What We Can Learn from the Soviet Collapse

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THE SOVIET experience teaches at least one cautionary lesson: development strategies emphasizing state-administered investment may produce rapid growth at first but are prone to eventual stagnation.

Why did the Soviet economic system prove nonviable after many years of growth? The economic crisis in the former Soviet republics since the collapse of the USSR in 1991 has understandably distracted attention from this retrospective question. The question may seem obvious in hindsight. Yet the sudden collapse of the system caught most people (including us) by surprise, cautioning us that the reasons for its downfall were not obvious before the fact. And the analysis of the collapse carries lessons for the development of all countries, including the former Soviet republics themselves.

While full-blown central planning has almost disappeared from the economic landscape, many countries' governments still attempt to influence the type and quantity of capital investment. Such attempts could be informed by a re-examination of growth through sheer force of capital accumulation. Our re-examination, drawing upon the large body of Western and Russian literature on the subject, reconfirmed many of the conclusions of this literature but also turned up two key surprises:

- Investment-led growth can be rapid at first then fall precipitately: following rapid pre-1960 growth, Soviet economic growth from 1960–87 was the worst in the world relative to investment and education rates—even lower than generally believed.
- Although the worsening performance of the Soviet economic system is usually attributed to its heavy reliance on capital accumulation, it turns out that a number of high-performing economies also relied heavily on capital accumulation. What was unusual about the Soviets' economic experiment was not the dependence on investment, or the low average return to investment, but rather the rigidity of the system that led to rapidly falling returns to investment.

Comparing growth rates

How did growth in the last decades of the USSR compare to growth in the rest of the world? Soviet economic growth per capita over 1960–89 was 2.4 percent, which was slightly above median world growth. This eminently respectable figure is based on the estimates of a generation of Western scholars such as Abram Bergson of Harvard University.

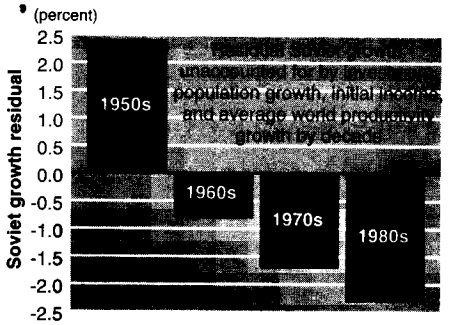
However, proper evaluation requires that we relate a country's performance—that is, its output—to quantity of inputs (such as capital investment). Stonehenge is a marvel because it was built with little in the way of capital equipment; we would be less impressed today if someone with heavy machinery took decades to line up a few stones. The Soviet growth performance no longer looks so satisfactory—or so worthwhile for Soviet citizens—once we realize that the Soviets had one of the highest investment rates in the world over 1960–89, yet had growth only at the global average.

We can go further in these international comparisons by utilizing the average statistical relationship for all countries between per capita growth performance and educational enrollments (good for growth), population growth (bad for per capita growth), and physical investment (good for growth). In fact, all of these factors should have been highly favorable for Soviet growth: in addition to its high investment rate, it had one of the highest secondary school enrollment ratios in the world and unusually low population growth.

Since Soviet growth was only average, there is in fact a large negative residual that we can attribute to the fact that the USSR was

Chart 1

Soviet growth: from good to bad to worse



Source: Western estimates (see Easterly and Fischer, *The Soviet Economic Decline: Historical and Republican Data*, 1994).

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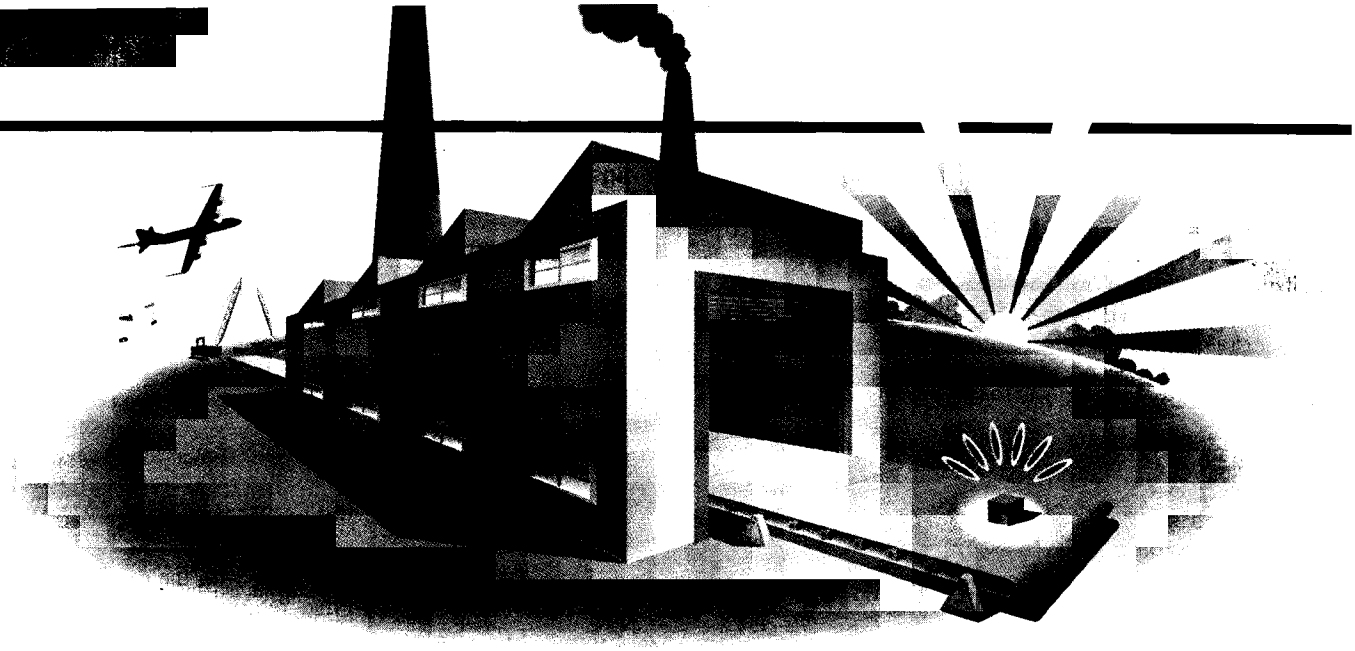


not a typical economy. Comparing the Soviet residual to other countries (controlling also for country size), we come up with a striking conclusion: the USSR has the largest negative growth residual, and hence was the world's most under-achieving economy, over 1960–89. Compared to how much consumption Soviet citizens had to give up to achieve high investment and education, the increase in output fell well short of international standards.

But this is not the end of the story, because Soviet growth was surprisingly good before 1960. If we repeat our growth residual exercise separately for each of the last four decades, we find that the Soviet growth residual was positive in the 1950s (Chart 1). Even taking into account the already high rate of investment in the 1950s, Soviet growth performance at that time was quite satisfactory. In fact, Soviet performance was so good in the 1950s that early growth theorists cited it as an example of how inefficient resource allocation does not affect the long-run growth rate. Economists like John Kenneth Galbraith predicted convergence of economic performance between East and West. But the Soviet growth residual became negative in the 1960s; Soviet growth then deteriorated further in the 1970s and 1980s. The Soviet growth residual shown here takes into account not only how Soviet growth compares to what should have resulted from the Soviets' high investment effort but also how Soviet growth compares to the world average growth during the same period. World average growth worsened in the 1970s and 1980s, but Soviet growth worsened even more, as shown by the increasingly negative residual.

In sum, Soviet economic growth was initially very satisfactory, then progressively deteriorated. Explaining why is more difficult than it would be if the Soviet economic system had always led to poor growth, which could have been attributed to inefficient and misallocated investment. Thus, we need to understand how the amount of growth coming from a given amount of investment worsened so markedly over time.

Defense, low morale

One popular idea is that the Soviet's increase in defense spending with Afghanistan and Star Wars from 1979–87 was the straw that broke the system's back. However, the data show that while higher defense outlays contributed to the Soviet slowdown, the quantitative impact was so modest as to be unimportant. Soviet defense expert Dmitri Steinberg estimates that this spending increase amounted to only 1.6 percentage points of GDP, and we can attribute only 0.15 percentage points of the growth slowdown over 1960–87 to increased defense outlays. The fact is that most of the long-run increase in Soviet defense spending occurred before 1960—that is, before the growth slowdown that we are trying to explain.

Another popular notion is that demoralization and a breakdown of discipline in the Soviet work force fed the Soviet collapse. Here, too, we find some evidence in the fact that surveys of Soviet emigres found the young to have been more dissatisfied than the old, a possible sign that the system was losing favor across generations. Alcohol consumption also rose sharply from the 1960s through the mid-1980s (when Gorbachev mounted an anti-drinking campaign), but rapidly growing countries have also had rises in alcohol consumption. The loss of morale was undoubtedly important, but must reflect, as well as be a cause of, slow growth.

Wrong type of growth

The most popular hypothesis for the Soviets' growth deterioration in the economics literature is the extensive growth hypothesis: that the Soviets relied too heavily on capital accumulation as a source of growth. According to classic economic theory, higher growth in capital than in other inputs like labor will lead to diminishing returns to capital in which output growth will fall over time even if capital growth is maintained. The definition of extensive growth is growth in which the capital stock increases faster than output. The ratio of the Soviet capital stock to output has indeed risen dramatically over time—about 2.5 percent per annum over 1950–87—which supports the conventional wisdom that the Soviets relied on extensive growth.

There is one problem, however, with the conventional wisdom. Contrary to the conventional view, the Soviets' rising capital-output ratio is not unusual: many countries have rising capital-output ratios. Moreover, the most successful economies in the postwar period are among those with extensive growth. Jong-il Kim and Lawrence Lau of Stanford University have estimated that Japan, the Republic of Korea, and Taiwan Province of China had rates of increase in capital-output ratios of over 3 percent per annum over 1960–90, which exceeds the Soviet increase over the same period. Alwyn Young of MIT has similar findings for these economies and adds Singapore to the list of countries with extensive growth. What makes the Soviet experience unusual was not the extensive growth itself, but the low payoff to extensive growth.

Why did one set of economies with extensive growth become the East Asian Miracle, while another economy with extensive growth became the Soviet Collapse? Martin Weitzman of Harvard University suggested many years ago an arcane but important reason. In market economies, capital (e.g., machinery and equipment) can substitute rather easily for labor and thus sustain growth for long periods even when the labor force is not growing. Growth would still slow down eventually, but much less dramatically, as long as the ease of substi-

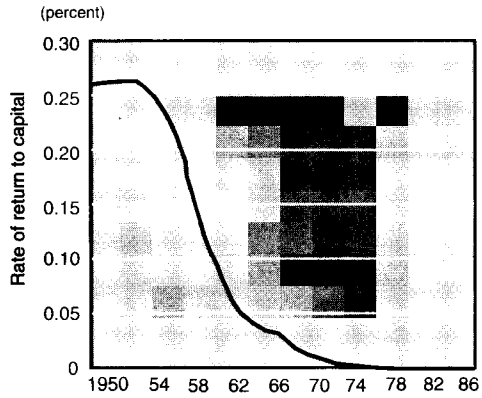
tution is high. Using data on output, capital stocks, and labor employed to estimate a production function, we can calculate this ease of substitution in the USSR as well as in market economies.

Weitzman found, and we have confirmed with more recent data, that capital was an extraordinarily poor substitute for labor in the USSR. In market economies, the ease of substitution was high—machines could replace labor and thus make it possible for each worker to produce what might have earlier taken, say, two workers. But the Soviet economy seemed to be constrained by technology that almost required unchanging proportions over time: one machine, one worker.

We can now understand why Soviet growth was rapid early on, then declined so precipitously. In the beginning, capital was scarce: not all workers had machines. Giving a machine to a worker without one would have a very high payoff; the payoff will stay high as long as there are workers without machines. Eventually, however, all workers will have machines and the returns to additional machines will fall off to virtually nothing. This is exactly the pattern we see in the Soviet industrial sector, where we have estimated the return to capital since 1950 (Chart 2). The rate of return to capital was high and constant in the 1950's during the period of rapid growth. But with the saturation of the labor force with capital, a precipitous decline in returns set in after 1960; by the mid-1970s, the return to new investment in Soviet industry was essentially zero. We find a similar pattern for the rest of the Soviet economy.

Chart 2

Soviet capital: from high payoff to none



Source: Western estimates of capital stocks, employment, and value added in industry (see Easterly and Fischer, *The Soviet Economic Decline: Historical and Republican Data*, 1994).

Why the payoff fell

Why is it that capital could replace labor relatively easily in market economies, while the Soviets were stuck with an almost fixed proportions economy? We can speculate, although more research is needed. Consider the following parable. Planners in a system like that of the USSR need to determine the kind and amount of capital good that will go to each enterprise under their jurisdiction. The planners may have some feedback from the enterprise on the desired type of capital good, but the sheer scope of the planning job makes it difficult to incorporate very much enterprise feedback into the capital allocation decision. The planners will probably prefer some homogeneous collection of capital goods that are easy to count, and hence to allocate among the enterprises. A narrow range of terms of capital goods will also make it easier for the central authorities to keep abreast of the relevant technological knowledge. The end result is that planners limit themselves to a small number of types of capital goods—tractors, drill presses, etc. (Similarly, for human capital accumulation, planners dictate narrow and rigid educational specialties for workers and technicians.) In our parable, only one type of machine is available, so investment merely involves giving machines to more and more workers until all workers have them.

In market economies, we have a contrasting parable. Students of growth such as Paul Romer of the University of California at Berkeley, Gene Grossman of Princeton University, and Elhanan Helpman of Tel Aviv University stress the key role that the increasing variety of capital goods plays in sustaining growth in market economies. Decentralized managers demand—and capital goods producers supply—an incredible array of different types of capital goods in response to profit incentives, an array of goods that would be far beyond the capacity of planners to allocate or monitor. In market economies, when the possibility of replacing labor with one type of capital good is exhausted, enterprises shift to another. Market incentives lead to the exploration of an enormous range of capital goods that could be useful in production (including great flexibility and range in terms of human capital with broad-based educational training). It was a lot easier for market economies to substitute for a worker a numerically controlled drill press, skills training in numerical control, and a computerized inventory control system, than it was for the Soviets to substitute simply another drill press for a worker.

What is the lesson? It has always been understood that investment imposed from above could have low returns because political pressures or inadequate information lead to poor allocation decisions. The Soviet case shows the additional, and less well-understood, lesson that the returns to such investment could also fall precipitously as governments continue investing in increasingly outmoded types of capital goods whose labor-saving potential quickly becomes exhausted. It is easy to understand how governments can make the mistake of imposing—and continuing—excessive control of investment, since such a strategy may lead at first to rapid growth when the types of capital favored by government are initially scarce.

Quality counts

Along with the caution about declining returns to government-controlled investment, the Soviet experience also shows that high investment alone is not sufficient to generate rapid growth, which is even more obvious in Soviet Central Asia (see box). This is a useful corrective to the sometimes excessive emphasis on the quantity—rather than the quality—of investment in development policy discussions.

Other research also suggests that the sheer quantity of capital accumulation does not explain all that much of cross-country growth differences. The classic growth accounting study of Nobel Laureate Robert Solow in the 1950s made the famous point that physical capital accumulation accounted for no more than a quarter of industrial country growth. A recent growth accounting exercise by Ross Levine of the World Bank and Robert King of the University of Virginia found that the quantity of capital accumulation only accounted for about 40 percent of the growth of developing countries. More controversially, researchers Magnus Blomstrom, Robert Lipsey, and Mario Zejan have suggested in a recent National Bureau of Economic Research study that growth may cause investment rather than investment causing growth. Many old and new views of growth suggest that the process of adopting more advanced technology—a process very sensitive to the economic incentives facing firms—is the key to growth.

Policymakers facing depressed growth are often tempted to increase investment by increasing the government's own capital accumulation. In fact, Soviet reformers first responded to depressed growth in the mid-1980s by increasing state enterprise investment. As we know, this response was not successful in avoiding the deepening systemic crisis. The same temptation exists today in many of the former Soviet republics.

Although the role of investment in growth remains controversial, we are probably safe in concluding that excessive fixation on the quantity of physical investment to GDP is not

Why so grim in Soviet Central Asia?

If the Soviet Union as a whole dramatizes that economies do not grow through investment alone and state-directed investment is particularly unrewarding, Soviet Central Asia is the most extreme dramatization of all.

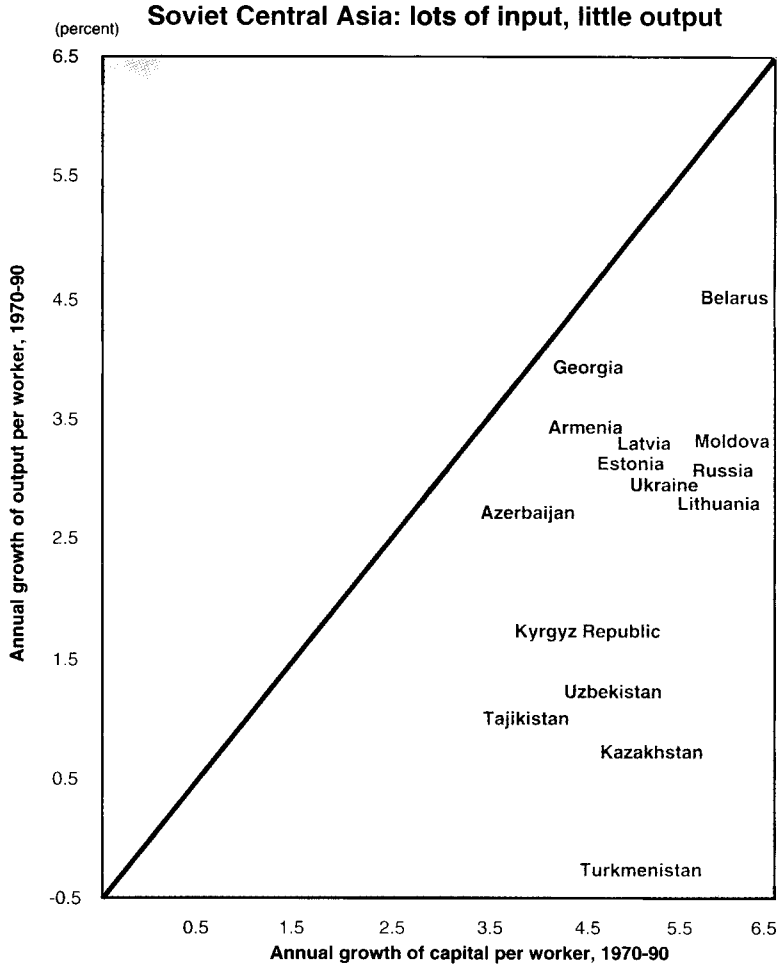
The Central Asian republics had minimal growth in output per worker despite strong growth in capital per worker over 1970–90, according to optimistic official data (Chart 3). Individual sectors are even more striking; over 1970–90, Turkmenistan's industrial output per worker fell at 1 percent per annum despite capital per worker growth of 6 percent per annum; Uzbekistan's agricultural output per worker fell at 2 percent per annum despite capital per worker growth of 5 percent per annum.

Why such a poor performance? One reason was the ill-considered attempts by the government of the USSR to have those republics emphasize products in which they were uncompetitive. Perhaps the most notorious instance was the attempt at irrigated cotton production that poisoned the soil, shrank the Aral Sea, and produced disappointingly little cotton. More generally, the Central Asian republics had much larger shares of agriculture in employment than would have been expected given their per capita income levels and natural endowments. Indeed, examining data across sectors and republics shows a statistical association between this kind of sectoral disproportion and poor total factor productivity growth.

Another key reason was the low educational attainment, a factor that crops up frequently in international studies of comparative growth performance. As a ratio to total population, the faster-growing republics to the west had almost twice as many specialists with higher education as Soviet Central Asia.

Chart 3

Soviet Central Asia: lots of input, little output



Source: Official Soviet data.

a useful guide to policy. Artificial increases in investment—such as increases in investment by state enterprises—do not necessarily increase growth. The proper response to depressed growth is to create a policy environment that fosters overall productivity growth, technology adoption, and high-quality private investment. The state can play a supporting role by supplying long-term public goods like infrastructure, environmental protection, and health care—a role that planned systems played poorly.

Gur Ofer of Hebrew University insightfully argued that the Soviet system was characterized by haste, in which Soviet managers tried to achieve short-term output increases to meet plan targets, but neglected long-term needs like adequate infrastructure and environmental preservation. This short-term bias was also true of Soviet human capital accumulation. One of the more troubling developments under the old system, was the deterioration in the health care system. This deterioration, among other factors, contributed to a startling decrease in male life expectancy beginning in the 1970s, at the same time as other countries at all income levels were realizing increases in life expectancy.

The haste bias helps explain why the quality of Soviet investment was low; it has also left the states of the former USSR with an unfortunate legacy of infrastructural and environmental crises, as is only too well known. Reversing the neglect of these long-term needs will require the governments of the successor states to engage in investment in these areas.

Could it have been different?

Looking back it is tempting to believe that the system could have been reformed successfully if it had started earlier, say in the 1960s. But remember that the Kosygin reforms in the 1960s did not succeed in reversing the growth slowdown. The flaw of the Soviet central planning system—a flaw that is likely shared by any heavily state-managed economy—was that it did only a very few things well. It was inevitable that severe diminishing returns would set in as the system kept doing more of the same.

The lessons from the Soviet experience seem particularly relevant for countries whose governments heavily control the type and quantity of investment—including the states of the former Soviet Union. Such governments will often be far more successful at achieving a high quantity of investment than a high quality. The Soviet economic experience of 1950–89 gives an almost clinical demonstration that a high quantity of investment is not sufficient to sustain growth for very long. The more subtle lesson is that heavy state intervention in the economy may achieve increases in growth in the short run, only to lead to stagnation in the long run. ■

For further detail, see the authors' "The Soviet Economic Decline: Historical and Republican Data," World Bank Working Paper 1284, April 1994; also available as National Bureau of Economic Research Working Paper 4735, May 1994.