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10 A Critique of CIA Estimates of Soviet Performance from the Gerschenkron Perspective

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In this paper, I briefly discuss some information on comparisons from sources other than the CIA or ICP that can be brought to bear in calculating the Soviet Union/United States GDP ratio (for a discussion of CIA estimates, see Maddison 1998). The Soviet Union took part in the Comecon comparisons. These were conducted every five years (the last was done in 1988) and covered not only national income but also industrial and agricultural production and investments in considerable detail. Of these countries, several (Poland, Yugoslavia, Romania, and Hungary) had also taken part in the ICP exercises in various years. Thus, they can serve as a bridge between the Soviet Union and, for example, the United States. Also, I should like to mention the special Soviet Union–Hungary (1985) and Soviet Union–Germany (1988) GDP binary comparisons that were made according to the full ICP methodology, which an inquisitive observer can apply as links in the Soviet Union–United States comparison. The last two comparisons were broadly consistent with the later 1990 ICP exercise in which the Soviet Union took part for the first time.

It seems to me, however, that a part of the problem encountered in the Soviet Union–United States comparisons is of a broader methodological nature and is, in fact, inherent to any comparison or growth rate calculation. Moreover, this issue may influence the outcome of a comparison considerably more than deficiencies in basic numbers that arise from suspected under- or overreporting, hidden military expenditures, etc. or even quality differentials (let us call them *real* differences due to basic data). I refer here to the index number prob-

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lem. This problem has become so acute in recent years that the Bureau of Economic Analysis (BEA) has recently abandoned fixed-based indexes in the national accounts of the United States altogether. I will illustrate this assertion that a more fundamental core problem lurks concealed in the series by reference to mostly U.S. numbers that may be deemed more reliable. As an additional consideration in using U.S. numbers, it is only fair to look closely at the other side of the Soviet Union–United States comparisons instead of assuming the U.S. numbers as given.

10.1 Index Number Problem

The issue goes back to the classic index number problem. Alexander Gerschenkron was really the first to pay close attention to this question in comparisons—across countries and time (growth rates). In his now classic *Dollar Index of Soviet Machinery Output* (1951), he investigated not only Soviet machinery output but also American machinery output in similar detail. His estimate, which gave rise to the term *Gerschenkron effect,* was based on calculations for the American machinery industry.[1] Specifically, he estimated the growth of American machinery production during 1899–39 at both 1899 and 1939 prices. His results are quoted in panel A of table 10.1.

Gerschenkron (1951, 55) went on to state, "Clearly, in the case of formidable differentials of this sort no adjustment of the index will do. Naturally, there would be nothing meaningful, let alone 'ideal', about taking the square root of the product of 1542 and 198 [he refers here to the Fisher index, which is sometimes called *ideal*]. The difference of regimens must be accepted and taken into account rather than disguised by some mode of averaging it, even though the result may meet certain technical tests." Similar effects can still be

1. The Gerschenkron effect is intrinsically related to the Paasche-Laspeyres spread (PLS). Let us define Q_L as the *quantity Laspeyres index* and Q_P as the *quantity Paasche index.* Then we can express the PLS as

$$\text{PLS} = \frac{Q_P}{Q_L} = 1 + r_{p,q}\sigma_{\frac{p}{p_L}}\sigma_{\frac{q}{Q_L}},$$

where $\sigma_{p/P}$, $\sigma_{q/Q}$ = weighted variances in relative prices and quantities, and $r_{p,q}$ = weighted coefficient of correlation between price and quantity relatives.

The expression given above simply states that the Laspeyres index exceeds the Paasche index if the correlation between relative price and quantity changes is negative, i.e., if the direction of movements in price ratios en masse is opposite to those in quantity ratios (or most of the product mix are normal goods). This intuitively looks right: if technical change (or something else) makes products cheaper, then their consumption increases; or, when some goods experience a price shock, their consumption decreases. Moreover, it can be observed that the hypothesis of normality of goods is validated by the whole experience of the ICP: examining a table of the PLS compiled from the ICP results for different years, one can find that the PLS is *always* less than unity for any pair of countries.

The Paasche-Laspeyres spread has a deep economic sense: all indexes allowing an economic interpretation are bounded by these two indexes, including those corresponding to nonhomothetic utility functions.

Table 10.1 Effect of Base Year on Some U.S. Manufacturing Volume Indexes

A. Indexes and growth rates of machinery output in the United States during 1899–1939 (1899 = 100):[a]	
At 1899 prices	1,542 (7.1% per year)
At 1939 prices	198 (1.7% per year)
B. Annual growth rates (%) of expenditures on producers' durable equipment in the United States during 1959–87:[b]	
At 1959 prices	26.1
At 1987 prices	4.7
C. Annual growth rates (%) of manufacturing output in the United States during 1977–1987:[c]	
At 1977 prices	4.7
At 1987 prices	1.6

[a]From Gerschenkron (1951, 52).

[b]From Young (1992, tables B and D). Young does not show the 1959-based index explicitly, but he does provide the corresponding 1987-based price index (−13.6 percent, table D); the two together when multiplied over produce the index of nominal change (+9.0 percent). From there, we can find the 1959-based quantity index as (100 + 9.0)/(100 − 13.6) = 126.1.

[c]From Young (1992, 34).

observed in the United States (only on a larger scale): discrepancies in indexes for the producers' durable equipment category of the GDP are even more manifest during 1959–87. The difference between the two indexes (the Paasche-Laspeyres spread) amounts to 20 percent a year in this case (see panel B of table 10.1).

The examples given above probably tell us that the Gerschenkron effect has become even more pronounced since World War II. One can notice, however, that the time differential between the base years is forty and twenty-eight years, respectively. During that time, one can expect immense changes in the product mix and relative prices. But what would happen if the time span were smaller? Another example from the same source, this time concerned with manufacturing output, is even more dramatic because the two base years are separated by only ten years (see panel C of table 10.1).

The above conveys the difficulties of making adequate comparisons (both cross-time and cross-country) in such a fast-moving world. We can now describe this effect in more detail:

> The Gerschenkron effect can be defined as follows: For any pair of countries (or years), a quantity index (GDP, industrial production, consumption, etc.) for a given country (year) at another country's (year's) prices will be higher than the index at that country's (year's) own prices.

Thus, the Soviet Union/United States GDP ratio as measured at U.S. prices will always be higher than that measured at Soviet prices, just as the United States/Soviet Union GDP ratio computed at Soviet prices will come out higher than the same ratio at U.S. prices. For growth rates (both positive and negative), the effect would result in the following: the growth rates would always

be higher when computed at the beginning year's prices, and lower if estimated at the concluding year's prices.

Given the above examples, it is in no way surprising that the CIA results are different from the official growth rates (7.2 vs. 3.7 percent for 1913–50 for Soviet industry). But it *is* surprising that they differ so little given the fact that the official industrial growth rates were computed at 1926/27 prices.

Against this background, it does not seem unreasonable for the indexes calculated on the basis of different methodologies to differ that much.[2] In such comparisons involving time series, the main emphasis should be on making the time series for two countries completely compatible from a methodological perspective, that is, using a set of common prices and identical index numbers. The common price vector would enforce compatibility between growth rates and levels at different time points. One cannot calculate growth rates of Soviet manufacturing at 1987 Soviet prices and U.S. manufacturing at 1987 U.S. prices and expect both growth rates to be compatible. The 1987 Soviet prices may be even further from the 1987 U.S. prices than are the 1967 U.S. own prices. However, from panel C of table 10.1, we know what just a ten-year difference in base years can do to the growth rates.

10.2 Contrasting CIA and Goskomstat Estimates of GDP Levels

It is known that the CIA estimates portrayed the Soviet Union more favorably than Goskomstat itself: the CIA had 49 percent for the GNP ratio for 1990 (Fisher index), with a corresponding GNP per capita number of 42.5 percent. For 1987, Goskomstat estimated the GNP ratio at 58 percent (64 percent for net material product [NMP]). However, that estimate was based on U.S. prices. For the Fisher index, the GNP ratio would amount to approximately 45.5 percent,[3] which in turn would render the GNP per capita ratio for 1987 at around 39 percent. Again, extrapolated to 1990, this ratio would become 36 percent. Actually, one can observe that the corresponding Goskomstat GNP per capita number was rather close to the 1990 ICP results:[4] 31.6 percent. On the other

2. That an index employs a certain index number formula does not automatically make it right or wrong. That index just cannot be considered in conjunction with another index utilizing some other aggregation procedure. Only the differences between indexes that are irreducible to the index number problem (i.e., distortion in basic physical units, misrepresentation of prices) can be regarded as "real" differences.

3. The ratio of ruble- and schilling-based GDP estimates for the Soviet Union (the Paasche-Laspeyres spread) in the 1990 Soviet Union–Austria comparison was around 0.617 (ECE 1994). That makes the ratio of the Fisher to the Schilling-based numbers $0.785 = (0.617)^{1/2}$. I use the same ratio in a shortcut to render the Goskomstat U.S. dollar–based results into the Fisher index. In reality, the PLS could be even more dramatic in a Soviet Union–United States direct comparison because usually, the more countries are different in GDP per capita terms, the further the Paasche index stands from the Laspeyres.

4. Linked through the 1985 Hungary–Soviet Union comparison to the Austria–United States pair, the Soviet Union/United States GDP per capita ratio stood at 38 percent in that year. Extrapolated to 1990, this ratio would have decreased to 35 percent. A part of the difference between this

Table 10.2 **CIA Soviet Union/United States Ratios Contrasted to Official Goskomstat Estimates (%)**

	1960	1987
CIA (GNP, Fisher)	48	53
Goskomstat (NMP, U.S. dollars)	58	64

Source: CIA estimates from Becker (1994), Goskomstat estimates from statistical yearbooks from various years.

hand, it is not improbable that, being naturally focused on Soviet military expenditures, the CIA could have been exaggerating their value. In this case, in fact, apart from an understandable disagreement over Soviet military expenditures, the CIA and Goskomstat numbers come out surprisingly similar. Moreover, the changes in Soviet Union/United States GDP ratios over time according to official Soviet estimates correlate very closely with those from the CIA sources (see table 10.2): both stipulate a 10 percent increase during 1960–87.

10.3 Conclusions

It would be very useful indeed to make the CIA archives containing documentation on the estimates of Soviet performance available to the public. That would enable further finessing of Soviet historical time series. However, it would be no less important for the United States to continue full participation in the ICP to remain an anchor in the future long-term economic comparisons (in a broader sense and not only with the Soviet Union/Russia). The ICOP (International Comparisons of Output and Productivity) project begot by Maddison can serve as an extremely valuable tool to cross-check the ICP results from various benchmarks and national growth rates. Finally, as can be seen, the methodological index number issues are of paramount importance and need to be thoroughly addressed in any such comparison to make the results compatible across countries.

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number and the 1990 ECP result (31.6 percent) can be attributed to productivity adjustments in services made in the 1990 ECP comparison but not in the 1985 exercise. The other part can be attributed to lack of consistency between national growth rates and changes in ICP benchmark results for the United States and Austria (bridge country). This inconsistency amounted to 12 percent during 1985–90 (it is within the ICP error range, however).

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