WHY DOES THE SOVIET ECONOMY APPEAR TO BE ALLOCATIVELY EFFICIENT?

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Introduction

Despite the conventional wisdom that the Soviet economy is inefficient in every dimension, there is a rather large amount of statistical and econometric evidence that some aspects of the Soviet economy may be allocatively efficient relative to market economies. The conventional wisdom is based on a plethora of institutional analyses, case studies, and statistics that demonstrate poor performance in the Soviet economy. The only exceptions to this dismal assessment of Soviet economic performance are a number of statistical studies. This paper argues that econometric results showing Soviet allocative efficiency do not refute the conventional wisdom of poor Soviet economic performance, but in fact are completely consistent with such an evaluation.

The results in question show that Soviet performance in foreign trade is consistent with neoclassical trade theory, and that inter-firm trade in factors of production may be as efficient as in market economies. To my knowledge there has been no systematic attempt to explain these unusual results in a way which is consistent with the belief that Soviet economic performance is poor. The conventional wisdom about these results—of those who have not done the statistical calculations—seems to be that they are merely the result of bad data and/or bad methodology, and thus have no significance whatsoever. The authors of the papers in which these efficiency results have been found have concluded simply that, in the aspect studied in each particular paper, the Soviet economy appears to perform better than expected.1 Neither of these explanations is satisfactory. Bad data and bad methodology are criticisms that could be levelled against any research if one analyses the assumptions of the model closely enough.

Such a criticism might be legitimate if the unusual results were isolated aberrations, but in this case there seems to be a consistent finding of allocative efficiency across methodologies; and there is no counter-evidence, from statistical analyses, in which the Soviet economy is found to be allocatively inefficient relative to market economies. Concluding that Soviet performance is good in a few particular ways also is unsatisfactory because it conflicts too strongly with prior conceptions about how the Soviet economy operates, and it does not explain why such an aberration should occur. In addition, since allocative efficiency has been found in several aspects of the Soviet economy, viewing these results in isolation is no longer adequate.

The purpose of this paper is to provide a general theoretical framework for
interpreting these results in view of certain generally agreed upon characteristics of the operation of the Soviet economy. The proposed theory implies that the appearance of allocative efficiency in the Soviet economy is to be expected, but at the same time is consistent with the idea that the Soviet economy is technologically stagnant and is characterised by endemic technical inefficiency. Specifically, it is argued that growth and technological change are inversely related to allocative efficiency, and that the appearance of allocative efficiency is actually a direct causal consequence of the dynamic stagnation of the Soviet economy.

The next section of the paper is a summary of the literature which shows a high degree of Soviet allocative efficiency relative to market economies. This is not a full literature review, but merely a summary of the relevant results and an explanation of the sense in which they imply allocative efficiency. I then present a model of the Soviet-type economy based on three theoretical scenarios. These scenarios demonstrate the correlation between dynamic change and static allocative efficiency in a Soviet-type economy. It is argued also that this correlation will exist in market economies. I then argue that an implication of the model is that a finding of relatively efficient inter-firm resource allocation and foreign trade is to be expected in the present Soviet economy. The last section concludes with a discussion of the implications of the analysis for how we view the Soviet economy.

Summary of the literature

Before this discussion begins several points need to be clarified. First, the efficiency results and the subsequent analysis concern allocative efficiency, not technical efficiency. Technical efficiency is the microeconomic idea that a firm is operating on the production frontier, i.e., producing the maximum possible amount of output for a given level of inputs. The following results and the interpretation of these results do not imply anything about technical efficiency. The discussion is consistent with either large or small levels of technical inefficiency. Second, the allocative efficiency results pertain to inter-firm and foreign trade rather than consumer goods markets, so no statement is being made about the efficiency of the allocation of goods among consumers. In this paper two aspects of allocative efficiency are discussed. First, in factor markets allocative efficiency means that firms use inputs such that marginal rates of technical substitution are equal in various uses. Second, in international trade allocative efficiency means that export goods have low domestic opportunity costs of production compared to relative world prices, and imported goods have relatively high domestic opportunity costs.

The first statistical analysis of the Soviet economy which found results implying an efficient allocation of resources was Rosefielde. Rosefielde estimated the factor content of Soviet production and trade and found that Soviet foreign trade was consistent with the Heckscher-Ohlin theory of international trade. This result implies an efficient allocation of goods in foreign trade in the sense that export (import) goods are produced using a production process that is intensive in the factors in which the economy has relatively abundant (scarce) supplies. This implies that exports (imports) are goods with relatively low (high) domestic
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opportunity costs. This research has been extended recently by Murrell.4 Murrell’s results go further in the sense that they show that all the socialist economies of Eastern Europe—including Yugoslavia—have trade patterns more consistent with Heckscher-Ohlin theory than any of the developed Western economies, and that the Soviet trade pattern is more consistent with the theory than any other economy.

Rosefield5 extends these foreign trade results by showing that Soviet trade is also consistent with the more general concept of comparative advantage. In this study measures of opportunity cost of production were derived by estimating production functions for various industrial sectors. The resulting opportunity costs were then compared to world trade prices and the pattern of Soviet trade. The Soviet trade pattern was found to be consistent with the theory of comparative advantage. This implies allocative efficiency in the sense that the Soviet Union imports goods with a high domestic opportunity cost of production compared to relative world trade prices, and exports goods with relatively low opportunity costs.

Danilin et al.6 estimated a frontier production function for the cotton refining industry using data for 151 firms in that industry. They found that the firms in this industry were, on average, about 92% efficient relative to the firms which defined the frontier. The authors argue that this shows a relatively low level of ‘technical’ inefficiency relative to similar results for market economies. However, this result actually does not imply low technical inefficiency (in the sense defined above), but it may imply low allocative inefficiency. ‘Technical’ inefficiency in this estimation is defined only relative to the least technically inefficient firms. If those firms which define the frontier are very inefficient relative to some absolute or engineering conception of the production function, then this estimation process is unable to perceive that fact. So the estimates do not demonstrate technical efficiency in this absolute sense. The estimates do show that productivity differentials across firms are small. This implies allocative efficiency in the sense that resources are being allocated in this industry such that cost differentials are small. If firms face the same prices, cost differentials will be small if marginal rates of substitution between inputs are similar in different firms and if firms have similar levels of technical efficiency.7

Koopman8 has applied this technique to the study of cross-regional productivity differentials in agriculture in the Soviet Union, the United States, Canada and Finland. He found little difference in cross-regional productivity differentials between Soviet and non-Soviet regions. Again, this has the implication that resources are being allocated efficiently across agricultural regions.

Baretto and Whitesell9 estimated production functions for sectors of industry in the Soviet Union and the United States. These estimates were used to calculate an estimate of the amount of output lost by a misallocation of inputs across industrial sectors. They found that the percentage of output lost in Soviet industry was insignificantly different from the percentage of output lost in US industry. Furthermore, the results show that the degree of allocative inefficiency was decreasing in the late 1970s and early 1980s.10 This indicates efficient allocation of resources in the sense that, if inputs were reallocated among industrial sectors
such that the marginal rates of technical substitution were equal in all industries, the increase in output would be relatively small.

*A model of the Soviet-type economy*

The following is an attempt to characterise certain aspects of how the Soviet economy operates by thinking about three extreme cases. The purpose of these three scenarios is to place the preceding results in a perspective which will enable them to be explained. But first it is necessary to specify several key operative assumptions which will be used in the analysis. These assumptions are well known and accepted characteristics of the Soviet-type economic system. They do not represent a comprehensive description of the system, but merely highlight aspects of the Soviet-type economy which are important to the present analysis.

The Soviet-type system does not allocate resources by responding to relative prices, but rather, by reacting to bottlenecks, i.e., resources tend to be allocated to those sectors with the largest imbalance between input supplies and the demands of the firms which use those inputs. Horizontal trades are made between firms through informal quasi-legal markets such as those engaged in by *tolkachi*. These trades are barter trades and are made at implicit barter prices which reflect real relative productivities and thus serve to improve the allocation of inputs relative to what it would have been based only on the plan. Firms develop long-term horizontal links with other firms which decrease the supply uncertainties associated with the centrally allocated supply mechanisms.

The first scenario assumes a traditional Soviet-type economy but with no aggregate growth and no technological change. This reduces the planning problem to one of allocating resources among competing uses in a static environment. This is exactly the problem which the Soviet system is designed to solve. Capital growth is determined by the replacement needs of the economy, and the labour allocation problem is merely one of replacing retiring workers with new entrants into the labour force. Over time, planners will be able to learn about firms’ production possibilities because these production possibilities will be stable. Because of this stability and learning planners will be able to reduce, and probably eliminate, bottlenecks. Stability and learning also will make it feasible for planners to make rational foreign trade decisions.

Planners would probably not be able to eliminate technical inefficiency, even in the long run, because they still would not have the detailed production data necessary to know exactly the true production possibilities of a firm. Also, incentives for firms to keep a safety factor would continue to exist, although they might be less pressing because uncertainty would be reduced. But planners would be able to reduce productivity differences between firms, because information on relative firm productivity levels would be available and it would be possible to exert relatively high degrees of pressure on poorly performing firms and relatively low degrees of pressure on relatively well performing firms.

Firms will be able to establish long-term horizontal supply channels with other firms to ensure input availabilities. Since there is no growth nor technological change, input needs will remain relatively constant over time so these relation-
ships need not be disrupted. Of course, there may be small changes in relative sectoral growth rates; lack of aggregate growth need not imply no changes in demands for individual products. But these should be handled rather easily—at least with a lag—because there would be no changes in the kinds or qualities of the inputs needed. All of this implies that in a no growth, no technological change environment it is reasonable to believe that the Soviet material balance planning system would be capable of converging to an efficient allocation of resources.

The second scenario assumes a standard Soviet-type economic system and allows extensive economic growth to occur, i.e., there is still no technological change but growth can occur by increasing input supplies. This scenario is not qualitatively different from the preceding situation. The planners' problem is somewhat more difficult because there are more changes occurring in the economy, but the planners' information requirements are not significantly complicated. If production is characterised by constant returns to scale then input–output relationships will be stable and standard programming models can be devised to learn the input requirements of firms, given the growth priorities of planners. Again, one would expect cross-firm productivity differentials to be reduced over time. If there are increasing or decreasing returns to scale in production, then the planning problem is somewhat more difficult, but information requirements about these relationships will still be discoverable by observing performance, although the time lag for adjustment is likely to be longer than in the constant returns or no growth cases.

Long-term horizontal supply relationships between firms will still be useful. The requirements on performance are more severe because quantities demanded will be more variable, but since there is no technological change, input qualities do not change. So changing input needs of firms will be relatively easy to predict given the priorities of the plan. The quasi-legal inter-firm trading mechanisms should be adequate to take care of unexpected problems, and firms will still maintain a safety margin for contingency purposes. Relatively stable and predictable production relationships will also continue to facilitate the gathering of information upon which foreign trade decisions are made.

In this second scenario the demands on the Soviet-type allocation system are more severe than in the first scenario, so one would expect a larger amount of static allocative inefficiency. Furthermore, the higher the growth rate of production the greater the adjustment difficulty and the greater the expected allocative distortion. However, the allocation problem still is not terribly difficult. Qualities of outputs and inputs do not change, and input–output relationships are rather stable and easily predictable. Over time information about input–output relationships will improve, even in an environment of rapid extensive growth, so allocative inefficiency should decrease over time. In fact, Weitzman has shown this result in a mathematical model of material balance planning. He shows that, in a model which corresponds to the one described here with extensive growth but no technological change, the planning system will converge to an efficient allocation of resources over time.

The third scenario assumes a standard Soviet-type economic system but now both extensive and intensive economic growth is allowed, i.e., the economy now
has process and new product technological innovation. In this situation the allocation problem is significantly more complicated. Input–output relationships are no longer stable nor easily predictable. Capital allocations are complicated by the fact that not only are different quantities needed, but different types of machines and factories are needed as well. Labour allocations are complicated because firms have changing labour skill requirements. Intermediate input requirements are more difficult to know because quality requirements are changing as well as quantity requirements. Planners will find it more difficult to reduce cross-firm productivity differentials because it will be difficult to acquire the information necessary to ascertain the cause of those differences. It will be difficult to discover the combinations of new input quantities, new input qualities, and new technological processes necessary to reduce those differentials. Because of the uncertainty involved with changing technology it will be more difficult to reduce bottlenecks, since changing technology means input–output relationships will be changing in ways which are difficult to predict. Long-term horizontal supply links between firms will be less useful because the quality characteristics of input demands will be changing, and since new technology may radically alter input–output relationships, quantity demands will be changing in unanticipated ways. Quasi-legal exchanges between firms will also be less effective because the probability will be lower that firms will have available the right quantities and qualities of the necessary inputs. Finally, rational foreign trade decisions will be more problematic because domestic opportunity costs will be changing in unanticipated ways.

In this third scenario the allocation mechanism of the Soviet-type economic system is severely strained. Static allocative inefficiency in the economy will be significantly higher than in the other two scenarios. Furthermore, the amount of static allocative inefficiency will be directly related to the speed of introduction and diffusion of new technology. The faster the introduction and diffusion of new technology the poorer will be planners' information about technological characteristics of production, and the more difficult it will be for firms to anticipate their input requirements and communicate those requirements to planners and firms from which they buy inputs.

These three scenarios provide a model of the Soviet-type economic system which relates the dynamic and static properties of the system. The model employs standard, well established notions about the characteristics of the Soviet-type economy to show that there is a positive correlation between the degree of static allocative inefficiency on the one hand, and the rate of economic growth and technological change on the other.

Furthermore, this correlation is likely to exist in any economy, whether it is a market, a Soviet-type or any other economic system. As long as markets do not adjust instantaneously this relationship will exist. Any number of stories can and have been told about why markets will not adjust quickly. Examples include imperfect information, bounded rationality, immobility of labour, inertia, etc. So a source of allocative inefficiency in any economy is the failure of markets to adjust quickly. Expectations that the Soviet economy should be more allocatively inefficient than market economies are based on the belief that the planning
allocation system will result in slower market adjustments than the price allocation system in market economies. But this implicitly assumes that technological innovation is the same in the two systems. The argument here implies that the finding of relatively similar levels of allocative inefficiency in the Soviet Union and the US economies is explainable as the coincidental convergence of two opposing forces. Differences in the allocation system imply greater allocative inefficiency in the Soviet economy, but differences in technological innovation imply greater allocative inefficiency in the US market economy.

Explanation of allocative efficiency in the Soviet Union

We have argued that there is a positive correlation between the rate of economic growth and technological change and the size of static allocative inefficiency in all economic systems including the Soviet-type economy. The implication is that the finding of relatively high levels of static allocative efficiency in the Soviet economy is a direct result of its relative technological stagnation. Consider the evidence. It has long been known that the Soviet economy is characterised by a low rate of technological innovation.\(^{17}\) It is also well known that Soviet growth is primarily extensive, i.e., growth comes mainly from the expansion of inputs rather than from new technology.\(^{18}\) Furthermore, by any measure, the dynamism of the Soviet economy has been rapidly diminishing. Output growth rates have been falling, the growth of labour productivity has been falling, and the growth of either capital or combined factor productivity has been falling. And these problems have accelerated since the mid-1970s. In fact, there is evidence that combined factor productivity growth has been zero, or even negative, since the late 1970s.\(^{19}\) If this is the case, then either there is no longer any new technology being introduced and diffused in the Soviet Union, or technical efficiency is falling so quickly that it is swamping the effect of changes in technology. The interpretation most consistent with non-econometric studies is that some technological innovation is occurring but it is small, and that technical inefficiency is increasing. This interpretation also is supported by empirical findings of increasing overall inefficiency in Kemme and Whitesell.\(^{20}\)

Soviet newspapers in the past three years give one the strong impression that Soviet economists and planners themselves believe that technical inefficiency has been increasing since the early 1970s. If the Brezhnev era was really the 'era of stagnation' then technical inefficiency is likely to have been increasing. Evidence includes: reduced pressure on firms to fulfil output targets; an increasing amount of plan revision in order to allow firms to fulfil plans \textit{ex post}; expansion of black and grey market activities; increasing absenteeism; increased cynicism of workers toward the system; increasing inventories, etc.\(^{21}\)

Since the introduction and diffusion of new technology comes primarily from central planners, one can infer that there has been a decrease in the pressure to introduce and diffuse new technology as well. In addition, the reduction in the rate of growth of capital, and the change in the allocation of much of that capital from manufacturing industries towards agriculture, have probably reduced the rate of embodied technological change.
The evidence cited above implies that the Soviet economy is dynamically stagnant and that it has become progressively more stagnant through time, at least prior to the Gorbachev era. The statistical evidence cited in this paper implies that the Soviet economy is characterised by a high level of allocative efficiency and that allocative efficiency appears to have increased in the late 1970s and early 1980s, exactly the time when the dynamism of the economy decreased. In the model we have presented allocative inefficiency is positively correlated with the rate of growth and technological change. The implication is that the Soviet economy appears to be characterised by an unexpectedly small level of allocative inefficiency precisely because of its dynamic stagnation. Therefore, the finding of relatively high levels of allocative efficiency in the Soviet economy does not imply that the Soviet economy performs surprisingly well. On the contrary, the existence of allocative efficiency is a symptom of and may be caused by its stagnation in technological innovation.

**Conclusion**

The purpose of this paper has been to provide a theoretical perspective on the operation of the Soviet economy which is consistent with traditional notions about how the Soviet economic system operates and with research results showing a surprisingly high degree of static allocative efficiency. It has been argued that theoretical models of the correlation between the dynamic and static properties of both Soviet-type and market economies imply a positive correlation between the rate of economic growth and technological innovation and the size of static allocative inefficiency. Therefore, one would expect the Soviet economy to be efficient in the static allocative sense relative to market economies because of its technological stagnation. This is the case because technological stagnation gives planners and firms a long time to adjust inputs so as to converge to an efficient allocation.

It seems likely that resistance to the plausibility of statistical results showing relatively high degrees of allocative efficiency has been predicated on the belief that such results imply relatively good economic performance in the Soviet economy. The argument in this paper refutes that implication. It is not argued that allocative efficiency implies good Soviet economic performance. On the contrary, it is argued that static allocative efficiency in the Soviet economy results from poor dynamic economic performance. Allocative efficiency is a direct causal consequence of the dynamic technological stagnation of the economy.

One implication of this analysis is that the emphasis on the static inefficiency of the Soviet-type economic system is misplaced. Schumpeter\(^22\) argues that the static efficiency model of a market economy does not demonstrate the most important benefits of market economies. He argues that the important aspects of market economies lie in their dynamic properties, i.e., they provide powerful incentives for technological innovation. Analogously, the present paper argues that the static efficiency model does not demonstrate the most important weaknesses of the Soviet-type economy. Rather, the important weaknesses of the Soviet-type
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economy lie in its dynamic properties, i.e., it provides powerful disincetives for technological innovation.

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* I would like to thank Peter Murrell, Steve Younger, Dave Fairris, Lori Kletzer, Ken Kletzer and members of the Williams economics seminar for helpful suggestions on an earlier version of this paper. Remaining errors are mine.

The only exception is Peter Murrell, The Nature of Socialist Economies: Lessons from East European Foreign Trade, (Princeton, N.J.: Princeton University Press, 1989). Peter Murrell and I have reached independently similar, but not identical, conclusions about the significance of these results.

1 I concur with the judgement of the profession that technical inefficiency in the Soviet economy is rampant, but nothing in this analysis contains implications that either contradict or support that contention.


3 Murrell.


6 Note that this does not imply technical efficiency. The idea is that inputs are being allocated efficiently at observed input productivity levels, but observed input productivity levels might be (and probably are) much lower than they should be relative to some absolute standard of technical efficiency.


9 This result is corroborated in Yasushi Toda, ‘The Imperfections in Factor Market and the Loss of Production in Centrally Planned Industry: A General Equilibrium Calculation’, paper presented at the AAASS meetings, New Orleans, November 1986; and Padma Desai, The Soviet Economy: Problems and Prospects, (Oxford: Basil Blackwell, 1987). Desai notes that technical inefficiency levels off in the 1970s if her results from Padma Desai and Ricardo Martin, ‘Efficiency Loss from Resource Misallocation in Soviet Industry’, Quarterly Journal of Economics, 98(3), August 1983, are extended to 1980. Toda’s results also show a levelling off of allocative inefficiency in the late 1970s. The only differences in data are the time periods covered. Desai uses 1955–80 and so does Toda; Baretto and Whitesell use 1960–84. That the later period should result in lower allocative inefficiency is consistent with the idea argued below that allocative efficiency and economic growth should be negatively correlated. Note also that Toda’s and Desai’s results are both consistent with the results in Baretto and Whitesell in spite of the fact that Toda uses a different methodology from that used by Desai or Baretto and Whitesell.

10 A particularly good description of how the system operates is found in Chapter 4 of Ed A. Hewett, Reforming the Soviet Economy, (Washington, DC: The Brookings Institution, 1988). Remember that only inter-firm and inter-industry allocations are being considered. Consumer goods markets are being ignored.

Resource Allocation under Central Planning', *Journal of Comparative Economics*, 8(1), 1984, pp. 1–24, present a theoretical model which demonstrates this.

Note that excess demands in consumer goods markets are unlikely to be eliminated because there is no mechanism which equates consumers' preferences and planners' preferences at actual prices, even in this no growth situation. However, excess demands for inputs by firms can be eliminated because those demands depend on planners' preferences rather than consumers' preferences.

It must be stressed again that this does not mean elimination of technical inefficiency. See note 2.


Weitzman’s model assumes that planners know firms’ production possibilities, hence his model also implies technical efficiency. My description does not assume planners know the ‘true’ production possibilities, but argues that planners will be able to learn about and reduce cross-firm productivity differentials. Hence, the result is allocative efficiency given some unknown level of technical inefficiency. In a model which does not assume planners know firms’ production possibilities, Michael Manove, ‘A Model of Soviet-Type Economic Planning’, *American Economic Review*, June 1971, pp. 390–406, shows that the Soviet-type planning system will converge to a consistent plan in only a few iterations. This model also allows for extensive growth but no technological change.


This is based on production function estimates made in Baretto and Whitesell.

David Kemme and Robert S. Whitesell, ‘Industrial Growth and Technical Efficiency in the Soviet Union and Eastern Europe’, project report for the National Council of Soviet and East European Research, January 1989. The inefficiency estimated in this paper is a combination of technical and allocative inefficiency. The technique used is unable to separate the effects of the two sources of inefficiency.

Again note that the arguments in this paper are about high allocative efficiency, not high technical efficiency. If technical efficiency is increasing this does not show up in the statistical evidence of allocative efficiency. The interpretation is that if technical inefficiency is increasing then resources are being allocated efficiently subject to observed input productivity levels which are much lower than they should be, and are not increasing as fast as possible.