

Can Neoclassical Economics Underpin the Reform of Centrally Planned Economies?

Peter Murrell

There's a curious symmetry between the arguments propounded over the last century in advocacy of socialism and the present popular discussion of the reform of centrally planned economies. In those old discussions, the vision of socialism was utopian, which was contrasted with the Dickensian realities of capitalism. Now, the disasters of central planning are contrasted with the benefits flowing from perfectly functioning markets. In the conventional wisdom of reform, the vision of markets is utopian and that of central planning concentrates on the awful reality. What is largely missing in the conventional wisdom is a satisfactory attempt to come to grips with the central question that should be answered in formulating reform plans: how does one explain the differences in performance of market-capitalist and centrally planned economies?

Of course, capitalism has outperformed central planning. The developed west is therefore an obvious source of ideas for reforms. But the institutions of capitalism come in many varieties and cannot be put in place instantaneously. There are many alternative reform paths, depending upon the importance attributed to each of these institutions. Thus, there remains the problem of tracing the source of the superiority of capitalist economies to specific characteristics. (This point was made clear to me on hearing a Vietnamese official justify single-party rule by noting the economic success of Taiwan and Singapore!) Reformers need a filter that interprets the experience of capitalist and socialist systems. This is exactly where economic theory plays a vital role.

■ *Peter Murrell is Professor of Economics, University of Maryland, College Park, Maryland and Visiting Fellow at the Woodrow Wilson International Center for Scholars, Washington, D. C.*

Standard neoclassical theory is an important input into the interpretation of comparative economic performance that economists offer reformers. This must be the case since, as Fisher (1987, p. 26) remarks, competitive equilibrium theory is the centerpiece of our subject: "The principal policy insight of economics [is] that a competitive price system produces desirable results and that government interference will generally lead to an inefficient allocation of resources . . ." Of course, there is continual debate over the extent of neoclassical theory, but most would agree that this theory uses profit and utility maximization by rational agents as its core behavioral assumptions, the Pareto criterion as its central normative principle, and the general equilibrium of competitive markets as the paradigmatic example of a well-functioning economy.

This paper addresses whether neoclassical economics can provide the intellectual underpinning for a theory of reform. I examine whether the neoclassical model satisfies an essential condition to qualify for this role: does it give us a satisfactory explanation for the vast differences in performance between capitalist and socialist economic systems?

The paper is divided into two major parts. First, I focus on the theoretical arguments that have traditionally been used to examine the comparative properties of central planning and markets. I show that developments within theory over the last 20 years have substantially changed the tone of these arguments, making their message more equivocal. The second half of the paper discusses empirical evidence, but of a particular sort. Much research shows that centrally planned economies perform less well than market economies; that fact is not in dispute. But few studies test whether the superiority of market economies appears within empirical models derived using the framework of basic neoclassical economics. Those studies are the relevant ones for the present exercise.

I should emphasize that this paper addresses only the usefulness of neoclassical theory as the broad underpinning for reform, not the necessity of reform. Clearly, central planning has performed poorly. Real-world market economies, moreover, must contain many useful lessons for reforming economies. The issue addressed here is whether those lessons are best extracted using the filter of neoclassical theory. The central conclusion is that economists must look outside the standard models of competition, the focus on Pareto-efficient resource allocation, and the welfare theorems to build a theory of reform.

While there is a negative tone to this conclusion, the paper is intended as a constructive contribution to the reform debate. There are many paths that might be taken as old institutions are destroyed and new ones created. Judgments about the relative benefits of each route depend critically upon the theoretical position that one holds (Murrell, 1991). This paper offers one important part of the evidence necessary to choose a theoretical position. At the

least, it suggests that reformers adopt a more nuanced view of capitalism than is contained in the invisible hand paradigm that is used frequently in reform debates.

The Theoretical Evidence

Two decades ago, the centerpiece of economics was the competitive equilibrium model, with its accompanying welfare theorems. For reform, this model's message is simple. Any efficient equilibrium could be achieved with a decentralized solution. Where knowledge was dispersed—Hayek's central assumption—prices would act as sufficient statistics. Moreover, the second welfare theorem held out the promise that distributional decisions could be separated from those on allocation.

Research by theorists over the last 20 years has not been kind to this tidy story. This research shows that the traditional conclusions are weakened once one takes seriously those concerns—for example, incentive problems or informational difficulties—that have been central when deliberating the properties of central planning.¹ Here I discuss briefly some of the research that can be used to justify this claim, necessarily simplifying matters enormously.

Asymmetric and Incomplete Information

The lesson that competitive prices are sufficient statistics for all relevant information has been shown to be incorrect when information can be used to further an agent's own welfare or where acquiring and transmitting information is costly. The importance of this finding here is that it reopens one of the central questions of the socialist controversy of the 1930s (Grossman and Stiglitz, 1976, p. 252; Holmstrom, 1985, p. 207): what are the relative informational properties of different varieties of economic organization? Economic theory provides us with only isolated snippets of knowledge on such properties, although Sah and Stiglitz (1988) provide some interesting theorems that constitute a beginning of research in this area. Moreover, little pertinent empirical information seems to exist.

Once one introduces the informational problems that are now at the center of theoretical inquiry, the view of the world embodied in the general competitive model does not hold. The existence of equilibrium is problematical (Rothschild and Stiglitz, 1976). If an equilibrium exists, it might not be a market-clearing, price-taking one (Stiglitz, 1987, p. 27), but instead can involve phenomena such as credit rationing. The trusty normative criterion, Pareto

¹For discussion of the theoretical developments that includes comments on the relevance of these developments to central planning and socialism, see for example, Arrow (1987), Grossman and Stiglitz (1976), Hahn (1980), Holmstrom (1985), and Hurwicz (1986).

efficiency, becomes ambiguous with incomplete information (Holmstrom, 1985, p. 207), its form depending critically on assumptions concerning information held by the economy's actors. Thus, there seems to be no generally accepted optimality concept that can apply to the world of creative destruction engendered by the process of information generation and transmission (Hirshleifer and Riley, 1979, p. 1414).

These points gain in importance on noting that informational problems are more central during reform than in a normal capitalist economy. Reforming economies will be riddled with informational imperfections, with individuals learning constantly about the effects of reforms. The fact that the neoclassical paradigm says little about real-world institutions for dealing with information asymmetry and information acquisition is of marked significance in judging its applicability to the design of reforms.

Decentralization, Entry and Exit, and Rationality

Entry and exit processes—the creation of wholly new sectors, the weeding out of inefficient state enterprises, and integration into the world economy—will be of crucial importance during reform. But to understand the costs and benefits of markets with entry and exit, one must employ a very different perspective on human behavior than is embodied in the traditional rational actor model of neoclassical economics.

When future-oriented decisions (like entry and exit) are made in the absence of a complete set of futures and risk markets, economic agents must form expectations about the behavior of other agents. If the formulation of such expectations is cast within the rational actor framework, each agent needs a model of the whole economy. For example, potential entrants have to formulate their own general equilibrium model to calculate how expected returns vary with their own and other agents' entry (Novshek and Sonnenschein, 1987, p. 1293). In such a conceptualization of economic behavior, as Arrow (1987, p. 208) remarks, "the superiority of market over centralized planning disappears. Each individual agent is in effect using as much information as would be required for a central planner."

Unless one maintains the assumption of a complete set of Arrow-Debreu futures and risk markets, the use of neoclassical rationality leads to violation of the assumption of informational decentralization that is most often used to propound the virtues of markets. To understand the merits of decentralization, there is no choice but to assume that agents' decisions are based on less than thorough-going rationality. Decision-making under bounded rationality seems to be inherent in entry and exit decisions. There is simply no theory of the comparative properties of different economic systems under conditions of bounded rationality. Nelson (1981) makes this point forcefully in his discussion of the relevance of neoclassical welfare economics to an assessment of the strengths of private enterprise.

Product Differentiation

To the traveler from the west, nothing was so striking in pre-reform Eastern Europe as the sheer monotony of the life of the consumer. The lack of product variety was astounding. It is hard not to add a normative content to these observations—the lack of variety shows that the free market will improve the welfare of consumers. While most of us have faith in this conclusion, neoclassical theory does little to justify this faith.

In a world of product differentiation, consumers gain from increases in variety, but scale economies require limiting the number of varieties. Hence, a large number of outcomes are possible when trading off between number of varieties and larger production facilities. The competitive economy chooses on the basis of a profit criterion, while efficiency requires the maximization of total consumer surplus. In general, these criteria do not lead to the same choices (Dixit and Stiglitz, 1977, p. 308). Moreover, it is easy to construct examples in which market economies produce too many varieties (Spence, 1976; Dixit and Stiglitz, 1977).

The superiority of one economic system over another in a world of product differentiation must come down to empirics—for example, examining the bureaucratic costs of organizing the production of many varieties versus the inability of a market economy to produce the correct balance between economies of scale and variety. Such empirics have not yet been undertaken.

The Increasing Irrelevance of the Second Welfare Theorem

Considerations of income distribution—for example, from the effects of privatization or from stabilizations—tend to dominate in discussions of how to reform the productive apparatus. Although this is hardly a surprise, it should be observed that much policy analysis in economics begins by assuming that distributional concerns can be separated from those on the organization of production—an assumption ultimately justified by the second welfare theorem. The message of that theorem therefore seems of little relevance in reform debates.

The irrelevance of the second welfare theorem in reform debates is mirrored in theoretical developments. When private information affects both allocation and distribution, that information can be used to improve a person's welfare, possibly at the expense of efficiency. A vast literature on the question of the "incentive compatibility" of economic mechanisms has arisen from this observation. The research on incentive compatibility has "deepened and changed the conventional wisdom regarding the possibility for achieving Pareto efficient allocations through decentralized means (such as competitive markets)" (Groves and Ledyard, 1987, p. 50). This literature addresses issues that had never been satisfactorily resolved in the socialist controversy of the 1930s (Hurwicz, 1972).

The research on incentive compatibility implies that there is a conflict between informational decentralization, efficiency, and the ability to obtain desired outcomes. Hence, one cannot dismiss the possibility that some centralization of economic activities could improve the trade-off between equality and efficiency.² Consider, for example, the traditional mechanism in centrally planned economies of directly monitoring enterprises to redistribute rents between them. In a neoclassical world, such a mechanism could plausibly be justified as improving the trade-off between equality and allocative efficiency. (Of course, applying a more sophisticated model of government's role than appears in the neoclassical model, these central interventions will be unproductive in the long run, for reasons clearly outlined in Litwack's essay in this volume.)

Summary

The above discussion has touched upon some of the core issues in the standard indictment of central planning—its poor informational properties, its inability to provide for entry and exit and to supply an adequate variety of products—as well as a key point in discussing alternatives, the possibility of separating allocation and distribution decisions. These were the issues emphasized so strongly in the socialist controversy of the 1930s.³ Now, study of these issues is at the center of theoretical inquiry. But the answers that come from theory are more variegated than was the case 50, or even 20 years ago. These answers suggest that the invisible hand story is not a satisfactory way of understanding the reasons why real-world markets find so much better solutions to economic problems than do real-world planners. A much broader perspective than the simple free market paradigm is needed to underpin reforms. Recent developments in theory surely tell us that there is room for a more nuanced approach to reform.

At this point, a skeptical reader might say: we know that there are profound differences between the centrally planned economies and market economies. Couldn't the neoclassical model be a powerful metaphor explaining the empirical effect of these differences, even though that model does not apply exactly? The next section summarizes the empirical evidence relevant to this question.

²Only if a procedure is implementable in dominant strategies can one really say that it has the property of informational decentralization. If a procedure is not a dominant strategy, then each individual will, in general, have to have a model of the whole economy in order to optimize (Groves, 1979). The results on incentive compatibility point out how limited are the types of equilibria that can be implemented in dominant strategies (Dasgupta, Hammond, and Maskin, 1979).

³Re-reading the contributions to the "socialist controversy" in the light of modern theory, it is easy to see that the neoclassicals sidestepped the issues raised by the Austrians (Murrell, 1983). That is not to say, however, that the Austrians convincingly argued for the superiority of unfettered markets. Indeed, modern economic theory perhaps shows that their arguments were inadequate.

Empirical Evidence

The review of empirical evidence presented here is highly selective. The goal of the paper is not to discuss whether markets or central planning have been most successful. The superior performance of market economies is not in doubt. Instead, the paper attempts to determine whether that superiority is adequately explained by the neoclassical paradigm or is instead rooted in some other part of the complex reality of markets. To be informative in this context, one must examine the set of empirical studies that address the ability of neoclassical economics to explain differences in the performance of centrally planned and market economies.

Before proceeding, it is useful to confront an issue likely to be in the forefront of readers' minds. The cited empirical studies often had to use poor data or, as a consequence of data problems, had to employ much less sophisticated methodologies than those prevailing in studies of western economies. But this lesser sophistication is not sufficient to dismiss the results, since consistent results are derived using a variety of techniques and data sets. At a minimum, the burden of proof should be on those who wish to argue that the results are produced only by methodological problems.

The reason I emphasize these points is that the consistency and tenor of the results will surprise many readers. I was, and am, surprised at the nature of these results. And given their inconsistency with received doctrines, there is a tendency to dismiss them on methodological grounds. However, such dismissal becomes increasingly hard when faced with a cumulation of consistent results from a variety of sources.

Technical Efficiency

Technical efficiency measures the extent to which an enterprise is producing at full potential given its technological level. This concept reflects only internal enterprise efficiency. It does not address allocative efficiency or the firm's adeptness in matters of technological change; these issues will be discussed presently.

It is commonly assumed that technical inefficiency is rife within centrally planned economies due to the lax discipline resulting from inadequate incentives, the absence of attention to costs due to fixation on output quotas, and the hiding of output potential to avoid future increases in plan targets. Additionally, bureaucratic allocation is thought to contribute to technical inefficiency by causing subordinates to hoard inputs in anticipation of future shortages and to use inputs that do not fit specifications, while superiors create units of inefficient size to minimize difficulties of control.

Implicit in the hopes for reform is the assumption that profit maximization and market-mediated exchange will quickly encourage appropriate attention to

costs. Hence, if technical inefficiency were found to be more significant in centrally planned than in market economies, the competitive-equilibrium metaphor, with its focus on profit-maximization and market interactions, could certainly be said to provide a theoretical underpinning for those hopes.

Danilin *et al.* (1985) examine the technical efficiency of cotton refining enterprises in the Soviet Union by estimating frontier production functions. They find an average level of technical efficiency of 92.9 percent, and conclude (p. 225) that "traditional Soviet methods may well be more effective in controlling efficiency than is usually supposed." The dissonance within this quotation, resulting from inconsistency between expected and actual empirical results, is echoed in studies examined in subsequent parts of this essay.

Should 92.9 percent be considered a comfortably high level of technical efficiency? Studies of market economies exactly analogous to that of Danilin *et al.* do not exist, but some studies are similar. For example, Schmidt and Lovell (1980, p. 97) found that a sample of U.S. generating plants had an efficiency level of 90.4 percent. For France, Meeusen and van den Broeck (1977) estimated efficiency in ten industries, with levels ranging from 71 percent to 94 percent.

Since the pioneering effort of Danilin *et al.*, many studies have examined technical efficiency in centrally planned economies. A full summary would be impossible here, since there is much variation in technique: frontiers can be estimated deterministically (constructing an outer envelope of the observed input-output combinations using linear-programming methods) or stochastically (using maximum-likelihood methods on a specification that includes a one-sided error distribution); the data can be aggregate or enterprise level; and the observations can be cross-sectional, time series, or both. Table 1 gives the briefest summary, providing perspective by matching results for socialist economies against those for market economies obtained in a reasonably comparable manner. Clearly, these results do not allow one to conclude that technical efficiency is a particularly important problem for centrally planned economies.

One doubt about the evidence might lie in the comparability of estimates obtained from separate studies, although Table 1 addresses this issue by matching studies with similar methodologies. One study, Koopman (1989b), employs observations on both centrally planned and market economies, thus providing direct comparability. He uses observations for 1960-79 for Soviet republics and a matched sample of Canadian provinces, U.S. states, and Finland, and employs a translog functional form that allows for differences in technology between Soviet and non-Soviet regions. The average level of technical efficiency in Soviet agriculture is estimated at 93 percent, while it is 92 percent for agriculture in the market economies.

A further doubt concerning the significance of the above evidence arises because the studies do not estimate the absolute level of technical efficiency, but rather a level of technical efficiency relative to best in-country practice. Hence,

Table 1
Comparisons of Technical Efficiency Estimates

	<i>Market</i>	<i>Centrally Planned</i>
Stochastic frontier; enterprise observations; cross-section.	90%—Schmidt and Lovell (1980) 84%—Meeusen and van den Broeck (1977)	93%—Danilin et al. (1985) 86%—Afanasiev and Skokov (1985)
Deterministic frontier; enterprise level observations; cross-section.	75%—Fare et al. (1985) 92%—Byrnes et al. (1984) 69%—van den Broeck et al. (1980)	64%—Lovell and Wood (1989)
Stochastic frontier; industry level observations; time series.		95%—Kemme and Whitesell (1992)
Stochastic frontier; aggregate observations; time series.	87.3%—Lovell and Sickles (1983)	95.3%—Kemme and Whitesell (1992)
Stochastic frontier; enterprise observations; cross section/ time series.	89%—Aigner et al. (1977) 93%—Schmidt and Sickles (1984) 58%—Kumbhakar (1987)	88%—Koopman (1989a)
Deterministic frontier; aggregate observations; time series.	96%—Burley (1980)	94.5%—Brada (1989) 89.5%—Kemme and Neufeld (1989)

Note: In cases in which the cited papers contain alternative estimates or results for a number of distinct samples, the figures above are averages of several estimates.

the estimating procedures cannot differentiate between a uniformly low technical efficiency and high, but variable, technical efficiency.⁴

Brada and King (1991) tackle this problem head-on by examining the performance of state and private farms within one country, Poland. They apply a linear programming methodology to county-level data to estimate a single

⁴If this objection is to be taken seriously, one should have a reason to suppose that there is a low variation in efficiency within centrally planned economies. But if the source of technical inefficiency is taken to be ad hoc bureaucratic interventions, the abilities of managers and party officials to obtain delivery of inputs, the degree of supply uncertainty, and the laxness of discipline, these factors are all likely to vary a great deal across economic units, if they are important. Hence, if there is much technical inefficiency, there is likely to be much variance in technical inefficiency.

production frontier. Using this frontier as an estimate of best-practice, they find little difference in technical efficiency between state and private farms. The incentive issues on which technical efficiency focuses do not seem to have explanatory power in this context. Interpreting the broader implications of their study, Brada and King conclude that differences in the agricultural performance of capitalist and socialist countries must be explained by features of the environment in which farms operate, rather than in the more narrow incentive effects of ownership.

Rationality of the Structure of Foreign Trade

It is traditional in comparative economics to assume that planning leads to an irrational economic structure. However, the Soviet Union, with its mammoth resource base and poor climate, does export fuels and raw materials and import food. The East European nations, which are middle-income countries, do export semi-processed products and import high technology. Are these decisions so inconsistent with economic rationality?

Soviet trade behavior has been largely consistent with comparative cost theory, according to Rosefelde (1973, 1981), who has argued that Soviet trade appears to be based on "fundamental" comparative advantage. According to Rosefelde, trade is based on fundamental comparative advantage if, at a fairly high level of aggregation, costs are sufficiently differentiated as to permit foreign trade interactions to react to comparative costs.

Rosefelde presents a variety of evidence in support of his thesis. First, he observes that the regional composition of Soviet trade reflects relative price differences between Eastern Europe and the west. Second, trade is consistent with the structure of domestic opportunity costs. Third, changes in Soviet trade over time have been in accordance with cost changes calculated from estimated production functions. Thus, Rosefelde concludes that Soviet trade behavior is consistent with the neoclassical theory of comparative costs.

Of the possible criticisms of Rosefelde's results, the most important is the absence of direct comparisons with market economies. Murrell (1990; Chapter 7) addresses this problem. That study begins with the standard neoclassical model of trade, the Heckscher-Ohlin model, which summarizes the behavior of economies acting in accordance with the dictates of allocative efficiency. One way of viewing the Heckscher-Ohlin framework is that it shows which set of variables should be important in determining a nation's comparative advantage if neoclassical theory applies. That set contains only factor endowments. Then, the trade of inefficient countries can be viewed as being affected by variables, such as policy decisions on agricultural subsidies, that should be irrelevant if efficiency were the objective. In geometric terms, the trade patterns of inefficient countries vary across more dimensions than those of efficient countries because of the effect of these additional variables. Moreover, the efficiency-reducing variables increase in size as the level of allocative efficiency declines. Comparative measures of the rationality of trade patterns can then be found by

examining how far a country's trade pattern deviates from patterns conforming to the Heckscher-Ohlin model.

Murrell's (1990) procedure calculates a rationality measure based on this insight, using data on market economies to find the trade patterns conforming to the Heckscher-Ohlin model. The procedure and exact results involve a number of complications, which cannot be described here due to lack of space.⁵ However, nothing in these results would allow one to conclude that the trade of centrally planned economies is at greater variance with the basic neoclassical model than is the trade of market economies. In fact, with the exception of Poland, it appears that Eastern European countries and the Soviet Union are in greater accord with that model than is the average OECD nation.

These results support Hewett's (1983, p. 269) observation on inconsistencies in the prevailing view of centrally planned economies: "[W]hile it is no doubt accurate for many Western economists (including myself) to characterize the institutions that manage Soviet foreign trade transactions as cumbersome, antiquated, and prone to discourage trade, it is equally true that, while the Soviet Union relied on those institutions over the last several decades, its foreign sector turned in a quite credible performance." Again, the empirical findings leave one with a sense of dissonance. This sense of dissonance might be removed by rejecting the notion of rational economic structure examined here. This is exactly the route followed in Murrell (1990), where it is shown that the inadequacies of the East European economies readily appear when trade patterns are examined from perspectives other than that of the neoclassical model.

Allocative Efficiency in the Use of Productive Inputs

As the previous discussion makes clear, one can interpret the estimates of rationality of trade as indicators of neoclassical allocative efficiency. One set of studies has attempted to measure such efficiency directly by analyzing the allocation of productive inputs between different industrial sectors.⁶ Thornton (1971) provided the basic insight showing that estimated production relationships could be used to measure allocative efficiency. Employing Cobb-Douglas functions for 13 sectors of Soviet industry, she calculated that an efficient reallocation of capital and labor would produce an extra 2.9 percent of industrial value added in 1960 (4.15 percent in 1964). Whalley's (1976) recalculations used a variety of assumptions on production functions, in particular

⁵See Murrell (1990) for a discussion of the significance of the methodological problems in constructing these results. The greatest problems are due to the non-availability of data from centrally planned economies comparable to the data for market economies.

⁶All the papers reviewed here ignore the inefficiency that might arise when a production structure is inappropriate given consumer demands. Since these demands are difficult to estimate and since there is a doubt as to whether the planned economies reacted to consumer, rather than planner, preferences, it is appropriate that this element of inefficiency should be ignored. However, although I will refer from here on to plain "allocative efficiency," the reader should remember that this is used in the sense of "allocative efficiency in the use of production inputs."

allowing the elasticity of substitution to vary from unity. With plausible values for the elasticity of substitution, he found that the efficiency loss could be as low as 1.5 percent. Desai and Martin (1983) generalized the methodology and provided time-series estimates of efficiency losses. Their estimate of the efficiency loss for 1960 was consistent with that of Thornton, but they also found such losses rising to 10 percent by 1975.

When these estimates were presented, they were interpreted as a serious indictment of central planning. Yet, there remained the question of significance, both statistical and economic. Toda (1976, p. 263) examined statistical significance, and summarized his results with the same sense of paradox evinced in earlier quotations: “The Soviet institutional setting, where the industries are under various governmental regulations in acquiring the factors of production and where the price of finished goods and intermediate products are arbitrarily set, makes one suspect that the use of primary factors must be in disequilibrium. In large part, however, empirical results [examining the statistical significance of differences between factor price ratios and marginal rates of technical substitution] fail to verify our expectations.”

The question of economic significance was examined by Whitesell (1990, 1991; see also Whitesell and Barreto, forthcoming). His basic premise is that economic significance can be judged only by comparing losses in centrally planned economies to those in market economies, since all economies evidence departures from first-best optimum. Such comparisons are most reliable when one uses an identical empirical methodology across countries. Whitesell finds that if the Soviet Union were to attain the U.S. level of allocative efficiency, GNP would increase by 2 percent—hardly an amount likely to encourage the overthrow of a whole socio-economic system. Whitesell does find that Hungary shows a high level of inefficiency, with a potential GNP gain of 20 percent from reaching West German levels of allocative efficiency. However, the message from these results is not clear, since Hungarian allocative efficiency decreased after the decentralizing reforms of 1968.⁷

While the availability of more comprehensive data could certainly lead to improvements in the methodologies of Murrell (1990) on foreign trade or Desai and Martin (1983) and Whitesell (1990) on input allocation, it is difficult to dismiss the results on the basis of methodological imperfections.⁸ Despite being

⁷Kemmer (1991) uses the same methodology for Poland for 1971–83 and finds an average yearly efficiency loss of 9 percent.

⁸For the Whitesell methodology, the most important problem is insoluble. For capitalist countries at least, the capital and labor in each sector are endogenous variables. Therefore, one has simultaneous equations bias if one uses the simple least-squares estimating procedures. This difficulty has been addressed in studies of capitalist countries by using price information and the assumption of cost minimization to obtain estimates of the parameters of the production function indirectly. But, given bureaucratic allocation of resources in the socialist countries, one cannot use price information in the same manner. If one wants to use the same estimating technique for both socialist and capitalist countries, one will violate some basic assumption of the technique. Whitesell chooses to use the techniques that are appropriate for the socialist economies, and thus the estimates for the capitalist countries must be viewed cautiously.

derived from a variety of techniques and data sources, these results reveal considerable consistency.

Incentives for Technological Change

When using the neoclassical model to explain the technological laggardness of centrally planned economies, there is a focus on the twin problems of incentives and bureaucracy. First, it is assumed that unless managers are motivated by profit maximization, they will not have an appropriate incentive to create and adopt new technologies. Second, the presence of bureaucracy is thought to impede technological advance in many ways—for example, by slowing resource reallocation and by separating research and development from the production process.

Can the neoclassical model explain the poor innovative performance of centrally planned economies? The most convincing answer to this question comes from the realm of theory. There are sound reasons why the process of technological change cannot be fitted into the basic neoclassical model, or in extensions thereof (Stiglitz, 1991). The disequilibrium-creating aspects of technological discovery, the impossibility of defining a choice set over innovative decisions, and the importance of limits on technological knowledge, all provide a poor fit with the neoclassical framework (Nelson, 1981). Putting this aside, inappropriately, the consequence for the present exercise is that there is no ready-made model to serve as an obvious standard for generating testable predictions. Additionally, there is a paucity of data that reflects systematically on comparative technological performance. Thus, empirical information can hardly provide a satisfactory answer to the question opening this paragraph.

The first problem is to specify an area of technological change where the neoclassical model of decision-making is least inappropriate. The implementation of new process technologies fits better than most other technological activities. Four characteristics seem most pertinent. First, changes in process technology often rely on traditional applied science, which provides a basis for estimating returns. Second, changes within process technologies often occur within a stable organizational setting. Third, the marketing of new products—one of the greater imponderables of economic life—is not involved in new process technologies. Fourth, information on process technologies is partially exchangeable within markets, either through the sale of turnkey plants or through licenses.

Thus, if the neoclassical model offers any chance of explaining the technological laggardness of centrally planned economies, one must examine that model's predictions in the area of process-technology change. One would seek evidence of inferior performance by planned economies in those sectors in which process technological change has been significant.

Unsurprisingly, cross-country comparable figures on levels of process technological changes are not generally available. However, foreign trade data do

show the sectors in which a country has been comparatively successful. If centrally planned economies had poor trade performance in sectors in which process changes have been significant, one might find some support for the argument that the neoclassical model diagnoses the source of the technological laggardness of centrally planned economies.

Murrell (1990) presents information on foreign trade performance in those sectors that have high rates of process technological change. On average, the centrally planned economies have approximately balanced trade in these sectors. In contrast, one finds that a group of middle income OECD countries—at the same level of development as the East European nations—have a marked comparative disadvantage in these same sectors. Apparently, the problems of centrally planned economies are not particularly pronounced in those sectors in which a neoclassical model of technological change might predict poor performance.

Leary and Thornton (1989) and Poznanski (1990) investigate differences in the rates of diffusion of steel-making processes using a simple epidemic model of diffusion. Their results do show that diffusion is slower in centrally planned than in the market economies. However, when Leary and Thornton test for the sources of this laggardness, they find that the nature of the economic system is not a significant explanatory variable explaining cross-country variations in rates of diffusion.

To forestall misinterpretations, I will summarize the previous paragraphs using the general themes of this essay. Nobody doubts the poor technological performance of the centrally planned economies. However, the causes of technological laggardness can be explained by many different theories, each having different conclusions for reform. On theoretical grounds, the neoclassical paradigm is hardly a strong candidate for providing such an explanation (Nelson, 1981). Moreover, in exactly the area in which the neoclassical approach seems most applicable—process changes—the results are less than convincing. Therefore, one must look beyond the standard neoclassical model to explain the poor technological performance of centrally planned economies.

Conclusion

This paper examines the power of the neoclassical paradigm to explain the differences in the economic performance of market and centrally planned economies. If one takes the neoclassical paradigm seriously in formulating empirical work, then one finds little to distinguish the two sets of economies. If one attaches significance to the informational problems now at the center of theoretical inquiry, then the clear-cut prescriptions of the invisible hand theorems no longer hold.

There remains the question of the appropriate reaction to these findings. One reaction of readers of an earlier version of the paper was to claim that the

process of reform is not driven by theoretical models but rather by the realities of economic performance in east and west. But this cannot be a correct characterization of the work of economists involved in that process. Choices have to be made along the reform path and only an analytical perspective can inform the trade-offs between choices.

A second reaction is to say that the basic neoclassical model is simply irrelevant to reform. While this might be true at the boundaries of theoretical research, it certainly is not at the level of policy debate. Especially during large systemic changes, when vast complexity requires great simplifications, theoretical refinements tend to be lost in the struggles between overarching visions. All too often, the debate on reform is driven by the metaphor and the simple model rather than by the details of modern theory and knowledge of western economic institutions.

In the battle of competing visions in economic reform, the invisible hand paradigm commands a powerful position. It is the only theoretical perspective that affords the possibility of declaring the superiority of one set of arrangements—unrestrained free markets. The presence or absence of such a definitive message must radically alter the tenor of debate.

The comparative economic experience of capitalist and socialist economies and modern economic theory offer only a diverse assortment of facts and results. There is unlikely to be a single unifying idea—such as the invisible hand—that captures the essence of this information. Hence, reformers need to be sensitive to the notion that there are many visions of the world, each with its own emphases and assumptions, clarifying and distorting reality. Of course, neoclassical economics is one of these visions; but as this paper has argued, it is not a strong candidate to provide the underpinning for reform. Other theories could be much more relevant to the reform process. For example, reformers might want to take into account the lessons of the new informational economics, which Stiglitz (1989b) suggests is producing a paradigm shift in economics. Or, following Kornai (1990), one might focus on the links between ownership systems and the viability of different coordination mechanisms. Or, there might be advantage to viewing reform through the lens of evolutionary economics (Murrell, 1990, 1991).

In this inchoate world of diverse facts and theories, there are two further conclusions for economic reform discussions. First, blanket prescriptions (“reform requires immediate price liberalization” or “there is no place for workers’ management in the transition”) surely do not deserve a place in the debates between economists. On hearing such a prescription, one should be duly skeptical and require a justification that explains its theoretical basis and the supporting empirical evidence. The difficulties of reform merit more nuance than is present in such oft-heard statements. Second, the intuitions of the economic reformer in choosing between competing visions and extracting facts from past experience must play a vital role alongside the more concrete lessons of economics. In matters of economic reform, the skills and knowledge more

usually associated with the philosopher and the historian must supplement those of the economic theorist and the econometrician.

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