

# THE IMPOSSIBILITY OF SOCIALIST ECONOMY, OR, A CAT CANNOT SWIM THE ATLANTIC OCEAN

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To decide whether an undertaking is sound we must calculate carefully.

— Ludwig von Mises, *Socialism*

**T**he socialist calculation debate has been prolonged, contentious, and often confusing (Vaughn 1980; Yeager 1997). Few issues in economics are more important, yet our understanding remains muddled, judging by the work of prominent mainstream theorists (e.g., Stiglitz 1994; Roemer 1994), as well as the debate in the Austrian tradition over the dehomogenization of Mises and Hayek (Salerno 1993, 1995; Yeager 1997).

If a common opinion prevails within the economics profession today, it may be that socialism is unworkable in practice but cannot be rejected on logical grounds as inherently destructive and inefficient. Some economists may not have strayed very far from Schumpeter's faulty assessment (1954, p. 989) nearly a half century ago:

so far as its pure logic is concerned the socialist plan makes sense and cannot be disposed of on the grounds that it would necessarily spell chaos, waste, or irrationality. . . . There exists a determined set of solutions of the equations that can be realized by the method of "trial and error."<sup>1</sup>

Contemporary economists and the general public are heavily influenced by the collapse of the Soviet Union and its former captive states in Eastern Europe, a deadly

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<sup>1</sup>Austrian economist Karen Vaughn, for example, concedes (1980, p. 544), "What [Mises and Hayek] argued was that the ability to calculate rationally under socialism was 'practically impossible' because the theory, while logically consistent, did not capture enough important features of the real world to make it applicable." A lapel button for sale in Red Square following the collapse of the Soviet Union was closer to the truth: "Socialism:  $2 \times 2 = 5$ ." This illogical equation, done in jest, is not a bad way to capture the essence of Mises's impossibility theorem, albeit missing the critical details.

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historical experiment.<sup>2</sup> Yet the failure of self-proclaimed socialist states is not strictly relevant to the question of the ability of socialism to achieve given ends economically. Why? Because state planners, just as entrepreneurs, capitalists, and everybody else, had access to real money prices to calculate low cost means to achieve their given ends (Mises 1963, pp. 698–99; Rothbard 1991, pp. 73–74). Like the U.S. Postal Service and other state bureaucracies operating in world markets, Soviet planners could borrow market prices to calculate the cost of alternative processes. A true test of socialism's ability to economize would be far more demanding than that faced by twentieth-century socialist planners, since the system would have to find cheap ways to do things in a world without markets for capital goods.

Mises (1981) was the first economist to isolate the fatal flaw in socialism at the deepest level—socialist economy is impossible because no human director in such a system could possibly find (“calculate”) the cheapest way to accomplish any given project among the infinite variety of ways to do the job. Without market prices to evaluate the opportunity costs of resource use in terms of final consumption goods, planners could not tell how best to produce outputs, nor consequently which outputs to produce. Mises's theorem is a deeper if narrower point than Hayek's subsequent elucidation of the “knowledge” problem. While Hayek performed a valuable service by pointing out that the immense amount of relevant data, dispersed among the population as it is, could not possibly be reliably assembled at the center, I believe that impartial observers will ultimately conclude that Hayek's contribution is not on an intellectual par with Mises's theorem. Hayek's observation is one of the many reasons (incentive failures, coordination failures, etc.) that socialism cannot possibly work as well as a capitalist economy.<sup>3</sup> Hayek's focus on the decentralized nature of human knowledge complements but does not replace or substitute for Mises's breakthrough.

Mises used the standard *ceteris paribus* approach of scientists to deduce his theorem. Mises was willing to suppose that all the production data known to every human being on earth could be assembled accurately at the center every day; even under this fantastic assumption, conceded to proponents of socialism for the sake of argument, he argued that the director still lacked a means to discover the cheapest way to accomplish his purposes; all he would have is statements “unrelated to each other. There is no means of establishing any connection between them” (1963, p. 698). Thus, there is no way to list the lost value in terms of goods ready for consumption for each method adopted.

The failure of economists to clearly grasp and appreciate Mises's proposition implies a serious defect in the profession's understanding of the work performed by the price system, as well as of the gross inferiority of the substitutes available to replace its functions upon disabling it, wholly or partially. Apparently Mises, despite his best efforts, did not bare the fundamental flaw in socialism clearly enough for the

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<sup>2</sup>Hoppe (1989, p. 120) correctly argues, “Experience does not beat logic, but rather the opposite is true. Logic improves upon and corrects experience.”

<sup>3</sup>For a stern assessment of Hayek's effort to add something of value to the socialism debate, see Hoppe (1996).

profession to see it. The gravity of the situation is suggested by Paul Craig Roberts's assessment (1990, p. xxvi) that "If we do not learn the lessons, the twentieth century will have been lived in vain." The preeminent issue of our century has been capitalism versus socialism—the decentralized market economy versus centralized political direction of resources.

The purpose of this article is to restate and clarify what Mises meant and to defend Mises's conclusion against some of the challenges hurled against it. One article cannot refute all the fallacies surrounding the calculation or economizing issue, but it can recast the impossibility theorem and refute some of the key misunderstandings. I disclaim originality, but by resorting to first principles I hope I can contribute to our knowledge by amplifying and restating, much as Salerno (1993) and Rothbard (1991) have done, so that more economists understand why economy is impossible under concentrated or common "ownership" of the means of production.<sup>4</sup>

### PRELIMINARIES ON ECONOMICS AND OWNERSHIP

So much confusion surrounds the socialist calculation debate that we had best start at the elementary level. Principles textbooks in economics claim that an economic system grinds out answers to three implicit questions: What?, How?, and For whom? Agreed. Which question, then, is the focus of the calculation debate? It is the "How" question, plain and simple. All else is secondary.

Economy of means, after all, is the principal occupation of economists. How does Mises handle the other two questions? In effect, he is willing to drastically simplify and put these questions aside by positing that only "one will acts." Despite socialism's grave problems with the What and For whom questions, then, they are answered by the planner's preferences, by assumption. Regarding the director's preferences, Mises correctly asserts, "As a rule, anyone in possession of his senses is able at once to evaluate goods which are ready for consumption" (1981, p. 98). Again, the only issue is how can socialism find the cheapest way for the planner who wants to build a house, build and equip a cannery, or liquidate undesirables. It must accomplish something at the smallest lost (subjective) value of production in goods ready for consumption elsewhere for each possible method.

We must also agree on a few institutional preliminaries. A prerequisite for the exchange of scarce goods and services is effective control (ownership or the right of disposal) over them by two or more potential trading partners. Such dispersed control over commodities (*de facto*, if not *de jure*) must exist for markets to operate. This necessary condition is true regardless of what legal arrangements might exist at a time and place.<sup>5</sup>

Modern property-right theorists recognize that the efficiency of an economy (populated by human beings as we know them) depends on the institutional rules or

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<sup>4</sup>My treatment also overlaps that of Herbener (1996), a penetrating article with which I find no substantive quarrel.

<sup>5</sup>According to Posner (1992), an ideal property regime for social efficiency would legally protect exclusive, transferable (alienable), and universal rights in all economic goods, assuming costless operation of the legal regime.

property rights structure. Ownership is intimately connected with rewards or incentives, and therefore with individual actions and both individual and collective prosperity. A laudable feature of the Communists has long been their recognition of the primordial importance of property (compared to the tone deafness of many economists); as Marx and Engels expressed it in their celebrated *Communist Manifesto*: "The theory of the Communists may be summed up in the single sentence: Abolition of private property" (Tucker 1978, p. 484).

**MISES'S THEOREM:  
IF NO ENTREPRENEURS AND MARKET PRICES,  
THEN NO EFFICIENCY**

The next order of business is to define socialism. Socialist writers and reformers have had many items on their agendas. To paraphrase Maurice Dobb, central planning means the abolition of markets or it means nothing. The most ambitious version has been called communism because it would effectively abolish money, private property and all trade in consumption (lower-order) goods, intermediate (higher-order) goods, and all factors of production, including labor. Markets would be replaced wholesale by central command. Many socialist writers have called this the "natural economy," meaning a non-monetary, in-kind system without exchange. Less ambitious forms of socialism presumably seek an incomplete ban on private property and trade for a subset of commodities, namely, the so-called means of production we define as capital goods, including land, in favor of "socialism" in such means of production. Presumably money, property, and trade would continue to be allowed in labor services and goods ready for consumption. The exact ownership of intermediate commodities and goods in process is left unclear in socialist writings, but presumably these are socialized.

To clarify the definition of socialism, Mises (1963, p. 695) wrote, "The essential mark of socialism is that *one will* acts. It is immaterial whose will it is. . . . The main thing is that the employment of factors is directed by one agency only." This is consistent with the pervasive theme in Marx, Engels, Bukharin, Lenin, Sweezy, and other "true" socialists. As Engels said, socialist men "with full consciousness, will fashion their own history" and manage everything very simply, like a single workshop or factory (Roberts 1990, p. 14). The idea of planning, of course, grew from the socialists' desire to abolish private property and the anarchy of the market system, and replace these with "science" applied to society.

On the eve of the Communist *coup* in Russia, Lenin wrote in August 1917, that to organize the whole national economy on the lines of the postal service . . . all under the control and leadership of the armed proletariat—this is our immediate aim. This is the state and this is the economic foundation that we need. (quoted in Roberts 1990, p. 28)

Surprisingly, Lenin wrote with some insight about the calculation failure of socialism before abandoning his effort to institute it in March 1921:

The difference between socialization and simple confiscation is that confiscation can be carried out by "determination" alone, without the ability to calculate and distribute properly, *whereas socialization cannot be brought about without this ability.* (quoted in Roberts 1990, p. 31)

Let us frankly admit our complete inability to conduct affairs, to be organizers and administrators. . . . If we are to be absolutely definite, we must know exactly what we are going to do over the year ahead. Who knows that? No one. (quoted in Roberts 1990, p. 35)

To solidify our understanding of Mises's theorem, consider the following compact restatement. All of the following systems of socialism are identical in their key feature, namely, centralized control of the means of production: isolated socialism, universal socialism, isolated communism, universal communism, central planning, abolition of decentralized ownership and trade in the means of production, monopoly or concentrated control of inalienable means of production. Specifically, Mises's theorem is that socialism has the following properties and consequences:

1. No monetized trade in capital goods (no transferable rights).
2. No money prices for capital goods.
3. No money cost calculation of production methods employing capital goods.
4. No alternative method of calculating the opportunity costs of various means to a given end in a vast, technically advanced society is possible.
5. Only arbitrary (uneconomical, inefficient, socially irrational) allocation decisions remain possible.

Therefore, socialism is necessarily wasteful, cannot serve consumer wants, and must be "planned chaos." Q.E.D.

The essence of the theorem—economical action is impossible because the lowest-cost option cannot be figured out—rests on the insight that scarce capital goods go unpriced under isolated socialism. With apologies to economists who already fully understand Mises's theorem, Appendix A offers a numerical illustration. In socialism's quest to free workers from the domination of private capital in favor of "empowering" them through socializing capital, socialists (inadvertently) abolish the possibility of cost calculations and therefore the ability to economize. As Milton Friedman might observe, in their normative obsession with "equality," socialists overlook the paramount normative function served by the price system, namely, productive efficiency (Friedman 1976, pp. 197–98). Without the ability to calculate the cost of alternative production techniques, disaster looms. And Mises rightly and courageously insisted that no one has proposed a credible alternative to replace capital markets.

No one can deny steps 1, 2, and 3 of the theorem; in fact, these historically have been among the basic objectives of socialists. Rational socialists (those aware of the problem of economy in resource use) must attack step 4. They must show how a real human being can figure out the lowest cost means without the aid of real prices generated by private entrepreneurs bidding for the use of assets.<sup>6</sup>

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<sup>6</sup>As an anonymous referee points out, my reference to "real prices" is problematic for neoclassical readers, who might object that productive and allocative efficiency requires prices to be perfectly competitive and externality-free rather than real. For them, neither real-world capitalism nor real-world socialism are Pareto efficient, so the question becomes whether the informational and bureaucratic costs associated with central planning are smaller than the likely benefits from correcting so-called market failures. For Mises, by contrast, rational calculation requires only actual

The action in Mises's theorem centers on step 4 of the restatement. Mises explains that *this crucial step rests on two real-world features, namely, complexity and change, with the major emphasis on complexity.* In effect, Mises (1981, p. 98) concedes that socialism can work (economical choice) without market prices for capital inputs if the choice problem is primitive enough. Consider this key quotation:

As a rule, anyone in possession of his senses is able at once to evaluate goods which are ready for consumption. Under very simple conditions, he should also have little difficulty in forming a judgment upon the relative significance to him of the factors of production. When, however, conditions are at all complicated, and the connection between things is harder to detect, we have to make more delicate computations if we are to evaluate such instruments. Isolated man can easily decide whether to extend his hunting or his cultivation. The processes of production he has to take into account are relatively short. The expenditure they demand and the product they afford can easily be perceived as a whole. But to choose whether we shall use a waterfall to produce electricity or extend coal mining and better utilize the energy contained in coal is quite another matter. Here the processes of production are so many and so long, the conditions necessary to the success of the undertaking so multitudinous, that we can never be content with vague ideas. To decide whether an undertaking is sound, we must calculate carefully.

At the risk of confusion, perhaps a mathematical metaphor can illuminate Mises's meaning: we can solve very simple mathematical problems in our head but we can only solve complicated mathematical problems with the aid of pencil and paper (writing tools). In the former case, we can mentally embrace the whole problem without calculation aids while in the latter case our grasp stumbles over the many steps to solution and we require aid. Similarly, the hunter-gatherer once figured out simple allocation problems without market prices for capital goods because the decision maker succeeds "in reducing all elements in the computation to such commodities as he can evaluate immediately, that is to say, to goods ready for consumption and the disutility of labor" (Mises 1981, p. 98). Such successful intuition is impossible with lengthy and roundabout processes of production.

In the narrow circle of a closed household, where the father is able to supervise everything, he may be able to evaluate alterations in methods of production without having recourse to money reckoning. For, in such circumstances, production is carried on with relatively little capital. Few roundabout methods of production are employed. As a rule production is concerned with consumption goods, or goods of higher orders not too far removed from consumption goods. Division of labor is still in its earliest stages. . . . It is possible to survey the whole process of production from beginning to end. It is possible to judge whether one particular process gives more consumption goods than another. But, in the incomparably more complicated conditions of our own day, this is no longer possible. (Mises 1981, pp. 101-2)

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market prices, those arrived at by a rivalrous process of continual bidding by entrepreneurs for factors of production, and whatever expectations these decentralized planners may have about future prices. These prices, of course, generally are distinct from perfectly competitive prices, but "suffice for practical purposes" (Mises 1981, p. 105).

So Mises's argument boils down to the fact that the length and complexity of production relations changes the whole character of the problem. Without reliable calculation of the opportunity cost of resource use in terms of goods ready for consumption, economical choices are impossible (economy is impossible). And the only way it can be achieved is with the "aid" of the action of all in a market system. Capitalism integrates all goods, not just those ready for consumption, into a vast exchange network using a general medium of exchange. Clearly, it works pretty well, although certainly not perfectly. "True, money calculations are incomplete," writes Mises.

True, they have profound deficiencies. But we have nothing better to put in their place. And under sound monetary conditions they suffice for practical purposes. If we abandon them, economic calculation becomes absolutely impossible. (Mises 1981, p. 105)

### OBJECTIONS

Mises's challenge to socialists is clear: Socialism can answer the "what" and "for whom" questions of economics based on one person's preferences (who couldn't?), but it has no means to figure out how to operate in a remotely efficient manner. Confronted with the director's desire to build a dam, it cannot calculate the list of lost production of consumption goods elsewhere in the system for each possible method of dam construction. Which method would least decrease valuable production elsewhere? None of the engineering reports and inventories of resources gives "him any clue to the solution of this problem" (Mises 1963, p. 698). The possibilities are endless, and the planner is clueless. Concrete assignments of inputs to production processes (and more or less continuous reassignments in accord with changing conditions) must be nothing but arbitrary. As Mises wrote: "It is just a system of groping about in the dark. There is no question of a rational choice of means for the best possible attainment of the ultimate ends sought. What is called conscious planning is precisely the elimination of conscious purposive action" (1963, pp. 700–1).

Socialists and mainstream economists ignored or scoffed at the Mises theorem in the 1930s and 1940s. Some economists, however, seriously tried to suggest ways around the devastating problem raised by Mises. None of the alternatives succeeded in showing how an ordinary acting mortal could calculate costs (economize) without real prices for capital goods. None of the (shadowy) alternatives proved remotely valid compared to the scarcity prices continuously generated and regenerated in the market system, though many fervently wished at least one would have proven cogent. Mises refuted many of the socialist rejoinders (1963, pp. 703–15), but apparently without persuasive success.

#### *Fixed Factor Proportions*

One reply to Mises is to define away or trivialize the economic problem of choice among the infinite number of lengthy and roundabout techniques. If there is only one method available to produce each consumption good, then there are no serious choices of input proportions to be made (in the glib terms of mathematics, location-less and individual-less right-angle production isoquants in two-input space, or more

generally, fixed production coefficients). The socialist planner need only choose a combination of consumption goods based on his subjective valuations because of the simple structure of production. Economic calculation of lowest cost means is rendered unnecessary in such a primitive economy because the connections between consumption goods and production processes are unique by assumption.

Since the abandonment of Ricardian economics, few economists believe that the world is characterized by zero input choices (Sraffa, 1960, is the famous exception). Instead, most would probably agree with Mises that

the present state of technological knowledge makes it possible to produce almost anything out of everything. . . . The only reason why the synthetic production of drinking water today . . . is out of the question is that economic calculation in terms of money shows that it is a more expensive procedure than other methods. (1963, p. 699)

Mises (1963, p. 712) correctly adds, "We must take into account real conditions."

### *Stationary Conditions*

Another way to define away the problem of choice of the cheapest production process is to argue that society moves from private capital ownership to socialism without further change in economic data. Then activities can merely repeat themselves, relying on the previous economies discovered by capitalism. This scenario, of course, assumes that the ruler does not wish to alter the demand for goods ready for consumption, which generally would change the value of inputs and therefore the cheapest process. Mises's theorem still stands. The changeless society envisioned by socialists is impossible.<sup>7</sup>

The notion of stationarity has an inkling of empirical relevance for traditionally static societies, as well as the twentieth-century socialist states, where central planning is basically reduced to annual goals of 10 percent more of everything. Nonetheless, the changeless society is a pipedream, if only because of the renewal problem for depreciating (aging) capital goods.

### *Simulated Markets*

This possibility departs drastically from the spirit and sentiment of most socialist speculation. Economists defending neosocialism imagine an isolated central authority that is denied real market prices for capital goods and services but who can rationally figure out least-cost processes by knowing scarcity "shadow" prices of capital goods. Socialism would only involve the elimination of real capital and financial markets. Private-ownership rights in capital disappear but the relative efficiency of capital allocation actually achieved does not suffer and may even improve.

In this imaginary world, newly selected or established non-entrepreneurs, non-capitalists, non-promoters, non-speculators, and non-business managers supposedly

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<sup>7</sup>Mises (1981, chap. 10) divides the perpetual changes in all economic systems into six great sources: external nature, the quantity and quality of the population, the quantity and quality of capital goods, techniques of production, the organization of labor, and demand.



continue their exertions as if the consequences of their actions were capitalized into their wealth, but know full well that the resulting profits and losses are delivered entirely to the agency of the commonweal.<sup>8</sup> Through the operation of these toy markets, neosocialism discovers non-arbitrary scarcity prices of capital services: the pretended buying and selling of pseudo-entrepreneurs and pseudo-capitalists operating with fictive coupons generates the necessary price information. Although no personal wealth consequences affect these ever-alert traders, they behave in the same way as if their own futures depend on the outcomes of these transactions.

The absurdity of this proposal is transparent. First, it must be deeply disappointing to real socialists since it concedes Mises's point: socialists cannot find least-cost production processes without capital markets. The scheme has nothing to do with socialism as originally conceived. As Polanyi (1951, p. 125) observes, "Modern Socialist theory, by adopting the principles of commerce, has quietly abandoned the cardinal claim of Socialism: the central direction of industrial production. . . . Oscar Lange (1938) makes no reference to planning in the proper sense." Second, such behavior is unfamiliar in human history. Imaginary creatures devote their energies to selfish capitalist simulations because of their selfless devotion to the neosocialist state. Ironically, the lack of entrepreneurs and capital prices under neosocialism is remedied by selfless pseudo-entrepreneurs and pseudo-capitalists recruited (evaluated and re-selected how?) to avoid the irrationality of socialism.<sup>9</sup>

The Mises theorem is reaffirmed again. Socialism cannot generate the necessary capital prices via simulations played out by people as we know them. How can socialists escape Mises's iron vise? They could argue that socialism would work in a world composed of a special breed of new "socialist men and women" who selflessly re-enact the despised profit-seeking exertions of entrepreneurs and capitalists, thereby generating reliable capital prices. This vision would seem to attract few revolutionaries. In any event, the Mises theorem applies to humans with all our limitations, not extra-terrestrials.

### *Supercalculator (Shadow Prices)*

Mathematicians and mathematical economists believe that they can represent the planner's problem and solution mathematically, and some also believe that they can make their representations relevant for real-world action. While the former has a modest element of truth, the latter is false. The idea turns out to be a blind alley, perhaps confirming for some observers the limitations of the mathematical approach

<sup>8</sup>Silly schemes for "market socialism" abound. Roemer (Bardhan and Roemer 1993, p. 89) for example does not define socialism in terms of "public ownership" but "as a system in which there are *institutional guarantees that aggregate profits are distributed more or less equally in the population*" (italics are his). First, Roemer's pseudo-entrepreneurs, pseudo-managers, and pseudo-capitalists would fail to undertake all their exertions if capital income is ultimately divided "more or less equally" anyway. Second, socializing the returns to assets but not asset "ownership" is a distinction virtually without a difference. This means that Roemer (p. 106) is egregiously wrong to assert that he is merely proposing "an economic mechanism that differs quite modestly from the successful capitalist market economies."

<sup>9</sup>Experimental economists are well aware of the difference in human behavior between games with monetary payoffs and without monetary payoffs. Also, Cowen (1994) points out that simulated competition does not remain "simulated" for long.

to acting man.<sup>10</sup> Ultimately, the mathematical programming approach leads away from real-world economics into theology.

The mathematical approach rests on the claim that economic problems are problems of maxima and minima. Economics, then, is thought to be a playground for mathematics, though the technique never achieved the results that it did in mechanics.<sup>11</sup> As Mises (1963, p. 350) points out "The better method would prove its preeminence by bringing about better results." A major reason for the scientific failure of mathematics to improve our understanding of socialism has been its drive for both "simplicity" and "greater generality" (Debreu 1991, p. 4). Extending the number of goods and techniques from two or three with short processes, and with all the possibilities omnisciently known as might be approximated by an intrafirm transfer pricing problem, to  $10^{100}$  lengthy, roundabout processes and mostly unknown interconnections, is deftly handled by a mere change in notation. Yet it is not merely a change in degree indicated by a change in notation but a change in order of magnitude so enormous that the problem is virtually different in kind. To believe otherwise is to succumb to the simplicity deceit of mathematics. As Polanyi (1951, p. 126) put it, can a cat swim? Yes. Can a cat swim across the Atlantic Ocean? No, it is strictly impossible.

It is possible, of course, to describe the imaginary state of general equilibrium (the evenly rotating economy) or an optimum in terms of differential equations and visualize it in curves. But these are imaginary limiting conditions that say nothing about concrete choice, action, process, and reality. They are a "merely auxiliary construction of theoretical analysis which does not play a role in real action" (Mises 1963, p. 378). Equations and inequalities are only "useful in describing the timeless, static, never-never land of 'general equilibrium'" (Rothbard 1973, p. 47). The real world has properties like sooner and later, cause and effect, and irreversibility of events ("path dependence") among its vital constituents. Functional correspondence is a poor substitute for these logical categories, literally abandoned by the mathematical approach.

What does mathematical activity analysis propose? It sets up the problem with three ingredients: a preference or valuation function over all goods ready for consumption, a complete inventory of available resources (presumably including all consumption goods relevant for production processes—"Leontief constraints"), and all production coefficients (the allegedly unique maximum output level associated with each conceivable production process). Granted, given enough mathematical assumptions about tractability (convexity, etc.) and data, this setup allows the socialist planner to know the impact of all (billions upon billions) conceivable factor assignments on lower order outputs and to choose a preferred combination on this hyperplane or frontier.

<sup>10</sup>Ronald Coase (1985, p. 185) puts it more lightly: "In my youth it was said what was too silly to be said may be sung. In modern economics it may be put into mathematics." In a more heavy-handed version, Plato said, "I have hardly ever known a mathematician capable of reasoning."

<sup>11</sup>As Leonardo da Vinci (1452–1519) remarked, "Mechanics is the paradise of the mathematical sciences because by means of it one comes to the fruits of mathematics."

In terms of real application, a practical person might dismiss the entire approach as naive or absurd. A more sympathetic observer might reply that some mathematical economists have gained realistic insights into the price system from this setup. Hicks, for example, says

the new [mathematical] methods are a great advance upon the old in the understanding which they convey of the *raison d'être* of the price mechanism. The rather inappropriate mathematical methods, which have been employed (at all levels of mathematization) by the school of Cournot and Walras—and of Marshall—did in this respect rather let us down. For they caused it to appear that the price system is just one way of organizing an economy efficiently; that it is, in a sense, exterior to the economic problem, something that is brought in from outside. . . . It has been made apparent, not only that a price system is inherent in the problem of maximizing production from given resources but also that something like a price system is inherent in any problem of maximization against restraints. The imputation of prices (or “scarcities”) to the factors of production is nothing else but a measurement of the *intensities* of the restraints—such intensities are always implicit—the special property of a competitive system is that it brings them out and makes them visible. It is through its power of developing the intensities (in the photographic sense of developing), so that they are available for use as instruments in the *process* [*italics mine*] of maximization, that the competitive system does its job. (1966, pp. 110–11)

Hicks might have added that the “intensities of the restraints” or shadow prices (“imputed value”) for all inputs cannot be calculated in practice by a socialist planner for a complex system with vast and lengthy production interrelations. Instead, he erroneously remarks, “One is driven to the conclusion that Linear Programming and the price mechanism are rather close substitutes—both in the things they can do and in those they cannot” (Hicks 1966, p. 99). As Pareto wisely observed in a related context, the purpose of mathematical economics cannot be “to arrive at numerical calculation of prices” because it would be “absurd” to assume that we could ascertain the data (Hayek 1989, p. 5). Of course, even if we had the data, Mises has demonstrated that there is no way for a human being to figure out the scarcity values of the means of production in a complex system.

Despite his mathematical sophistication, Hicks was merely rediscovering Menger’s fundamental insight about derived or imputed value from a century earlier:

The value of goods of higher order is therefore, in the final analysis, nothing but a special form of the importance we attribute to our lives and well-being. . . . But due to the causal connections between goods, the value of goods of higher order is not measured directly by the expected importance of the final satisfaction, but rather by the expected value of the corresponding goods of lower order. (Menger 1976, p. 152)

Only a market system can achieve this coherent set of value interconnections among goods. As the late political scientist Aaron Wildavsky shrewdly noted (quoted in Roberts 1990, p. xv): “The effort of central planners to determine hierarchies of importance is hopeless.”

Programming as a guide to efficient choice can only work for small, closed problems with small numbers and short, simple production processes (e.g., diet or

transportation choices). But this conclusion about the successful scope for programming is entirely consistent with Mises's contention that an isolated household can solve such simple problems tolerably well without market prices for capital goods. Therefore, the modest successes of mathematical programming are not contrary to Mises's impossibility theorem. In addition, the existence of a solution or equilibrium condition (optimum) to a vast problem, even if obtained, would tell the dictator nothing about the most appropriate action (cost-minimization) in new circumstances. That is, an equilibrium assignment tells the director nothing about what to actually do next.

To clarify further, Mises asks whether any mortal, equipped with the capacities of the human mind, would be up to mastering the following problem:

1. The socialist planner has all the technological knowledge of the age at his disposal in the form of a crowd of experts and voluminous reports piled up in his office.
2. He also has a complete inventory of all the material means of production, down to exact locations, and the amounts of usable labor available from another crowd of experts and reports stacked up in his office.
3. He wishes to maximize his own satisfaction, which depends on outputs.

The planner must decide what orders to execute to achieve the highest satisfaction. As Mises states,

He must choose among an infinite variety of projects in such a way that no want which he himself considers more urgent remains unsatisfied because the factors of production required for its satisfaction are employed for the satisfaction of wants which he considers less urgent. (1963, p. 696)

Could a mere mortal, unaided by market prices for capital goods, solve this calculation problem? Mises answers "No." The socialist planner cannot know what specific actions will accomplish his ends efficiently. There is no known substitute for the system of money prices, the product of a kind of intellectual division of labor all over the globe, in order to achieve an acceptable degree of economy of means, whether the alternative has been proposed by socialists, Communists, mathematical economists, or Roman Catholic Bishops. This is especially true since Mises (1981, p. 121) rejects treatment of the choice problem as a conventional, static (timeless) optimization problem:

To use a popular but not altogether satisfactory terminology, we can say that the problem of economic calculation is of economic dynamics: it is no problem of statics. . . . the problem arises in an economy which is perpetually subject to change, an economy which every day is confronted with new problems which have to be solved.<sup>12</sup>

The debate over socialism ultimately raises the question of what economists might mean by costless or "perfect" information, knowledge and calculation. Do they mean that everybody knows and understands everything, past, present, and future? In the limit, omniscience on the part of a mere mortal would mean a complete

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<sup>12</sup>See note 7 above for sources of perpetual change.

and universal understanding, a quality theologians might attribute to a Supreme Being but not to humans. Omniscience, as Mises points out, implies that all future events already are unalterably determined. Otherwise, future happenings could not be known with certainty. This creates a logical conflict with a postulate of either individual choice or omnipotence. If the course of events is predetermined, choice by the socialist authority or anyone else is rendered fanciful. Everyone will act in a predetermined way. In this case, the economic problem again has been furtively defined away by a supercomputer device.<sup>13</sup>

Mises's theorem must be accepted for the earthly society in which we live. A vast and complex society with an infinite number of lengthy and roundabout production processes must rely on a real price system for a tolerable degree of economy. And all systems do, in fact, despite extensive political interference with the price system by governments around the world. There is no such thing as a socialist economy, in fact, although it has been seriously tried twice—Soviet war communism 1918–1921 and Cambodia 1975–1979—and in both cases produced chaos and death quickly, lending empirical confirmation to Mises's theorem (Reynolds 1995, pp. 355–59). When there are no private-property rights in labor, and hence no real markets, colossal waste results in terms of the rulers' own aims (Anderson and Tollison 1985).

### CONCLUSION

Rational action requires that a decisionmaker's goal be worth more than its costs. The expected result must have a value ranked higher than the costs. Socialism is ruinous because it cannot calculate costs and therefore cannot act rationally with respect to goals. It cannot even choose the least-cost method to accomplish a given goal.

Those opposed to private property, prices, and commerce have to posit an alternative for the sake of economy. They crave planning, socialism, communism, market socialism, and such visions. Unfortunately for them, their wishes will forever be dashed on the rocks of reality. As Wildavsky (Roberts 1990, p. xv) said, an economic system performs tasks "for which central cognition is inappropriate." In such a complicated world, altered daily, there is no alternative to real capital markets. Logic and experience in Russia in 1918–21 and Cambodia 1975–79 demonstrate that economizing is impossible without real prices for capital goods. The socialist planner or director cannot solve the problem of how to assign capital goods to those employments in which they render the best service, even if only the planner's or director's preferences matter. Mises reached the correct, if neglected, conclusion long ago (1981, p. 113): "Where there is no market there is no price system, and where there is no price system there can be no calculation." Mass destruction must ensue.

Economists are well aware of the inefficiencies of the so-called socialist economies observed in the twentieth century. But these nation-states, in fact, operated decentralized systems, used prices and exchange, and relied on market prices to guide decisions. These socialist governments were not a true test of Mises's impossibility theorem.

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<sup>13</sup>Might a cynic suggest an odd parallel between mathematical proofs for the existence of efficient socialism and those for the existence of God?

Instead, they were (and are) interventionist systems like those in the West, only more so.<sup>14</sup>

We can infer from the impossibility of economic calculation under universal socialism that each weakening of private ownership in the means of production (plant closure laws, industrial policy, etc.) moves society further from efficiency and toward poverty and starvation. The irrationality of political assignments displaces economic calculation and value maximization. I cannot offer a general proof here, but note that serious economists continue to call for more central political planning (1977 Nobel Prize winner James Edward Meade 1995) or fixate on various brands of "market socialism" (Archibald 1992; Arnold 1994; Roemer 1994). As Mises (1981, p. 102) warned, "Every step that leads away from private ownership of the means of production and the use of money is a step away from rational economic activity."

Tolerably efficient coordination of human effort is impossible without trade in productive assets (capital markets). There is no demonstrated, superior alternative to Wall Street and the price system. Though most intellectuals recoil from the idea, a logical corollary is that each step away from capitalism is a descent into barbarism, degradation, and irrationality. Experiments in unalloyed socialism have quickly ended in failure. The bones of millions of Cambodians suggest why living human beings will never reach socialism.

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<sup>14</sup>As Polanyi (1951, p. 130) says, "An essential part of that [Russian] policy was to make the world forget the original aim of Socialism and its abysmal failure at its first trial, while trying to dress up as a planned economy a productive system operating through the market."

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**APPENDIX A: SOCIALIST CALCULATION EXAMPLE**

Consider three methods of producing the same output,  $Q_0$ .

	Required Inputs to Produce $Q_0$ .	
Method	K	L
A	2	10
B	4	6
C	8	3

Time Period	Prices per Unit Input	
$t_0$	$P_K=\$4$	$P_L=\$1$
$t_1$	$P_K=\$3$	$P_L=\$2$

How can we economize on resource consumption throughout the system and yet accomplish a given task?

**UNDER CAPITALISM:** Market (scarcity) prices give reasonably accurate indicators of the social opportunity costs of inputs in terms of consumption value sacrificed elsewhere.

To minimize total cost,  $TC=p_KK+p_LL$

@ $t_0$	Method A:	$\$4 \times 2 + \$1 \times 10 = \$18$
	Method B:	$\$4 \times 4 + \$1 \times 6 = \$22$
	Method C:	$\$4 \times 8 + \$1 \times 3 = \$35$

A is minimum cost @  $t_0$ , that is, the least expensive method to produce  $Q_0$ , and therefore A reduces value elsewhere by the least amount.

@ $t_1$	Method A:	$\$3 \times 2 + \$2 \times 10 = \$26$
	Method B:	$\$3 \times 4 + \$2 \times 6 = \$24$
	Method C:	$\$3 \times 8 + \$2 \times 3 = \$30$

Under the new scarcity prices, method B, which is more capital intensive and less labor intensive than method A, minimizes cost.

**UNDER SOCIALISM:** The planner does not know the market prices of capital goods and services, so the simple calculations of least-cost methods available under capitalism are not available. He can choose A, B, or C based on "intuition" rather than calculation at the time  $t_0$ ,  $t_1$ , or  $t_n$ , but it is a "leap in the dark." What substitute measures could be used to guide economical decision making, especially under continually changing conditions in a vast, complicated system with millions of methods, input interrelations and interdependencies with lower order goods? The central planner is blind without reliable "shadow prices" for the opportunity costs of millions of units of capital.