less, a result consistent with the re-estimation of the decline in 1990 carried out earlier by Berg and Sachs (1992); 2/ according to PlanEcon (1994), similar results obtain for the Czech and Slovak Republics. Finally, it could be conjectured that if half of the economy had genuinely evaporated, major social upheavals would already have been observed.

Some of these reasons may be less than fully compelling. If underground activities represent a broadly constant share of the officially measured economy, as they do in many countries, ignoring the shadow sector will not bias growth rates. However, underrecording is most blatant in those sectors that are expanding, particularly the new private entities, reflecting the highly plausible motivation of tax evasion as well as the attempt to avoid all kinds of government regulations. Consumption may be declining less than output because less of the latter is wasted on the way to the final user, because the share of investment goods falls, or because of destocking. The monetization of transactions associated with the move to a market economy would in itself increase household money incomes and expenditures. Lastly, the Russian population has endured so much hardship in the past that it may show more patience than outsiders would expect.

This paper focuses on the size of the output collapse and on its welfare implications, but will not dwell on its causes. Much of the discussion is relevant for the other countries of the former Soviet Union, where analogously large declines in output have been recorded (see Table 1). The paper proceeds as follows. Section II discusses to what extent pre-transition output is overstated by the official statistics, and what the magnitude of the understatement of economic activity may have been in the course of the transition. In the process, alternative real GDP estimates are proposed. Section II also examines the impact on growth rates of the choice of the price set used to value quantities, and shows that for industrial output the closer the benchmark is to shadow prices, the smaller the measured decline. Section III discusses the benefits of moving away from a teratogenetic system. Some of the tremendous inefficiencies

1/ See also Koen (1994) and the references therein.

2/ See also IMF (May 1994), Box 12.

characterizing the centrally-planned economy lost their prominence as the latter was dismantled. The associated welfare gains are often overlooked even though they should be part and parcel of any analysis of the output collapse. Section IV offers some concluding remarks.

II. Quantities

Growth rates were probably overstated in the old regime, as argued by Khanin and others. 1/ While under central planning incentives were mostly geared towards overreporting, they are now reversed, suggesting that rates of output decline since the onset of transition are likely to be overstated. In addition, with growth rates differing across sectors, production turns out to have declined less when revalued using current period or world prices rather than highly distorted base period prices. Both sources of bias imply that the curvature of the actual path of output since the late 1980s is much less pronounced than suggested by official statistics.

1. Overstatement of the Base

Official output data in Soviet times suffered from manipulations by the statistical agency and from falsification by the reporting units themselves. 2/ A variety of tricks were used to document the achievement or more of the objectives laid out in the Plan, ranging from sheer tampering with the raw data to the inclusion in finished goods totals of *brak* (spoilage, rejects, and substandard goods) and incompletely assembled articles. 3/

Insofar as the resulting officially recorded pre-transition output levels were artificially high, the decline recorded for 1990-94 could constitute a belated recognition of earlier overstatements. Khanin (1992) for example argues that actual output in the late 1980s has been vastly overstated by Goskomstat. If indeed part of measured output around 1989 was essentially fictitious (*pripiska*), part of the subsequent collapse may have been equally fictitious. Importantly, this would imply that the centrally planned economy had exhausted its growth potential well before the start of radical reforms.

It should be recognized, however, that enterprise managers in the centrally planned economy also faced incentives to underreport, not least to conceal the illegal appropriation or diversion of production, but perhaps also unintentionally, reflecting prior theft or pilferage of the product.

1/ See Ericson (1990), Kostinsky and Belkindas (1990) and, for an official recognition, Guzhvin (1992).

2/ Perversely, cheating was sometimes necessary for the reporting firms to overcome the inefficiencies of central planning and meet plan targets.

3/ Grossman (1960) provides a wealth of examples. Regrettably, such bad habits die only slowly and occasionally still appear to resurface.

Another incentive to underreport would be related to the so-called ratchet effect: as firms' targets were set on the basis of registered performance, it was prudent not to advertise success too boldly. Nevertheless, on balance, the overall impression was that traditionally the underreporting bias was smaller than the overreporting one (Grossman, 1960).

It should also be acknowledged that the overstatement of activity in the official sector in the late 1980s was offset to some extent by the understatement of the growing activity in the "informal" sector, notwithstanding the attempts initiated by the U.S.S.R. Goskomstat at that time to include estimates of the second economy in the computation of GDP. 1/

On the whole, it seems fair to conclude that the pre-transition peak of output in the registered economy was overstated by Goskomstat, but that the actual size of overall GDP in the late 1980s, including the shadow economy, may have been smaller or larger than indicated by the official statistics.

2. Understatement of Output Since the Onset of the Transition

The existing statistical apparatus had originally been set up as a central planning instrument. However, reform of the measurement techniques used by Goskomstat lagged the breakdown of the command economy. In particular, exhaustive reporting of production outcomes, as opposed to business surveys, has so far continued to be a key data collection tool. 2/ As a result, whole chunks of economic activity have vanished from the official statistics even as many new entities escape recording. Moreover, reporting incentives are presumably inversely correlated with output expansion, since enterprises would readily report sharp output declines in order to justify claims for subsidies, tax exemptions, cheap credits, or other favors but would be reluctant to advertise relatively buoyant performance which would imply substantial tax liabilities. Thus, the official rates of decline in production tend to reflect more what is happening in the shrinking state sector rather than movements in overall economic activity.

A number of inconsistencies between official data of various sources point to a significant understatement of output. One of the most prominent

1/ See Treml (1994) and, for more general references, Grossman (1990). It may be no coincidence that such methodological innovations were undertaken as growth in the state sector could on some measures be seen to be coming to a halt. The effort to measure underground activity collapsed, however, with the dissolution of the Soviet Union in 1991, and resumed only slowly. It should be noted that the 1993 System of National Accounts recommends that underground and illegal production of goods and services be included in GDP (§§6.30-6.36).

2/ Surveys are admittedly difficult to implement in a context of high rates of exit from and entry into any pool of enterprises.

is the sharp divergence between output and consumption of various food items (Table 2). Changes in net imports, dishoarding, or declines in waste are unlikely to account for the full discrepancy between the very large drop in production and the small decrease, or in some cases the increase, in consumption. As the underreporting bias is less of a problem for consumption data, the odds are that output is substantially understated.

Table 2. Russia: Measured Output and Consumption of Selected Items

(Percent change)

	<u>Production</u>				<u>Consumption</u>		
	First half of 1994				(Average monthly per capita consumption)		
	<u>compared to first half of</u>				<u>compared to</u>		
	1990	1991	1992	1993	1991	1992	1993
Meat	-60	-53	-36	-23	...	...	...
Sausages	-36	-28	13	1	...	...	...
Meat and meat products	...	...	...	...	-9	4	--
Milk	-69	-65	-33	-18	...	...	...
Cheese	-41	-31	-28	-11	...	...	...
Milk and milk products	...	...	...	...	-17	-9	-6
Flour	-33	-34	-32	-15	...	...	...
Bread	-27	-32	-29	-16	...	...	...
Bread products	...	...	...	...	12	17	4

Sources: Goskomstat (production); and Center for Economic Analysis (consumption).

In the case of bread, it is reasonable to believe that, as indicated by household budget surveys, household consumption increased, since bread is a typical inferior good. Imports and exports are virtually nil, implying that changes in foreign trade flows cannot be invoked to reconcile changes in output and consumption. Similarly, the scope for intertemporal substitution in the form of hoarding and dishoarding is negligible. One rationale for the observed divergence could be that the quantity of bread used as fodder declined a lot. However, as the price of bread did not rise more than that of grain, and as privately owned livestock increased, 1/ this is unlikely to be a plausible explanation. Indeed, Goskomstat seemingly continues to

1/ Feeding bread to animals was a technology used only by households, not in state or collective farms.

rely exclusively on the production figures collected from factories even though small-scale bakeries have sprung up in many cities. In the case of meat and milk, imports represented no more than 10 to 15 percent of consumption in 1994. Again, changes in net imports cannot account for the gap between production and absorption. Most probably, the missing output of milk and meat is produced but not reported, or underreported, by privatized enterprises, new small farms or even collective farms equipped with their own processing facilities.

More generally, using published Goskomstat national accounts data, 1/ it appears that the decline of real GDP based on end-use categories is smaller than the drop derived from the production side. This reflects inter alia the fact that Goskomstat has started to make upward adjustments in order to better measure consumption but without correspondingly amending the production side. This discrepancy will be exploited below to produce an alternative GDP series.

A second type of inconsistency pertains to financial stocks and flows by main sectors as compared to shares in value-added (Table 3). It appears that a major portion of credits (50 percent) goes to the category "other sectors", which contributes only marginally to GDP (about 12 percent). Similarly, current accounts with the banking system are predominantly held by those same "other sectors". In all likelihood, the latter comprise entities that are not registered and/or do not report to Goskomstat.

Likewise, a considerable fraction of net cash emission is unaccounted for by increases in measured household balances. For example, in 1993, over rub 11 trillion were put into circulation while cash-on-hand in the household sector rose by less than rub 7 trillion. The difference contributed to increase working capital in the enterprise sector, 2/ most probably to finance underreported transactions. Another way for enterprises to avoid reporting is to engage in barter transactions, which many firms have been conducting on a large scale.

1/ See for example Goskomstat (1994).

2/ Part of the rub 4 trillion may also have migrated to other states of the former Soviet Union.

Table 3. Sectoral Shares in Credits,
Current Accounts with Banks, and GDP

(In percent)

	<u>Bank credits</u> As of 01/01/1994	<u>Current accounts with banks</u>	<u>GDP shares</u> <u>1/</u> 1993
Industry	29.6	18.2	38.6
Construction	2.1	2.9	8.0
Agriculture	7.3	2.4	8.8
Trade, procurement and supply	8.3	3.3	10.1
Transport	1.6	12.2	9.3
Everyday services for households	1.1	1.4	0.4
Other <u>2/</u>	50.0	59.5	12.0

Sources: Central Bank of Russia; Center for Economic Analysis; and authors' estimates.

1/ Provisional.

2/ Derived as a residual in the first two columns; to estimate the share of those same other sectors in the GDP decomposition, it is necessary to subtract the contributions to value-added of the banking sector and of the budgetary, public and government organizations (which are also excluded from the first two columns).

A third source of doubt stems from the comparison between the path of electricity consumption and that of output. A priori, one would expect a high degree of positive correlation between those two variables. However, electricity consumption both for industry and overall declined much less than officially measured output (Chart 1). 1/ The divergence between the two series of course partly reflects the existence of fixed costs, but its magnitude and persistence may also indicate that the actual collapse in output was not as large as the official data state, all the more as the emerging private sector is likely to be less energy-intensive than the old production apparatus. The year-on-year elasticity of electricity consumption with respect to actual output may be quite volatile, however, and depends on parameters that are hard to quantify such as sectoral price elasticities of electricity use, 2/ ongoing changes in the output mix, and the technological scope in the short run for reducing wasteful usage and

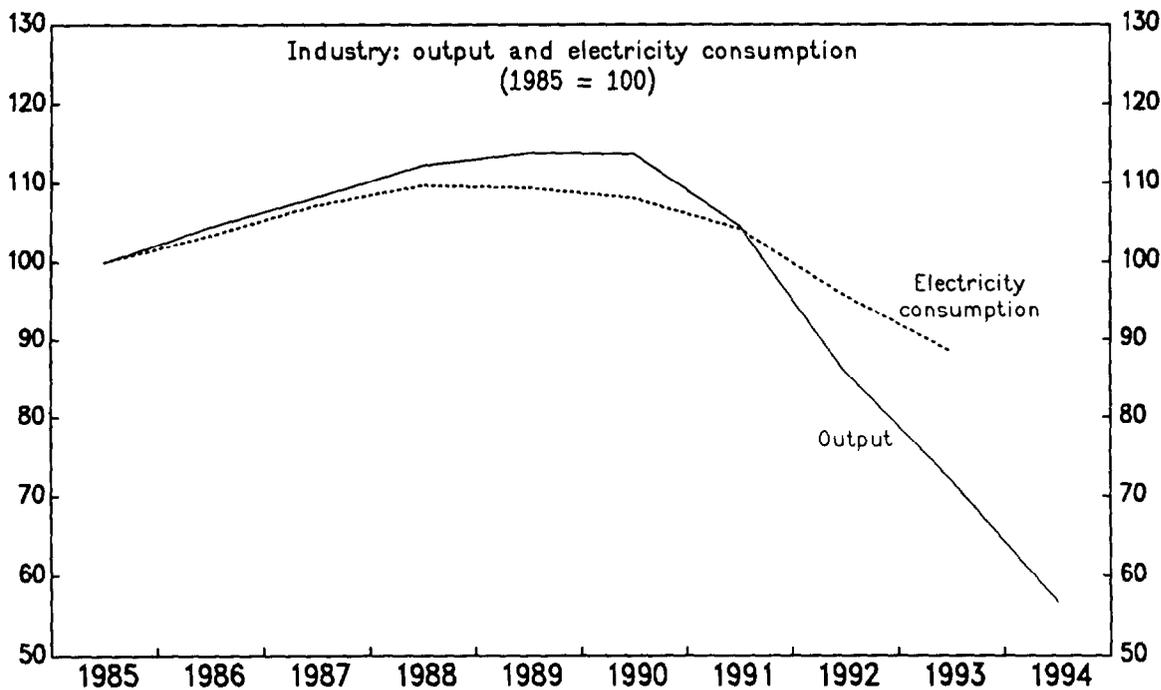
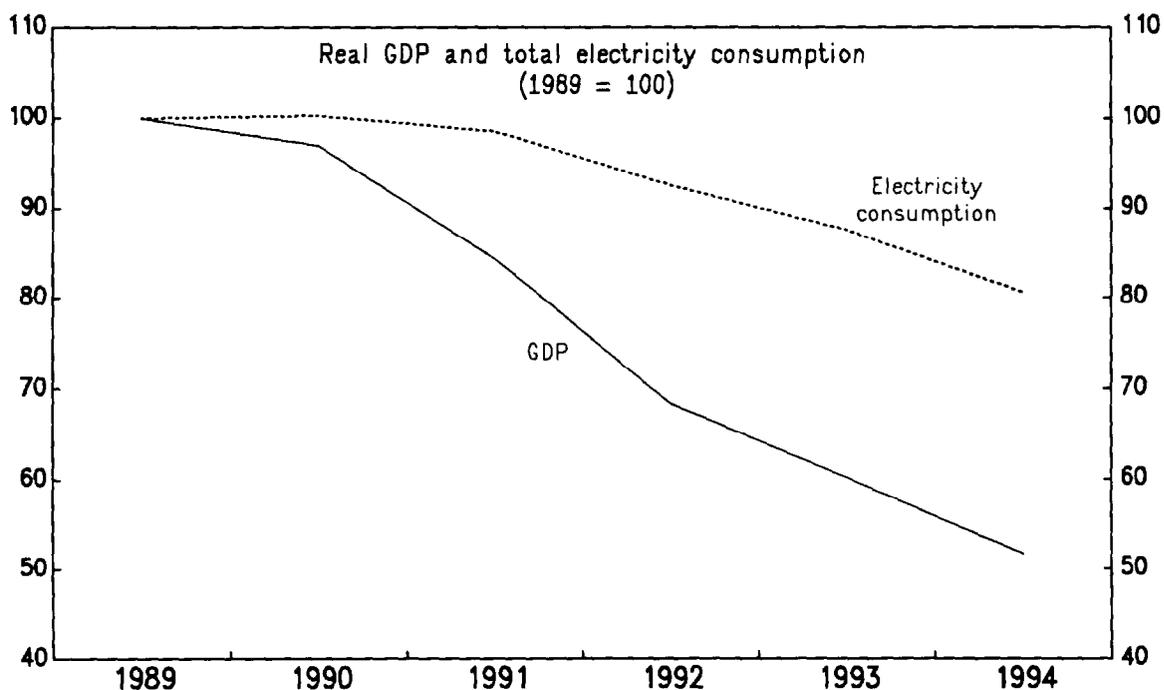
1/ Incidentally, the turnaround in the consumption of electricity by industrial enterprises preceded that of industrial output. This could be interpreted as a sign that output growth may have been overstated in the late 1980s.

2/ The build up of large arrears on electricity bills should also be taken into account.

CHART 1

Russia

Officially Measured Output
versus Electricity Consumption 1/



Source: Goskomstat of the Russian Federation.

1/ Data for 1994 are projections based on information for the first 9 months.

for substitution among energy sources. It would therefore be difficult to go one step further and estimate the bias in the output series based on electricity consumption alone.

Besides the above inconsistencies, it is clear that numerous activities cannot be captured through the traditional reporting channels. Some of the areas where the problem is most acute include street trading, private taxi services, real estate services, individual translation services, tutoring, home manufacturing (e.g., handicrafts), small-scale private manufacturing (e.g., of furniture and clothing), construction and renovation (crews working on private housing projects and sometimes referred to as *shabashniki*), repairs of various kinds, private practice medicine, poaching, pilfering of material inputs such as timber or gasoline from state-owned enterprises for private resale, small-scale smuggling (the so-called "business tourists"), illegal exporting of raw materials (particularly petroleum and non-ferrous metals), private "security" services, and production of moonshine vodka. 1/

The importance of such activities is reflected in labor market statistics: according to Goskomstat, secondary employment is rising and reached 8 million people by mid-1994, of which half had such secondary employment on a permanent basis, and of which 2.5 million were involved in "middleman trading activities". 2/ The survey data cited by Rose (1994) suggest that involvement in the second economy is probably even more widespread than what Goskomstat's published estimates indicate. Another sign of the importance of this type of hidden output is the rapidly growing share in household incomes of "business activities, interest and dividends, and other sources"--which by 1994 accounted for over one third of the total--and the correlative sharp decrease in the share of wages.

While many of these activities never entered the national accounts in the first place, others apparently disappeared from the Goskomstat totals. Inspection of the monthly, deseasonalized industrial output series shows very substantial declines in January 1993 and January 1994. 3/ These falls are not observed for sectors such as the fuel and energy complex, where output can be monitored relatively closely, but rather for sectors such as light industry, where the extent of privatization and the nature of the production process make control more difficult. This suggests that with

1/ Ivanov and Ponomarenko (1994) indicate that thus far illegal activities are not included in official Russian GDP estimates. However, many of the occupations listed above would not be considered illegal in a market economy, even though some of them are admittedly more value-additive than others.

2/ The total labor force was officially of the order of 75 million persons at the time.

3/ Such series are published in the monthly Goskomstat bulletins and in the quarterly reports of the Center for Economic Analysis.

the advent of a new year, as tax and other rules are changed, a number of enterprises decided to stop reporting and simply dropped out. 1/

As mentioned earlier, Goskomstat officials have long recognized that underrecording was a major problem. Indeed, several adjustments have started to be made by Goskomstat to the output data provided through the traditional reporting channels. Specifically, as of mid-1994, the raw numbers collected for trade, construction, and agriculture were supplemented by information from other sources (household budget surveys, customs surveys, building permits, and other survey data). 2/ These adjustments added up to about 10 percent of GDP at that time. Another innovation has been the inclusion in the official monthly data on gross industrial output, from July 1994 onwards, of an estimate for the heretofore excluded production of small enterprises, raising the level of that series by some 10 percent. While such efforts are most welcome, they are long overdue and apparently only cover a few sectors.

3. Alternative Real GDP Estimates

The most significant adjustments carried out so far by Goskomstat pertain to retail sales, which form the bulk of household consumption. 3/ As shown in Table 4, a drastic revision was implemented, implying that instead of a cumulative decline of about 40 percent between 1990 and 1994, the volume of retail sales fell by only about 1 percent. The revision reportedly involved three mark-ups to the "old" series, which for 1993 amounted to 5 percent on account of undercoverage of outlets, to 20 percent on account of underreporting, and to some 36 percent for supply through "hectic trade" (i.e., imports by individuals in their private capacity). Paid services were also adjusted by Goskomstat but the resulting cumulative 72 percent decline still seems implausibly large. The size of the revisions shown in Table 4 is of the same order of magnitude as the gap between the sum of the old retail sales and paid services series on the one hand and consumption as estimated via household budget surveys on the other.

1/ Another sign that some entities stopped reporting could be that nominal gross industrial output is smaller than what would be implied by real output and producer price data. As noted in Koen (1994), however, this discrepancy may also be caused by differences in sample coverage.

2/ While using information on building permits is sensible, unreported renovation activity would still go uncaptured, as would construction carried out in the absence of permits.

3/ In 1991, they represented 83 percent of household consumption (before revisions).

Table 4. Russia: Sales of Goods and Services
(Percent change compared to one year earlier)

	1991	1992	1993	1994 <u>1/</u>
Retail sales:				
Series based on old definitions	-7.2	-35.3	-0.1	-2.0
Revised series	-3.2	-3.5	1.9	4.0
Household paid services:				
Series based on old definitions	-20.8	-41.3	-31.0	-45.0
Revised series	-17.1	-18.0	-30.0	-41.0

Source: Goskomstat (1994).

1/ First 9 months.

Goskomstat, however, did not carry out the corresponding adjustments on the supply side, nor was real GDP compiled anew from the demand side. 1/ As a result, the early estimates for real GDP continue to be used even though the evidence on expenditures calls for a re-estimation of production. 2/ The exercise could be attempted by adjusting the raw output data for those sectors where underrecording seems to be most acute, using for example such data as employment (including secondary employment) combined with some assumptions about productivity, or even information obtained from enterprise surveys. This route is left to those who have access to the unpublished data collected by Goskomstat.

The corrections proposed below rely solely on public information and deliberately err on the conservative side. In other words, the adjustments are of a partial nature, and when in doubt the lower volume estimates were used. Moreover, no conjectures about the size and growth of the shadow economy are introduced, nor is there any speculation about the quantitative effect of improvements in the quality of output. 3/ Therefore, the resulting real GDP path should be interpreted as a lower bound rather than as the most plausible estimate of actual GDP.

1/ No decomposition of real GDP changes by sectors of origin or by end-uses was ever published.

2/ Official nominal GDP estimates were revised for 1992 (from rub 15 trillion to rub 20 trillion, and subsequently back to rub 18.1 trillion), but strangely enough without any change in the associated real GDP numbers.

3/ PlanEcon (1994a,b,c) for example based its alternative GDP estimates for the Czech and Slovak Republics and for Poland on hypotheses regarding these two factors.

Starting from 1990, 1/ and using prices of 1990, the expenditure side of GDP is adjusted in the following way (see Table 5 for details). Household consumption was augmented taking into account the revisions appearing in Table 4. No allowance was made for the likely increase in households' domestic production and consumption of food. Changes in public consumption were estimated on the basis of budget execution data. Changes in fixed investment were derived taking into account the rising share of capital repairs (as opposed to the installation of new capacity). Lastly, given that considerable uncertainty surrounds any estimates of stockbuilding and net exports, alternative assumptions with respect to their real rates of change were tried out. The estimates actually used involved a downward correction of the official Goskomstat data for inventory accumulation and net exports. In any event, their contribution to the rate of change of total GDP was small since these two components represent a relatively modest fraction of GDP.

Table 5. Russia: Adjusted Real GDP at 1990 Prices

	1990	1991	1992	1993	1994 <u>1/</u>
GDP	639.9	599.2	515.4	476.6	433.5
Consumption	444.4	396.9	360.7	350.0	342.1
Households	305.0	289.6	274.7	271.3	275.2
Goods <u>2/</u>	265.0	256.5	247.5	252.2	261.3
Services <u>3/</u>	40.0	33.1	27.2	19.0	13.9
Public	139.4	107.3	86.0	78.7	66.9
Gross investment	194.1	199.5	153.9	124.1	88.7
Fixed <u>4/</u>	184.9	156.3	109.4	95.2	74.2
Inventory <u>5/</u>	9.2	43.2	44.5	28.9	14.5
Net exports <u>6/</u>	1.4	2.8	0.8	2.5	2.6

Sources: Goskomstat; and authors' estimates.

1/ Projection.

2/ Based on revised Goskomstat retail sales series (see Table 4).

3/ Based on revised Goskomstat paid services series (see Table 4).

4/ Including capital repairs.

5/ See Koen (1994) for a behavioral rationalization of stockbuilding in 1991 and 1992.

6/ Allowance is made for the underreporting of imports and exports (see IMF Economic Reviews for details on the measurement of balance of payments flows).

1/ No adjustment is attempted for the rate of change from 1989 to 1990. Since most of the factors underlying the underrecording of output only became important around 1991, one would not expect the methodology followed here to produce a result very different from the official 3 percent decline.

Based on this approach, real GDP appears to have declined significantly less than indicated by the official Goskomstat statistics. By and large, the latter would overstate the annual rate of decline over the years under consideration by at least 4 to 7 percent (Table 6 and Chart 2), and the cumulative decline in real GDP from its pre-transition peak to 1994 would thus be of the order of one third rather than one half.

Table 6. Russia: Alternative Real GDP Estimates

(Percent change compared to one year earlier)

	1990	1991	1992	1993	Jan-Sep 1994
Goskomstat <u>1/</u>	-3	-13	-19	-12	-16
Alternative estimates:					
At prices of the previous year	...	-6.4	-14.9	-7.7	-10.2
At 1990 prices	...	-6.4	-14.0	-7.5	-9.1
At prices of:					
1991	...	...	-14.9	-7.0	-9.7
1992	...	...	...	-7.7	-10.1
1993	...	...	...	...	-10.2

Sources: Goskomstat; and authors' estimates.

1/ Quantities are valued at the prices of the previous year. Decimals are not published.

4. Valuation Base Effects

Even if the official data correctly captured the activity of all new and old enterprises, the measure of the change in real output would still depend on the base period used for valuation purposes. 1/ While it may be unclear a priori which base is most appropriate, relying on pre-transition prices is problematic as the latter are highly distorted. Unfortunately, inconsistencies in the published Goskomstat data limit the set of usable alternative base years.

1/ This type of effect was already discussed by Bergson (1961) when he analyzed Soviet growth from 1928 to 1937, which was also a period of radical change in the structure of the economy.

The extent of price distortions in industry has been documented by Kuboniwa (1993) and Gavrilencov (1994a,b), who reach similar conclusions even though they employ different methodologies. As suggested by Table 7, the structure of pre-transition relative prices was very different from that of prevailing world prices or any proxy thereof. In particular, relative prices for energy carriers and raw materials were very low in Russia, while relative prices for manufactured goods were high. As a result, the share of the energy sector in gross industrial output was of the same order as in energy-importing Finland, and the share of the light and food industries was very large notwithstanding chronic shortages of foodstuffs and consumer goods. 1/

Table 7. Russia: Structure of Industrial Output
Using Alternative Price Sets

(In percent, at current prices)

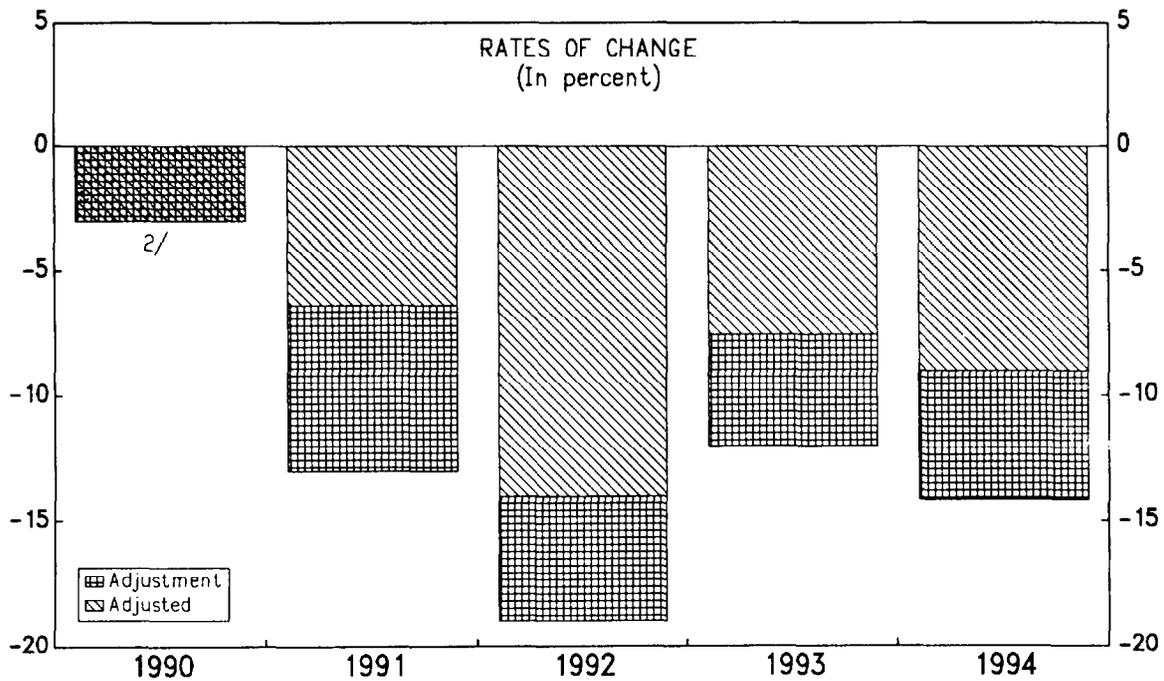
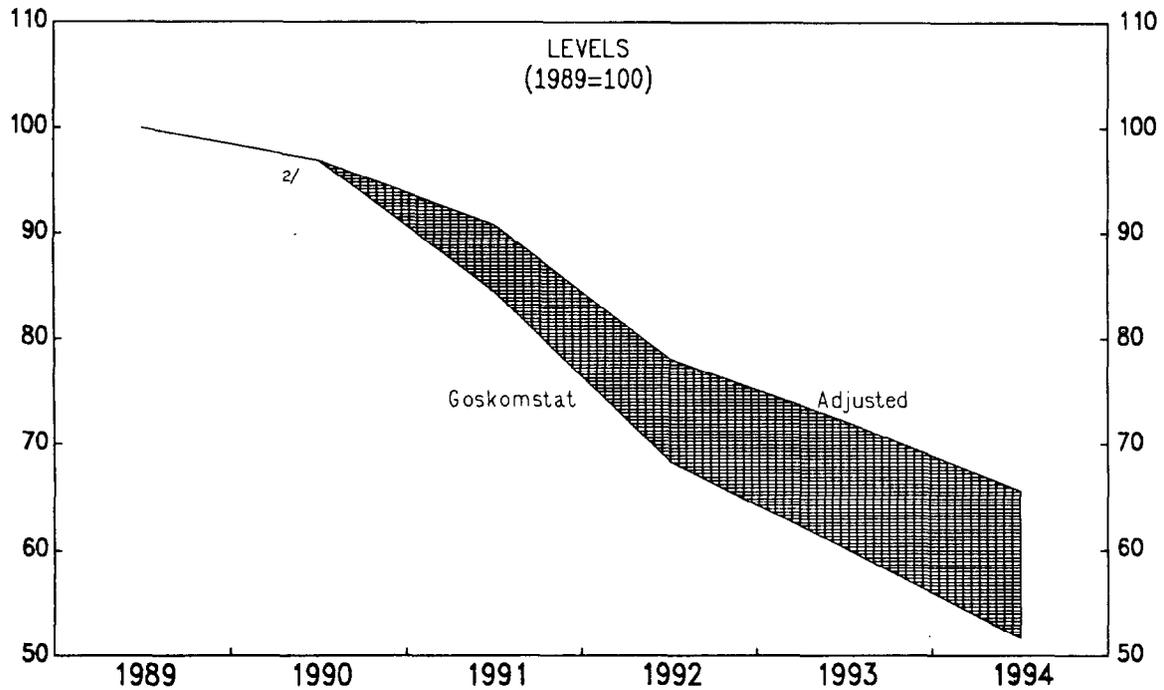
	1991	1992	1993	Jan-Sep 1994	World prices <u>1/</u> 1991
Electric energy	4.0	6.4	9.2	13.1	12.4
Fuel	7.3	18.5	17.2	17.3	25.7
Metallurgy	11.2	16.7	17.1	16.2	7.9
Chemistry	6.5	8.0	7.2	7.3	2.2
Machine-building	24.9	20.1	20.0	18.5	19.0
Forestry, timber-processing pulp and paper	5.8	4.8	3.9	4.0	13.5
Construction materials	3.7	3.3	3.3	3.9	5.4
Light industry	16.2	7.1	5.2	3.0	2.9
Food industry	14.4	10.3	12.4	12.2	8.2
Other	5.9	4.9	4.6	4.4	2.8
Total	100.0	100.0	100.0	100.0	100.0

Sources: Goskomstat; and authors' estimates.

1/ Estimates from Gavrilencov (1994b).

1/ Table 7 also illustrates that if output is valued at world prices, Russia was traditionally much more dependent on mining activities than claimed by those who deplore Russia's "de-industrialization" (based on valuations at current prices).

Real GDP: Alternative Estimates 1/



Sources: Goskomstat of the Russian Federation; and authors' estimates.

1/ Data for 1994 are projections based on information for the first 10 months.

2/ No correction is attempted for 1990.

As a result of price liberalization, relative prices moved much closer to world levels. 1/ The convergence was slower for electricity because liberalization was delayed in that sector, and it was incomplete for fuels partly because of maintained controls on the price of natural gas.

As output volumes fell much less in the energy sector than in other industries, a recalculation of the 1992 decline of industrial output based on 1992 prices would show a drop much smaller than the official 18 percent contraction (which was derived by Goskomstat based on 1991 prices). Using world prices rather than current year prices would only reinforce this conclusion. The same holds, but to a lesser extent, for 1993 and 1994.

Regarding overall GDP, the importance of the base year is illustrated in the lower part of Table 6. The re-estimation carried out above at 1990 prices was first repeated using prices of the previous year, which produces a series that is more directly comparable to Goskomstat's. 2/ The resulting series differs only marginally from the one compiled at prices of 1990; cumulatively, they virtually lead to the same estimate. The re-estimation was then carried out using more recent fixed reference years; while the resulting point estimates are not exactly the same, the overall conclusion regarding the cumulative output decline remains unchanged.

III. Quality

Notwithstanding the substantial bias distorting official real GDP statistics, there is no doubt that the total volume of output has dropped very steeply since the late 1980s. However, assuming that the welfare impact was of the same order of magnitude as the actual decline in output, as is often implicitly or explicitly done, is misleading because it ignores the ongoing changes in the composition of output and the sharp reduction in deadweight losses associated with price liberalization and hardening budget constraints.

1. Machines to Make Machines

One of the characteristics of the centrally planned economy was a massive overaccumulation of capital, and therefore a slowdown of growth despite very high investment rates. The glorification of gross industrial output, the reliance on an extensive and semi-autarkic growth strategy, the correlative use of antiquated technologies and emphasis on installation of

1/ Direct comparisons across years in Table 6 are only suggestive, since changes in volumes differed across sectors. Inconsistencies plaguing the Goskomstat data prevented a calculation of sectoral shares at world prices for years posterior to 1991.

2/ Goskomstat never published a time series for real GDP based on prices of some fixed year (the cumulatives appearing in Goskomstat documents are derived by chaining year-on-year estimates based on prices of the previous year).

new capacity at the expense of maintenance and distribution, and the constraints imposed by the Plan resulted in more production goods being used per unit of consumer good than would have been necessary under more efficient arrangements. Not only were productivity levels low, but the decline in the efficiency of investment accelerated during the second half of the 1980s, as evidenced by the rise in the ratio of unfinished construction and uninstalled equipment to gross fixed investment and in the ratio of investment to gross output. 1/

When the tyranny of Plan objectives and constraints ceased, the incentives to continue with overinvestment receded and the composition of domestic absorption changed. From 1989 to 1993, the share of fixed investment in GDP (at current prices) fell from 32 to 21 percent. At the same time, the output mix shifted away from producer goods in favor of consumer goods (Chart 3). As in other transition economies, the steepest declines were recorded in industry (see Table 1). Within industry, investment goods such as locomotives, freight wagons, bulldozers, cranes, tractors, machine tools, electric motors, turbines, and steel pipes were amongst the hardest hit. However, a key reason for the dramatic drop observed for many of these items is that they were of very poor quality or obsolete in their design. Table 8 suggests, for example, that about six times as many tractors were needed per unit of grain output in Russia as in the United States. 2/ That such equipment virtually ceased to be produced should not be lamented as an output "loss" but rather interpreted as the sign that market forces were beginning to operate. Correlatively, as can be inferred from Table 8 for the case of steel, output for some items declined from excessively high levels.

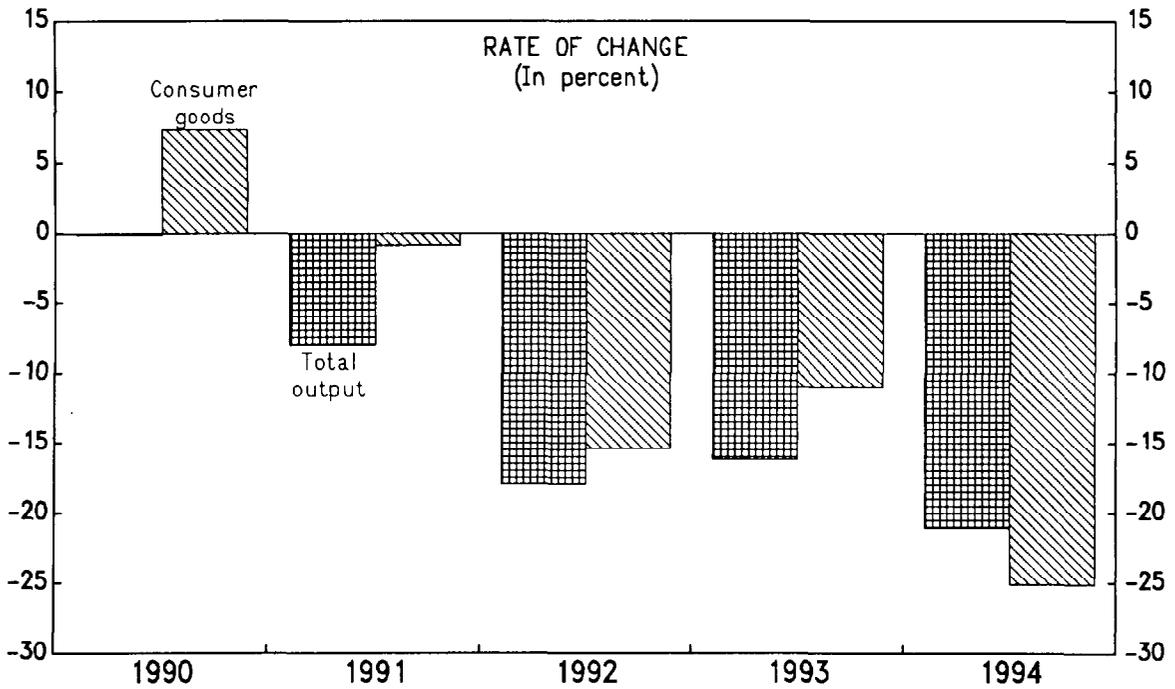
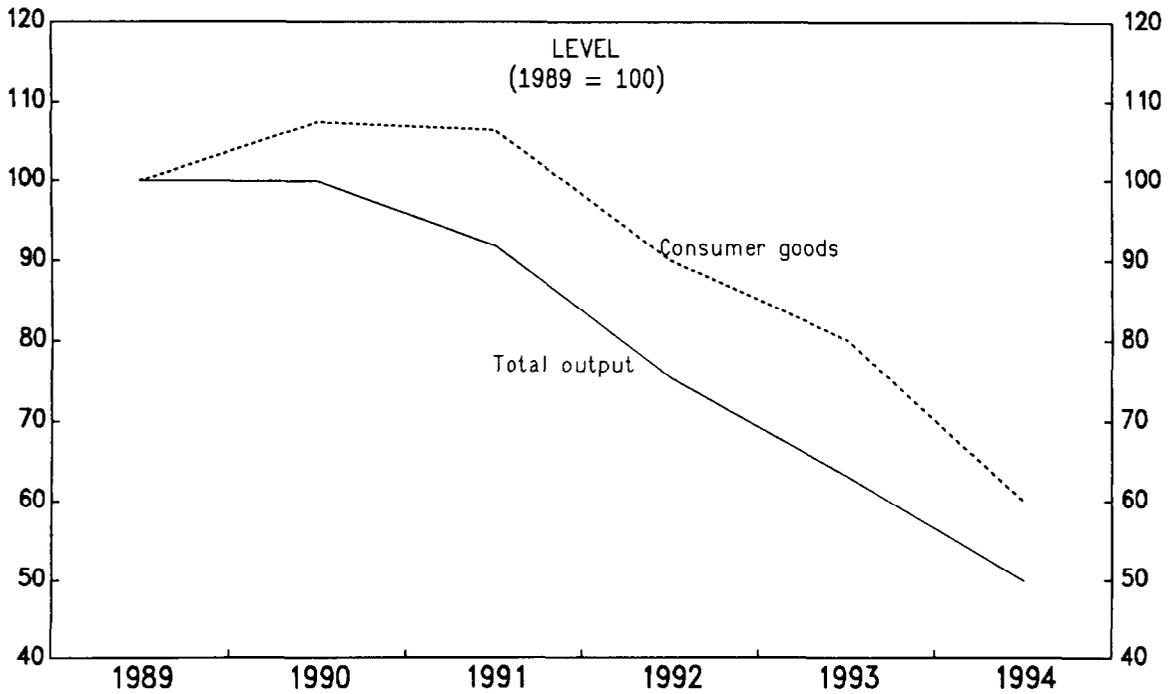
1/ See for example IMF, IBRD, OECD, and EBRD (1991), Volume 1 and Gavrilentov (1994b). Also striking and paradoxical is the disregard of planners for long horizons, which is obvious, for example, in the way Russia's natural resource base was exploited.

2/ A more precise comparison would have to be based on stocks of tractors rather than on the domestically produced flow.

CHART 3

Russia

Industrial Output 1/



Source: Goskomstat of the Russian Federation.

1/ 1994 is a projection based on information for the first 10 months.

Table 8. Production of Selected Goods
in Russia and in the United States

(In 1989, per capita)

	Russia	United States
Iron ore (in kg)	726	222
Steel (in kg)	630	364
Cars (units)	0.0072	0.0274
Tractors (units)	0.0159	0.0043
Fertilizers (in kg)	119	94
Grain (in kg)	711	1,152
Television sets (units)	0.0302	0.0592

Source: Goskomstat.

2. Military Output

Given the highly militarized structure of the Soviet production apparatus, a particularly important dimension of the shift in the composition of output is related to the conversion process in the military-industrial complex (MIC), launched in the late 1980s. Traditionally, enterprises in the MIC produced, in addition to armaments, the bulk of civilian intermediates such as presses for the shoe industry, spinning looms, and agroindustrial equipment; and of civilian final goods such as refrigerators, ovens, vacuum cleaners, television sets, VCRs, cameras, radios, tape recorders, and sewing machines. Civilian products represented some 44 percent of the output of the MIC enterprises in 1988.

The overall collapse in output did not spare defense enterprises (Table 9). However, the blow was cushioned by a rapid substitution from military to civilian goods. Output declined only moderately or barely at all between 1989 and 1993 for a number of the consumer goods manufactured by MIC firms (e.g., refrigerators, vacuum cleaners, television sets, sewing machines). 1/ Combined with drastic cuts in defense procurement, this caused the share of civilian products in total output to approach 80 percent by 1993. Notably, defense enterprises not only stepped up the production of existing goods, but also attempted to diversify and innovate, for example in the areas of electric household appliances and medical equipment. 2/

1/ However, the sharp real appreciation of the ruble in the second half of 1993 contributed to substantial declines in the production of some of these items in 1994 (see also below).

2/ More detailed information and methodological comments are provided in the latest report of the Center for Economic Analysis (1994).

Table 9. Russia: Conversion of Enterprises
in the Military-Industrial Complex

(Percent change compared to one year earlier)

	1991	1992	1993	<u>First half</u> 1994
Volume of production	-14	-18	-16	-27
Of which:				
Military goods	-26	-38	-30	-39
Civilian goods	-4	-7	-11	-36
Production personnel	-4	-9	-12	-15

Source: Center for Economic Analysis.

3. Queues and Shoddy Consumer Goods

The liberalization of internal and external trade in 1992 resulted in a dramatic expansion of consumer choice and an equally spectacular curtailment of queues. 1/ Under central planning, enterprise managers had an incentive to choose the intra-commodity assortment that would maximize plan fulfillment in terms of the specified physical unit of measurement rather than the one which would satisfy consumers. The death of the Plan, the liberalization of prices, and the opening up of the economy meant that a wide range of consumer goods and services that were previously unavailable or restricted to an elite were henceforth on sale in kiosks and private shops or offered by private companies. Moreover, as the real exchange rate of the ruble appreciated, 2/ Russian consumers gained access to a widening array of foreign goods, which contributed to the switch from a sellers' to a buyers' market.

The availability of goods continued to improve over time: while the overall retail availability coefficient (calculated as the average proportion of main cities where items were available) was approximately 50 percent for food products and 70 percent for nonfood goods in 1992, it

1/ Koen and Phillips (1993) analyze price liberalization at length. The 1992, 1993, and 1994 IMF Economic Reviews of Russia describe the evolution of the rules governing external trade.

2/ Largely reflecting massive overshooting at the time of the price jump associated with the freeing of most prices, the real exchange rate vis-à-vis the U.S. dollar on the interbank market appreciated by close to 1,000 percent between January 1992 and December 1993. In the first 10 months of 1994, it remained within a 10 percent band around the end-1993 level.

stood at or above 90 percent by September 1994. 1/ This is consistent with the evidence from opinion surveys, which show a sharp decline in the time spent in queues: according to one such poll, 2/ the proportion of respondents spending at least one hour a day in a queue fell from 67 percent in January 1992 to 23 percent two years later. 3/ At the same time, anecdotal evidence strongly suggests that the availability of services also improved considerably.

Traditional indicators of household welfare do not capture the benefits entailed by the broadening of the consumption set and by the reduction of the time spent searching and queuing. It remains a moot point whether, as suggested by Roberts (1994), these gains exceed the measured real income losses suffered in the wake of price liberalization, but they are clearly very substantial.

4. Efficiency in Consumption

The former economic system was characterized not only by chronic overinvestment, a high degree of militarization, and pervasive shortages of consumer goods but also by waste on a large scale in the consumption of intermediates and final output. 4/ Examples of such behavior abound in the literature. 5/ They include the deliberate destruction of producer goods which sometimes took place when performance was measured not by output but by the consumption of an input (wanton spilling of gasoline, scrapping of unused structural steel by construction enterprises). Another example is the accumulation of unnecessary ton-miles (actual, not written-up) hauled by trucks. More generally, the rates of breakage and spoilage in the course of the distribution process were notoriously high, while the goods received by customers often deviated considerably from their alleged specifications, forcing end-users to adapt them to their needs at considerable cost. These gross inefficiencies meant that some enterprises were actually engaged in value-subtracting activities. Declining raw output in such instances is value-additive.

The rise in real interest rates and hardening of budget constraints associated with the transition significantly increased the cost of the above mentioned "losses". To the extent that their occurrence indeed

1/ The unavailability of some items in some cities almost three years after price liberalization probably reflects insufficient demand or administrative restrictions on price setting rather than persistent supply failures.

2/ New Russia Barometer III, conducted nationwide in March-April 1994 under the aegis of the Paul Lazarsfeld Society, Vienna, Austria.

3/ Residual queuing can be associated with maintained local price controls or, in a newer way, with the (most often illusory) perception of golden investment opportunities--witness the long lines to purchase the shares offered by some of the investment funds.

4/ These characteristics are distinct but obviously interrelated.

5/ See for instance Grossman (1960).

lessened, there was scope for consumption to decline less than gross output. Admittedly, some inefficiencies were too deeply imbedded in the organization of the economy to disappear overnight. Moreover, the disruption of the traditional linkages caused by the abandonment of the old rules entailed significant but temporary coordination failures and the transitory persistence of wastage. Thus, short-run rigidities meant that the gains allowed by the move to market-based arrangements would only materialize over a period of several years.

IV. Welfare

The earlier sections showed that output fell less than stated in the official statistics and that part of the decline was not detrimental to welfare. This concluding section tries to come closer to an overall judgement on aggregate welfare. A definitive verdict is of course bound to remain elusive, as some important dimensions cannot be quantified, but some of the oft-encountered misconceptions about the welfare impact of the output collapse can be dismissed.

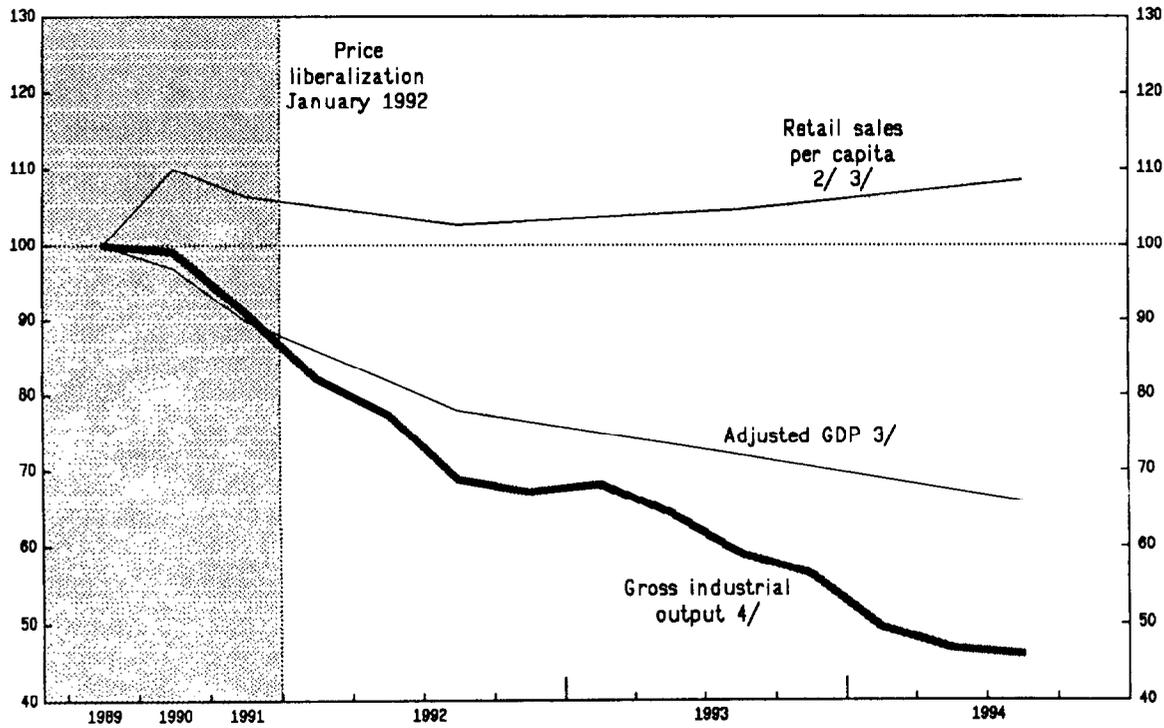
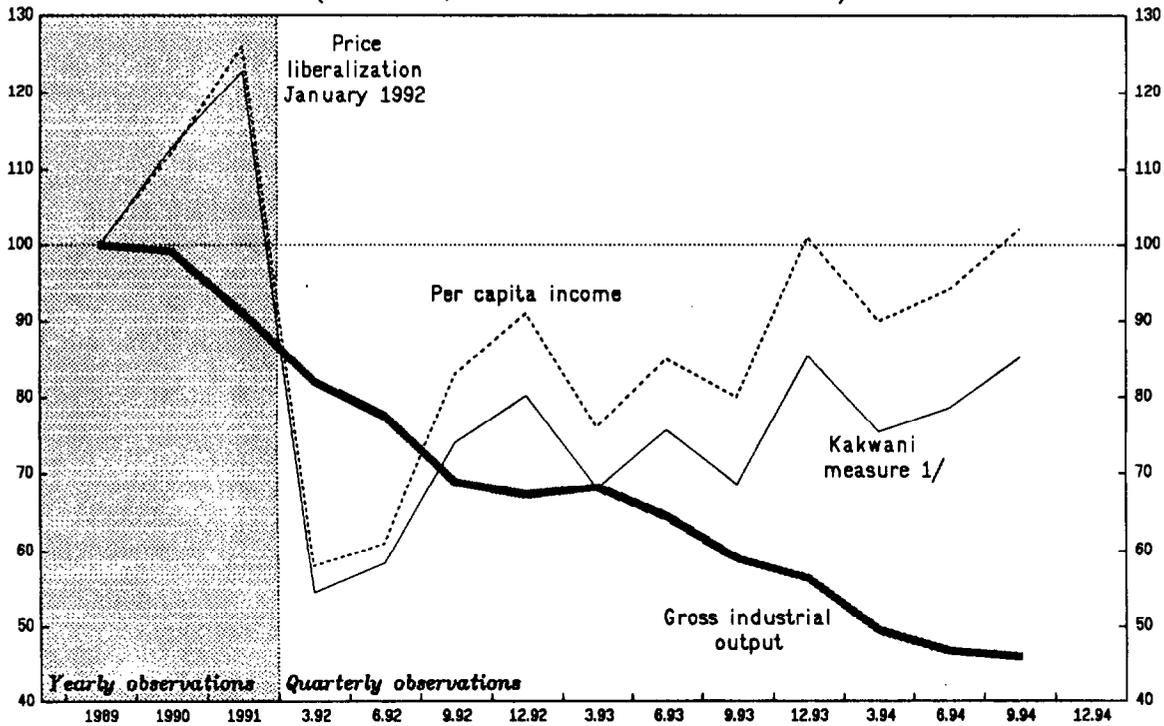
A very crude, extremely inadequate but frequently cited welfare indicator is the officially measured volume of gross industrial output. Many commentators in the Russian press, in line with Soviet prejudices, continue to describe the evolution of living standards over the last few years as if they were perfectly correlated with this indicator and thus assert that on average, they have tumbled by more than half (Chart 4).

A more relevant production-based measure would be GDP corrected for underreporting, as estimated above. On that account, aggregate welfare would have declined by no more than a third (Chart 4). However, if only because of the changes in the output mix, GDP may not be a satisfactory proxy for welfare. Another reason to prefer an absorption-based measure can be illustrated by the case of oil. A large portion of the oil produced in Russia was traditionally sent to the other states of the former Soviet Union at a price such that these shipments in effect represented a huge subsidy. The steep decline in Russian oil production since the late 1980s was accompanied by a considerable compression of those subsidized deliveries. Part of the output decline was thus the counterpart of a cut in subsidies to foreigners, thus not hurting domestic living standards. 1/

Average real income per capita may be considered a better proxy for welfare than GDP. This measure suggests that by the third quarter of 1994, welfare had broadly reverted to its 1989 level. It could be argued, however, that the sharp increase in income inequality registered since 1991 mitigated the recovery in average real incomes. A synthetic measure taking into account both the level of total household incomes and its distribution can be defined as $W = \mu(1-G)$, where μ is an average real income per capita

1/ A more complete analysis would have to encompass the changes in terms of trade and volumes exported and imported for all goods and services.

Alternative Welfare Measures (1989=100, All Variables in Real Terms)



Sources: Goskomstat of the Russian Federation; Center of Economic Analysis; and authors' calculation
1/ Defined as the product of average real per capita income by one minus the Gini coefficient.
2/ Revised series, adjusted for undercoverage, underreporting and "hectic trade" (see Table 4).
3/ Yearly series.
4/ Yearly series through 1991, quarterly series thereafter.

index and G the Gini coefficient. 1/ This measure, depicted as the Kakwani measure in Chart 4, increases with the aggregate income level and decreases as inequality rises. By the third quarter of 1994, it stood at around 85 percent of its 1989 level. 2/

An alternative set of indicators would be based directly on household per capita consumption. The bulk of the latter is constituted by retail sales of goods. If Goskomstat's adjustments for informal trade (discussed in Section II) are taken into account, this indicator declined only moderately in 1991 and in 1992, and recovered thereafter, while remaining above its 1989 level throughout the period under consideration. Sales of paid services declined much more but they represent only a tiny fraction of household expenditures (of the order of one tenth). Aggregate private household consumption thus did not collapse at all. This is consistent with the observed increase in household ownership of consumer durables such as cars, washing machines, and television sets (Table 10).

Table 10. Russia: Ownership of Selected
Consumer Durables 1/

(Units per 1,000 persons)

	1990	1992
Television sets	364	376
Radios	329	337
Recorders	191	198
Freezers	308	308
Washing machines	254	260
Vacuum cleaners	167	171
Watches	1,926	1,986
Sewing machines	191	179
Cars	59	68
Motorcycles	68	72
Bicycles	176	181
Photo cameras	114	122

Source: Goskomstat.

1/ Reportedly, no survey was conducted for 1993.

1/ One among several rationales for this measure is the following: in a society with n individuals arranged in ascending order of their incomes x_1 ($x_1 \leq x_2 \leq \dots \leq x_n$) a welfare function can be defined as $\sum_i x_i v_i$, where v_i is proportional to the number of individuals whose income is at least equal to x_i ; then it can be shown that aggregate welfare equals $\mu(1-G)$ (see Kakwani (1985) and the references therein).

2/ The Gini coefficients published by Goskomstat and by the Center for Economic Analysis differ at times, but the use of one or the other series only marginally affects the evolution of the Kakwani measure.

It could be argued, however, that the current dynamism of aggregate consumption is not sustainable because it is being paid for by the dilapidation of the capital stock, as evidenced by asset-stripping behavior or the deterioration of important segments of the infrastructure (which were never that good to begin with). In this regard, a measure such as GDP has the merit of including investment, and thus of reflecting this trade-off. In principle, of course, welfare would be better captured by the present value of current and future consumption flows than by current consumption alone.

The income as well as the consumption based measures project an overly bleak image of the evolution of welfare insofar as they ignore the gains associated with wider choice and shortened searching and queuing. In addition, as emphasized by Illarionov, Layard, and Orszag (1994), some services such as housing remained vastly underpriced while their consumption stayed broadly unchanged, implying that total consumption properly defined (i.e., at some shadow market-based prices) declined much less than indicated by the above real money income or real consumption measures. In that light, it may not be unreasonable to claim that by 1994 welfare had actually improved compared to the late 1980s.

Finally, there are a number of costs accompanying and potentially associated with the transition, such as the deterioration in the sanitary situation, the increase in morbidity rates, the generalization of corruption, and greater uncertainty that would be incorporated in more comprehensive welfare measures. Similarly, a number of benefits such as the newly gained political freedoms or the reduction in pollution levels mirroring the decline in industrial production also ought to be factored in. ^{1/} An extended welfare analysis of this type, however, lies beyond the scope of this paper.

^{1/} In some cases, it is not clear how intimately these costs or benefits are related to the output decline per se.

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