

Between Institutionalism and Formalism:  
The Rise and Fall of the Austrian School's  
Calculation Argument: 1920-1950\*

by

Don Lavoie

George Mason University

1986 - 21

\*I would like to thank the participants to a Liberty Fund Conference on "The Problems of Economic Calculation Under Socialism," January 25-27, 1986 for helpful comments on an earlier draft of this paper.

Before 1920 the dominant approach in the economic theory of socialism tended to adopt an institutionalist view that denied the applicability of economic categories derived from the study of capitalism to the new socialist future. Thus any systematic analysis of how socialist institutions would work was deemed utopian. After 1950 the dominant approach in the economic theory of socialism tended to adopt a formalist view that moved the whole discussion of theory away from any attempt to provide a realistic understanding of the workings of institutions and into the higher reaches of abstract theorizing. Between these years three of the Austrian school's leading figures at the time, Mises, Hayek, and Robbins, formulated a complex argument in comparative institutional analysis and then saw this argument almost completely misunderstood and rejected by the economics profession. Properly understood, the Austrian argument raises a powerful, and as yet unanswered, challenge to both the Marxian variety of socialism that preceded the challenge as well as the market-socialist varieties that succeeded it. For some reason the argument didn't stick and a mistaken "standard" account of the controversy has become entrenched in the literature.<sup>1</sup>

The real issue at stake in this debate, although the participants were unaware of it, is a methodological one. It is a question about what economists should do and about how economic theory should be developed. Whereas institutionalism can be described as an attempt to do history without theory, formalism can be described as making the opposite methodological error by trying to do theory without history. An institutionalist in this sense is someone who

<sup>1</sup> I have elaborated on the details of this debate in an article that provides a critique of the standard account (1981) and in a book, Rivalry and Central Planning, that provides a statement of an alternative account (1985a) from which several passages of the present essay have been borrowed. I have also attempted a restatement of this argument against planning and applied it to modern proponents of planning in my National Economic Planning: What is Left? (1985b).

underestimates the generality and explanatory power of economic theory. A formalist, on the other hand, is someone who so overestimates the applicability of his abstract theoretical models that he mistakes the models for the world. (As it turns out, Mises was falsely accused of institutionalism while the other two Austrians, Hayek and Robbins, were misinterpreted as having made a formalistic argument.) Even though institutionalism and formalism appear, from the Austrian perspective, to be polar extremes which economists ought to avoid, the dangers they represent are remarkably similar. Each polar extreme can be said to lead to the relativistic conclusion that "economic theory" can properly say nothing about the great issue of socialism versus capitalism which must depend instead on ethical, political, or sociological arguments. They both, in other words, neutralize the economist's ability to compare economic systems. Institutionalism does so by denying what is common to all economic systems: the basic problem of how to allocate scarce resources through time as rationally as possible. Nothing can be said about the socialist economy that is derived from studying the workings of capitalism. Formalism, on the other hand, does so by denying what is different about economic systems: the manner in which their institutions address the problem of allocating scarce resources. The Austrians, then, by avoiding these twin hazards, were in fact articulating a genuine theoretical contribution to comparative systems.

The way the standard account has distorted the meaning of the Austrians' challenge can be illustrated by the title of a recent survey article on the calculation debate by M. H. Dore and M. C. Kaser: "The Millions of Equations Debate: Seventy Years After Barone." The article's purpose is "to establish continuity from Barone to contemporary mainstream economics" (1984, p. 30) within which is included the Austrians. What it succeeds in doing is showing the commonality between Barone's Walrasian argument of 1908 and the post-1950

Neoclassical research on market-socialist mechanisms for resource allocation. It fails to establish that the "calculation argument" of Mises, Hayek, and Robbins is a part of this tradition. The standard view has assumed that the calculation argument is really the same thing as the "Millions of Equations" argument, and that modern work on market-socialist models constitutes a more rigorous elaboration of "the central issues raised by Hayek, von Mises, and Robbins" (p. 130). In fact, I will argue the Austrians' calculation argument was something else altogether and was never understood or answered.

Of course this raises the question: If the Austrians were right all along, why have so many readers thought otherwise? What, exactly, went wrong? Part of the answer to this question lies in the timing of the specific contributions to the debate. Elsewhere I have discussed these contributions in logical rather than in strictly chronological order. But the particular sequence in which the key contributions to the debate became available in English and the specific timing of the various responses and rejoinders may have had a profound impact on the perceived outcome of the debate. The Austrians may, with hindsight, be charged with some bad timing in both their presentation of the challenge and their rejoinders to the market-socialists.

Another part of the reason the Austrians are thought to have lost besides their bad timing has to be traced to their failure to recognize the dangers of formalism. It is the formalist trend of economics in general, and not any particular events within the calculation debate itself, that explains the Austrians' "defeat."

The Austrian school constitutes a particular interpretation of the Subjectivist/Marginalist revolution which considers the graphs and mathematics of Neoclassicism to be nothing more than heuristic devices potentially useful for explanations of the subject matter of economics. Formalism taken to the

extreme tends to mistake these devices for the subject matter. When Austrians talk about demand for a factor going up there is, as it were, running through the backs of their minds, a picture of real businesspersons deciding how to employ real capital equipment in qualitatively different combinations. When an extreme formalist talks about demand for a factor going up it may well be the case that all that goes through his mind is a curve shifting up or a function changing one of its independent variables. Today whole generations of economists have been trained in formal skills of this sort and receive Ph.Ds in economics without the slightest idea of how the business world works. But in the 1930s the Austrians had no idea that the heuristic devices of their fellow Neoclassicists would come to so cripple their capacity to think like economists. The rise of formalism caught them almost completely by surprise.

Unaware of the formalistic trend of Neoclassicism, the Austrians allowed their own calculation argument, which I prefer to call the knowledge problem, to be confused with Barone's "millions of equations" argument, which I like to call the "computation problem." As the words calculation and computation suggest these two problems were deceptively similar, just as the Mengerian and Walrasian traditions of thought from which they stem appeared similar. The further development of these intellectual traditions has made it clear that they represent profoundly divergent ways of understanding how capitalistic market economies work, and hence were bound to implicitly hold drastically different standards for the appraisal of socialist theories. By the methodological standards of Walrasian formalism most of what the Austrians wanted to say lies outside the domain of economics, while by the Austrians' standards most of what the Walrasian market-socialists wanted to say was irrelevant to the economics of socialism.

Issuing the Challenge: 1920-1936

The "calculation argument" is a theoretical challenge to the practicability of socialism which was formulated, and so named, by Ludwig Mises in his 1920 essay "Die Wirtschaftsrechnung im sozialistischen Gemeinwesen" and his 1922 book Die Gemeinwirtschaft, works which were only translated into English in the mid 1930s. The problem it raises for the economics of socialism can be described briefly as the inability of any system of common ownership of the means of production to generate and disseminate the scattered and largely tacit knowledge, including knowledge of the relative scarcities of various consumers and producers goods, upon which advanced technological production depends. The argument claims that separate owners actively contending with one another for money profits are able to (undeliberately) impart knowledge to the system of relative prices, and in turn to orient their own actions by reference to their "economic calculations" in terms of these prices, in such a way as to enable the millions of independent decision makers to coordinate their actions with one another. Without these prices to serve as "aids to the mind," as Mises called them, the planner would not know how to organize his or her commonly owned means of production with anything close to the degree of efficiency attained spontaneously by the rivalrous workings of the market process. Thus Mises's argument is that there is a practical problem involving the use of knowledge facing any society which attempts to deliberately (and thus non-rivalrously) plan its economic order. Hayek's later restatements of this argument (1935b; 1935c; 1940) were not different in any significant respect but only make increasingly clear the importance of the nature and uses of knowledge to the whole critique of socialism.

Now if proponents of socialism take seriously Mises's argument that the complexity of the planner's task exceeds the capacity of any single mind or

organization, the natural response would seem to be to greatly simplify this complex task. Instead of trying to plan the whole economy down to its every detail, as many Marxians had ambitiously proposed, a more modest planning policy might be to just plan major sectors or aggregate categories or particular aspects of the economy. Many proponents and critics of socialism in the 1920s and 1930s assumed that the Central Planning Board would actually keep track of all the intimate details of the individual organization of each factory. Such a view of comprehensive planning is implicit in the Marxian theory of socialism but today it seems so far from the real experience of Soviet-type economies that it sounds almost like a strawman.

The attempts, however, to withdraw from comprehensive planning to more moderate forms of partial planning are illusory. The appraisal of the efficacy of an economic plan can only be made in the context of a specific choice between real alternatives whose opportunity costs can be ascertained. The choices that together impart rationality to economic processes are only meaningful in certain specific contexts. It is not possible arbitrarily to separate out choices about prices from all the other aspects of choices, allocating decisions about price changes alone to the planning board. Neither is it possible for the central planners to decide on overall aggregates while leaving the details to be worked out by decentralized decision makers. In both cases an artificial division of decision making is being proposed in which the partial decision that the planners are supposed to make is in fact a meaningless one. The planning board cannot intelligently decide on the price to charge for, say, a new computer program without detailed knowledge of the qualitative characteristics of this good and the costs of its production. For exactly the same reason the planning board cannot decide on the total "quantity" of all computer programs needed by society without first having detailed knowledge of all the specific programs

that make up this aggregate. To pretend to plan the price alone or the aggregate alone and leave the rest to others is to retreat from rational planning as the society's organizing mechanism to arbitrary intervention into a market-organized system. Thus the whole rationale of planning is undermined unless it can be shown how the planners' task could possibly be parcelled out or delegated to subordinates without also relinquishing the meaningfulness of the decisions being made. 

How, then, is the "intellectual division of labour," as Mises ([1920] 1935, p. 102) put it, accomplished under capitalism? Here each rival is able to focus his mental capacity on but a part of a complex network of economic relationships whose overall structure no market participant knows. Yet by allowing its participants to adjust their activities to one another through prices, the overall system exhibits an unintended order that makes advanced technological production possible.

The practice of accounting, that is, of the calculation of profit/loss accounts in terms of money outlays and receipts, both ex ante and ex post, has enabled human beings to orient their productive activities to one another in such a manner as to permit social production as a whole to be carried on with a high degree of complexity. The calculation argument contends that in fact this complexity has, in the case of the advanced industrial nations of the Western world, come to far exceed that which could possibly be consciously planned by any single mind or agency. By taking account of one another's decentralized plans indirectly, as mediated through relative price signals which are continuously registering the competitive tugs and pulls of market participants, we are able to attain a complexity that is unattainable in any non-competitive and centralized way. Thus the (Marxian) socialist ideal of abolishing the

"anarchy" of capitalist production to be replaced by central planning is impossible.

The crucial issue for the Austrians was not primarily how the relative demands for consumers' goods was to be registered without competition, but rather how these consumer good evaluations, however determined, could be imputed through the complex network of relationships the Austrians call the capital structure. The defining characteristic of socialism throughout the period of the calculation debate was its ambition of abolishing private ownership of the means of production. Whether we assume the state arbitrarily decides what everyone needs for consumer goods, as Maurice Dobb was to suggest during the debate, or a free market in consumers' goods was to prevail, as advocated by the market-socialists, the real problem lies in translating these consumer evaluations into evaluations of producer goods.

If the means of production are commonly owned then plant managers cannot openly bid against one another for factors in the kind of competitive discovery process that imparts information to producers' goods prices in a capitalistic market economy. They cannot "play at competition" without putting their own wealth commitments at stake. It is precisely through rivalrous contention by separate and independent owners that market participants are able to impart information to the prices of factors of production, prices that in turn allow them to intelligently appraise alternative avenues of production. Producers' good prices are not "derived" logically from consumers' goods prices, they are "imputed" through a historical process of competition.

The challenge to socialism which Mises articulated in 1920 was, on this reading, an argument about the ongoing practical difficulties encountered in Austria's and Germany's experiences with "war socialism" and the Soviet Union's experiences with "war communism." That is, it was not a "purely theoretical"

argument in the sense of some sort of abstract theoretical demonstration that is taken to be distinct from issues concerning the practicability of real world economic policies. On the other hand the challenge was not a contribution to economic history. Mises was trying to formulate a general, that is to say a theoretical explanation of the gross inefficiency encountered in several real world attempts to replace the market process with deliberate national economic planning. The argument is both about how alternative institutions would work in the real world, and also about how the economists' theory of choice can be seen as posing a general problem for any socialist organization of production. It is thus a species of economics standing between the institutionalism of many Marxian socialists and the formalism of many Neoclassical market-socialists: it is both a theoretical argument in the sense that it claims generality for itself, and an argument of practical significance for real world problems.

What made possible these serious misinterpretations of the calculation argument as either institutionalist or formalist was that the Austrian and Walrasian strands of Neoclassicism were still trying to coexist as one school when in fact, as would eventually be revealed, they were incompatible. As in any failure of communication, blame will have to be shared between the writers and their readers. The virtually simultaneous invention of marginal utility theory by Walras, Jevons, and Menger and its successful triumph over classical objective value theories had inclined the Austrian followers of Menger to think of themselves as differing only in style of exposition with mainstream Neoclassical economics. It was a piece of conventional wisdom what Walras did with equations, Jevons and Marshall did with curves and Menger did with words. In fact, as the more complete development of the Walrasian and Mengerian research programs is making increasingly clear, these are not variations on one idea but fundamentally divergent perspectives on the whole nature of economics.

It was a piece of conventional wisdom what Walras did with equations, Jevons and Marshall did with curves and Menger did with words. In fact, as the more complete development of the Walrasian and Mengerian research programs is making increasingly clear, these are not variations on one idea but fundamentally divergent perspectives on the whole nature of economics. The issue of the practicability of socialism was, it turned out, ideally suited to force the Austrians to rebel against the formalism of Walrasianism without, however, retreating to the anti-theoretical extreme of institutionalism. It is only a result of the calculation debate that the Austrians began to realize they were a distinct school of thought.

Many contemporary Austrians see themselves as radically opposed to what they see as the impoverishment of contemporary economics under the influence of the formalism of mainstream Neoclassicism. The Austrian school today stands to a large extent outside of the mainstream of the economics profession, urging basic changes to the whole way we think about economics. There has, in short, been a profound shift of the Austrians' self-description since the debate from that of a leading branch of Neoclassicism to that of a leading opponent. Therefore it seems appropriate to consider how the earlier, and in retrospect faulty, Austrian identification with Neoclassicism may have affected their readers' ability to appreciate their argument. By employing the computation argument alongside their own calculation argument, the Austrians left the Neoclassical market-socialists free to focus only on that argument which they were more likely to understand, and to almost completely ignore the distinctively Austrian challenge.<sup>2</sup>

---

<sup>2</sup> Moreover the shift of the whole debate into economic statics which was entailed in this neglect of the Austrian challenge gave Marxists a convenient excuse (if they needed another one) to ignore the controversy as irrelevant to their dynamic conception of economic processes.

Unlike the computation argument, which is formal and devoid of references to institutions, the issue stressed by Robbins and Hayek, and the only issue ever raised by Mises, was concerned with comparing the real institutional specifics of alternative forms of economic organization. The kind of property rights system prevailing, in terms not of official legal titles but of de facto control over resources, was the central focus of the calculation argument, but is a matter of indifference for the computation argument.

The first clear statement of the computation argument is the 1908 article "Il ministro della produzione nello stato collettivista" by the Walrasian economist Enrico Barone. A student of Pareto (who briefly argued along the same lines) Barone was not primarily concerned with arguing for or against socialism but only wanted to clarify the nature of the problem facing the planning board. He did, however, briefly employ the computation argument at the end of his article. He argued that planning on the basis of Walrasian equations is unworkable mainly because of "the difficulties -- or more frankly, the impossibility -- of solving such equations a priori ... For the solution of the problem it is not enough that the Ministry of Production has arrived at tracing out for itself the system of equations of the equilibrium best adapted for obtaining the collective maximum in the well-known sense ... It is necessary to solve the equations afterwards. And that is the problem" ([1908] 1935, pp. 286-7). Or rather that is one problem.

This computation argument differs from Mises's original challenge in that it poses the problem as one of finding solutions, whether by algebra or trial and error, to a set of general equilibrium equations.<sup>3</sup> It is assumed that in a

<sup>3</sup> When Lange answered Mises and Hayek in 1936 by denying that the central planning board would have to literally 'solve' equations algebraically, he was obscuring the fact that, as we will see, he did indeed pose the problem as finding solutions to such equations by "trial and error." See Lange ([1936], 1964, pp. 88-9): "Exactly the same kind and number of 'equations,' no less and no more, have to be 'solved' in a socialist as in a capitalist economy, and

capitalistic economy producers "know" their production functions and consumers their utility functions and that the market serves the function of computing the solutions to this Walrasian problem. The difficulty for the socialist planners is here depicted as a problem in mathematical economics, as an algebraically complicated puzzle of finding the solutions to equations that the market "solves" spontaneously. The problem appears to be a technical one of computing the answer to a fully formulated mathematical problem. A whole literature has grown up in response to this problem in mathematical economics.

The main outlines of the modern market-socialist point of view developed only gradually from 1908 to 1933 when, starting with Dickinson's 1933 Economic Journal paper, "Price Formation in a Socialist Community," an interest in market-socialism rapidly spread throughout the English-speaking economics community. Although exactly what their solution was had not yet been made clear, they were already comfortable with a Walrasian formulation of the problem to be solved well before an English language formulation of the Austrians' calculation problem was available. Barone in 1908 had briefly hinted at the idea of adjusting supply and demand by "trial and error," evidently borrowing from Walras's abstract theoretical notion of an auctioneer who calls out tentative prices until an equilibrium is reached. This same idea of trial and error had also been put forward by Fred M. Taylor in his 1928 presidential address to the American Economic Association ([1929] 1964). A variation of it is contained in H. D. Dickinson's 1933 paper which talks of "a process of successive approximation" (1933, p. 241). Dickinson went so far as to explicitly assert that "It would be possible to deal with the problems mathematically" (p. 242). In all of these cases the problem for the socialist

---

exactly the same persons, the consumers and managers of production plants have to 'solve' them."

planner is posed as the difficulty of finding the set of general equilibrium prices under the assumption that all the other relevant knowledge is given.

From 1933 on there were increasing stirrings among advocates of socialism about incorporating some "market" features into the theory of socialism. Neoclassical and Marxian views clashed in 1933 in the Economic Journal when Dickinson's market-socialism was condemned by the leading Marxian participant to the debate, Maurice Dobb, and again in 1934 and 1935 when Abba Lerner and Dobb confronted one another in the pages of the Review of Economic Studies. Lerner's October 1934 article "Economic Theory and Socialist Economy" was particularly important in that it explicitly described Mises's argument, which was still unavailable in English, as a specious comparison between real world socialism and an ideal image of perfect competition. Mises, he explained, "assumes the pricing system transformed unaltered from a perfectly competitive economy." Naturally when compared with "a 'perfect' price mechanism" socialism is bound to look bad.

Lerner opened his article by placing his own market-socialist position in between the two "dogmatic" extremes: the Bolsheviks' Marxism and Mises's radical laissez-faire liberalism. Unlike these extremists, enlightened  Neoclassical economists recognize that neither unregulated markets nor completely centralized planning works perfectly and that some judicious mixture of planning with markets provides the best policy. Economics cannot pronounce judgment, apart from the particular circumstances of each case, on whether markets are preferable to planning or not. This middle-of-the road position had an attractive ring to it -- remember this was during the Great Depression which was being blamed on the capitalist system, while Stalinist repression was in full swing in the leading socialist country -- and Lerner's interpretation of Mises went unchallenged in the Review of Economic Studies.

Apparently few noticed when Mises's article was made available in English the next year that its case for the use of money prices was far from the specious comparison with "perfect competition" attributed to his argument by Lerner. For example Mises ([1920] 1935, p. 109) explicitly argued that economic calculation is not perfect but only serviceable in its guiding function. He wrote:

"Admittedly monetary calculation has its inconveniences and serious defects, but we have certainly nothing better to put in its place, and for the practical purposes of life monetary calculation as it exists under a sound monetary system always suffices."

I am not, of course, denying that in some sense Mises's policy position was extreme. But Lerner's happy-medium position is not inherently any more rational or scientific than either Mises's extreme pro-market view or Marx's extreme anti-market view. To advocate planning and markets together is to stand for a definite kind of economic system, a system Mises called interventionism. This system always leaves to government the power to interfere in the otherwise voluntary relationships of a competitive market, and the responsibility to use this power wherever their best discretion tells them. Such a system is certainly widely believed in and practiced, but the case for it over either "extreme" cannot be decided by asserting that anyone who favors the pure market or the pure market-less socialism over interventionism must naively believe his pure system to be perfect.

Maurice Dobb in his 1935 response to Lerner did nothing to raise any doubts about Lerner's interpretation of Mises. Dobb agreed completely with the standard account that Mises was making a static equilibrium argument and that on this level he was effectively answered by the market-socialists (1955, p.74). But Dobb had already begun to rebel against the emerging formalism of the market-socialist position in 1933 in reaction to Dickinson's "barren feat of

abstraction." Economics, he insisted, should be seen as more than "a formal technique ... a system of functional equations, a branch of applied mathematics" (1933, p. 589). Similarly Lerner's 1934 article came under attack by Dobb for the same vice of an overly formalistic mode of expression:

Naturally, if matters are formulated in a sufficiently formal way, the 'similarities' between one economic system and another will be paramount and the contrasting 'differences' will disappear. It is the fashion in economic theory today for propositions to be cast in such a formal mould, and so devoid of realistic content, that essential differences ... disappear ... The distinctive qualities of the laws of a socialist economy and of a capitalist economy ... are not, of course, given in the rules of algebra, but in assumptions depending on differences existing in the real world (1935a, pp. 144-5).

This emerging "fashion" in economic theory to reduce economic theory to problems of algebra, though noticed by both the Austrians and the leading Marxian participant to the debate, was to so profoundly transform the nature of economics as to catch the Austrians and Marxians quite by surprise.

These early quarrels among socialists in English language journals were important in that they were finally beginning to bring serious scholarly attention to the economic problems of socialist planning. The fundamental issue, however, of how the planning bureau would actually conduct itself and how it would know what it was doing, had not yet been addressed satisfactorily. What these skirmishes needed to be transformed into a thoroughgoing debate was a well articulated and forthright challenge from the critics of socialism upon which the defenders could then focus in their attempts to construct workable procedures for planning.

Just such a clear challenge in English was finally provided by Lionel Robbins' Ludwig Mises, and F. A. Hayek, in three books in three successive years: America's Great Depression (1934), Collectivist Economic Planning (1935), and Socialism (1936). Together these works constituted an undeniably

powerful theoretical formulation of the calculation argument. A chapter of Robbins's book on the depression (1934) summarized Mises's 1920 essay which itself appeared the next year in the collection of essays edited by Hayek (1935a) along with formulations of similar criticisms of socialism by Georg Halm (1935), Nikolaas Pierson ([1902] 1935), and Hayek himself (1935b; 1935c).<sup>4</sup>

Hayek's contributions in particular made clear that for the Austrians the important problem was whether the necessary knowledge can be considered "given" even to the decentralized decision makers (1935c, p. 154-5). Such knowledge exists only in tacit form, in "a technique of thought" and not in a form that could be communicated to a planning board. Both Robbins and Hayek criticized the excessively static form in which the early market-socialist models were cast and their failure to properly specify the kind of property rights they were assuming would prevail. When J. Kahane's English translation of Mises's Socialism ([1922] 1936) was published the Austrians can be said to have reached the peak of their influence in the field of comparative systems. Here was a comprehensive challenge to socialism, taking up sociological, political, and legal issues in combination with economic ones. Particularly important in clarifying the Austrians' position were the chapters on private property about which the [1920] 1935 essay was less specific. There seemed to be every reason for the Austrians to hope at this stage that they were about to chase advocates of both Marxian and market socialism out of the realm of respectability in modern economics.

But such was not to be. Before the 1930s were over Oskar Lange's famous essay "On the Economic Theory of Socialism" was being acclaimed as the

<sup>4</sup> Moreover in 1935 a thoroughly revised and updated English translation was published of Boris Brutzkus's 1922 classic *Economic Planning in Soviet Russia* to which Hayek contributed an introduction. Thus not only was the Austrians' theoretical argument available, but also its applicability to the historical experience of the Soviet Union was now much clearer.

definitive refutation of the calculation argument while both Austrian and Marxian perspectives were being increasingly ignored. Market-socialism had somehow managed to win for itself a secure position in the comparative systems field. Even for those readers of the debate who, like me, believe Mises and Hayek were basically right all along must take seriously the question of why so many people who read Lange's classic essay are convinced by it. Looking back can we see weaknesses in that undeniably impressive salvo of arguments by the critics of socialism from 1934 to 1936 that could help to explain their impending "defeat" by the market socialists in the eyes of the profession?

It seems plausible that had the Austrians been more critical of their Walrasian cousins Lange's victory would have been less likely.<sup>5</sup> By contaminating the presentation of their nonformalistic calculation argument with the formalistic computation argument Hayek and Robbins were inviting confusion. Collectivist Economic Planning contained not only the first English translation of Mises's 1920 essay, but also the first English version, translated and included by Hayek without criticism, of Barone's 1908 article. Robbins's 1934 contribution was primarily a fair summary of Mises's 1920 calculation argument, but Robbins added his own statement of the computation argument, in a reference to solving hundreds of thousands of equations. Hayek too added his own statement of the computation argument to his restatements of Mises's argument.

Because the institutions-oriented calculation argument was introduced to the English language community alongside the simpler institution-less

---

<sup>5</sup> I would also contend that there were in some respects more similarities between Austrian and Marxian perspectives than between Austrian and Walrasian ones. Mises, Marx, and Hayek can all be seen as antiformalistic and as having had a disequilibrium understanding of capitalism whereas the market socialists had a formalistic and equilibrium-bound one. When Mises dismissed Marxism as inherently unscientific (e.g. [1922] 1936, p. 12) and allowed that Lange and Dickinson were at least "conversant with economic thought" ([1949] 1966, p. 706), he was contributing to the misunderstanding, by both Neoclassical and Marxian economists, of his whole argument.

computation argument, the formalistically inclined market socialists, who had already been trying to apply Walrasian principles to socialist organization, dismissed all the institutional, political, and legal details of the Austrians' arguments, without which the calculation argument is meaningless, as extraneous matters lying outside the proper domain of economic theory. They then went ahead and articulated responses to the issue of the strictly formalistic computation problem without realizing that they were thereby completely missing the main point of the original challenge.

#### The Triumph of Formalism: 1936-1950

The Austrians' impressive salvo of criticism of socialism from 1934 to 1936 was answered promptly by a salvo from the market socialists from 1936 to 1939. Contributions by Durbin, Lange, Lerner, and others each appeared to be responding directly to the Austrians' argument, and yet the latter were not to rejoin the debate until 1940, by which time most observers agreed the market-socialist had won.

E. F. M. Durbin's "Economic Calculus in a Planned Economy" ([1936] 1968) in the December 1936 Economic Journal responded directly to the Austrians' challenge by suggesting, as he put it, "a more practicable method of calculus than Dr. Dickinson's simultaneous equations" (1937, p. 578) which Hayek had ridiculed in 1935 as hopelessly impracticable. At first glance Durbin's article may seem to contradict my theme that the market socialists failed to distinguish the distinctively Austrian nature of the Mises/Hayek challenge. Durbin contends that Dickinson's equation-solving solution suffers from its exclusive adherence to the Walrasian as opposed to the Austrian or Marshallian branches of Neoclassicism. On a closer look, however, it is clear that Durbin viewed the three branches of Neoclassicism as different only in their styles of exposition, i.e., equations, verbal discussions of marginal utility and marginal

productivity, or supply and demand curves. The content of these theories, and in particular the assumptions made in them about knowledge, is taken to be the same. Indeed Durbin was to be chided by Lerner for overstating the differences among the three Neoclassical approaches.

The Austrians had left themselves open to this wholesale identification with the other branches of Neoclassicism by not emphasizing the basic difference in their assumptions about the use of knowledge in society. If only expositional style separates the three schools then surely Lerner was right that it doesn't matter which approach is used and Durbin's is no better than Dickinson's. Durbin's claim that a solution in terms of marginal products was more practical was, argued Lerner, beside the point. Such matters of practical implementation are outside the legitimate realm of economics as Durbin himself had pointed out:

It may be very difficult to calculate marginal products. But the technical difficulties are the same for capitalist and planned economies alike. All difficulties that are not accountancy difficulties are not susceptible to theoretical dogmatism ([1936] 1968, p. 143).

Although Durbin's average cost rules prompted a debate in the Economic Journal it was unfortunately not with the Austrians but only with Abba Lerner (1937). Despite differences over the rules that they thought should be recommended by economic theory, they agreed that "in theory" some such system of rules issued by a central planning board under common ownership of the means of production can replace the competitive market under private ownership. And they agreed to  confine economic theory strictly to the specification of optimality conditions, and not to "dogmatize" about incentives or about which kind of property institution would better approximate these conditions. In other words an increasing methodological formalism was serving to block from discussion the very issues of knowledge-dissemination under alternative property arrangements

stressed by the Austrians, and to confine the theorists' attention to the statement of the ideal. As Lerner put it, "Price must be made equal to marginal cost. This is the contribution that pure economic theory has to make to the building up of a socialist economy" (1937, p. 270).

The major prong of the market-socialists' response was undoubtedly the two part article by Oskar Lange in the Review of Economic Studies, October 1936 and February 1937. What Lange did in this article was not only provide what came to be seen as the definitive market-socialist answer to the Austrians' challenge, but more importantly provided the specific interpretation of the meaning of Mises's and Hayek's arguments which has found its way into virtually every contemporary textbook in comparative economic systems. By commandeering, as it were, the interpretation of the Austrian challenge within a year after the publication of Collectivist Economic Planning, and by thus transforming it into a form suitable for Neoclassical problem-solving techniques, Lange was able to almost completely dissipate the force of the Austrian challenge. It was Lange whose reading of Mises as denying the pure "logical credentials" of socialism was to influence Schumpeter and Bergson in this regard, and it was Lange's reading of Hayek's argument as a computation argument that was to set the stage for most of the subsequent market-socialist contributions to the debate. Lange's re-interpretations of Mises and Hayek became much more widely read than the original challenges themselves, and the profession came to believe that Mises's argument, which by this interpretation had already been refuted by Barone, was unworthy of serious attention, and that the important issue was whether there was a way in practice of finding solutions to the "millions of equations" to which Hayek (1935c, p. 156) had referred. Thus in Lange's response can be found both of the kinds of misinterpretations of the calculation argument I have been calling institutionalism and formalism. Far more important

than Lange's substantive attempts to answer the Austrians was his way of posing the problem which left no room between institutionalist and formalist perspectives.

Lange took Mises to be attacking "the universal validity of the fundamental principles of economic theory." Mises was read as contending that "the economic principles of choice between different alternatives are applicable only to a special institutional set-up, i.e., to a society which recognizes private ownership of the means of production" ([1936] 1964, p. 62). And indeed from the formalist vantage point in which Lange was standing, Mises did look like an institutionalist. All this seemingly irrelevant detail about how alternative property arrangements could work seemed, from the formalist perspective, to be a denial of what was taken to be common to the three branches of Neoclassicism: an appreciation of the formal similarity of the choice problem facing any economic decisionmaker, regardless of the institutional specifics in which such choices are made. This wallowing in historical or institutional detail was seen as a "spectacular contradiction" of the arguments of the whole Austrian school which had, after all, risen up in reaction to institutionalism in the form of German historicism.

Lange's misreading of Mises in this respect is highly significant. Other branches of Neoclassicism saw the Austrian's critique of institutionalism as a condemnation of institution-specific theorizing, but the Austrians understood themselves to be rejecting the historicists' theory-less description of institutions in favor of an application of economic theory to the explanation of the evolution and functioning of institutions. Far from trying to remove institutions from economics, the Austrians were attempting to provide a way for economics to enhance our understanding of institutions which for real institutionalists and historicists had to be taken as given. From Menger's work

on, the Austrians have been primarily concerned with explaining the evolution of institutions in terms of choice theory. Indeed for the Austrians the whole point of developing the collection of universal principles of choice theory we call economics was to help in the explication of the workings of institutions. Had this distinctive Austrian emphasis been better appreciated it is unlikely so gross a misinterpretation would have been accepted. Once again the Austrians' identification with other branches of Neoclassicism rendered them susceptible to counterarguments by the market-socialists.

The Austrians had been assuming that economics was a discipline concerned with the interpretation of the meaning of human actions as they are oriented to one another by actual social institutions. The Walrasian way of talking about human choice was taken to be nothing but a different style of presenting Mengerian insights. When Austrians discussed an entrepreneur "choosing" to buy in this market rather than that they had in the back of their minds real-world decision makers, facing genuine uncertainty under specific institutional constraints. When their fellow Neoclassical economists talked about such things no such real circumstances seemed to reside in the back of their minds. They were already only discussing a mathematical problem of maximizing utility or profit under the assumption of given knowledge. The Austrians were late to realize that their whole point was being missed because the other branches of Neoclassicism had already fallen into the grip of formalism.

The same formalism that led Lange to a misreading of Mises in one direction led him to a misreading of Hayek and Robbins in the opposite direction. They had gone further in joining with other Neoclassical economists than Mises, since they both used the Walrasian computation argument in addition to the Austrian calculation argument. Lange took every advantage of this gesture of Neoclassical solidarity to turn the computation argument on its head

and to suggest, quite plausibly in fact, that it is just as possible for the socialist Central Planning Board to do what Walras's capitalist auctioneer is supposed to do. To the extent that Hayek and Robbins brought up such issues as forms of property, legal institutions, and price setting procedures under socialism, they were lapsing into the institutionalism of Mises, and could be similarly dismissed.

Lange's specific marginal cost pricing model was designed to answer this narrow Walrasian computation argument. Lange thought the judgment between socialism and capitalism was a matter of comparing the speed with which the two systems are able to "reach the right equilibrium prices" ([1936] 1964, p. 89). The knowledge he thought it necessary for the agents in this model to discover was limited to information about the equilibrium prices that would solve the equations. Hence even though he rejected Dickinson's equation-solving approach for finding these prices in favor of an iterative trial and error procedure, he uncritically adopted this narrow computational formulation of the problem to be solved. Under this formulation Lange could assert, without realizing he was begging the Austrian question, that "The administrators of a socialist economy will have exactly the same knowledge, or lack of knowledge, of the production functions as the capitalist entrepreneurs" ([1936] 1964, p. 61). This is only true for Barone's way of posing the problem. For the Austrians institutional issues such as property rights and incentive considerations suggest that in fact the entrepreneur will not discover as much about even his own "production function" if he is not imbedded in a rivalrous process of competition with other entrepreneurs. Moreover for the Austrians the real capitalist world never could reach an equilibrium.

Walrasians would naturally raise the question: If capitalist entrepreneurs don't even know their own production functions and if prices

aren't presumed to be equilibrium prices, how is it possible for entrepreneurs to make the efficient response to price signals? Such questions reveal a profound difference between what I have been calling the Austrian and Walrasian ways of depicting the market. The Walrasian agent comes to the market already equipped with full relevant knowledge, and his choice is a mechanical function of the constraints he faces. He reacts to occasional changes in his environment thereby keeping it in an equilibrium. The Austrians' actor engages in an open-ended discovery process under disequilibrium circumstances with his ever-changing environment, and his choice is an active contribution to those changes. He may, in what I think is only a very misleading terminology, be said to contribute to an "equilibration" process, but it never brings about an actual equilibrium, nor even a "tendency" in the sense of approaching equilibrium over time. The Walrasian theory supplies no adequate explanation of how these prices, which every agent is supposed to treat parametrically, ever get changed, for which task the mysterious auctioneer is invoked. The Austrian theory attempts to provide such an explanation of price and other changes by reference to the theory of competition and entrepreneurship.

Lange's model is populated by Walrasian agents rather than Austrian actors, and they face mechanical optimization problems, not genuine choices. These agents mechanically obey "rules" issued to them from above which tell them to do the things the perfect competition model has its agents doing, like setting quantity produced at that level where marginal cost equals price. The Central Planning Board meanwhile sets prices so as to ensure that supply equals demand, just as the Walrasian auctioneer would have under capitalism. We have an appearance here of central planning, that is to say, of the elimination of rivalrous competition, since plant managers are merely supposed to do as they're told. And yet we also have the appearance of an unregulated market in that all

the central planner is doing is responding to supplies and demands indicated by the levels of inventory stocks. Nobody in this model, in fact, neither plant "managers" nor "planners," is taking initiative, is bearing risk, is attempting to cope with an uncertain future. The reason the apparently decentralized decision making of the market can be seen by market-socialists as a system of central planning is that they have robbed every agent in their world of the ability to actually make decisions. In this sense it can be said that the perfect competition model is not an approximation to capitalism but is a model of central planning. When all decision making has been reduced to routine there is indeed little difference between so-called socialist and capitalist institutions, but the relevance of this model of mechanical agents to anything in the real world is highly questionable.

Many Neoclassical economists who read Lange's article were impressed with the way he, as Marshall Goldman (1971, p. 10) put it, "decided to meet von Mises on his own terms," but only because they still evidently believed Lerner's 1934 interpretation of Mises as having a naive perfect competition view of how capitalism works. It was that perfect competition model that was deftly turned on its head, not Mises's argument.

Two other articles published in 1936 contributed to the acceptance of Lange's interpretations of the Austrians' argument. First and most important, the esteemed Frank Knight in the American Economic Review read Mises as denying the "logical credentials" of socialism in an article entitled, "The Place of Marginal Economics in a Collectivist System," which he argues is "not essentially different from its place in an economy of 'competitive individualism' (1936, p. 263). Economic theory is assumed to be confined strictly to the statement of the formal conditions for optimality, just as Lerner had insisted. Knight thereby lent his considerable intellectual

authority to the market-socialist cause even though several years later he was to clarify his position in such a way as to virtually endorse the Mises-Hayek view:

Thus the contention of Professor von Mises, and other opponents of socialism, that there would be no objective rationale for the organization of production under socialism, while adequately refuted by Professor Lange (and others) for the routine operations of a stationary economy, is after all essentially correct for the really serious problem of organization. This is the problem of anticipating substantial changes in the given conditions of economic life and in making necessary adaptations and/or of bringing about such changes (1940, p. 285).

Alan R. Sweezy's 1936 essay on the debate was one of the first to pronounce Lange's "definitive" victory over the Mises-Hayek challenge, and reiterated again the charge that the Austrians' argument "stages a battle between the mythical knight of a purely competitive capitalism, in which everything works out for the best by definition, and the straw dragon of a patently unworkable type of planned economy" (1936, p. 423). By the end of 1936, fueled by the chorus of Lerner (1936), Durbin ([1936], 1968), Lange ([1936] 1964), Knight (1936), and Sweezy (1936), and lacking any direct and substantive Austrian rejoinders, the official interpretation of Mises and Hayek was fast hardening.

An indirect rejoinder by Hayek was contained in his 1937 Economica paper, "Economics and Knowledge" which identified as the "central question of all social sciences" the uniquely Austrian question about knowledge, that is, the question that was being ignored by the market-socialists:

How can the combination of fragments of knowledge existing in different minds bring about results which, if they were to be brought about deliberately, would require a knowledge on the part of the directing mind which no single person can possess? (1937, p. 54).

Although this paper made it clearer than any previous Austrian work how different this branch of Neoclassicism was from the others, it made no specific

references to the several 1936 models of market-socialism and seems to have had no effect on perceptions of the nature of the debate.<sup>6</sup> Meanwhile 1937 saw the publication of the second half of Lange's celebrated article, and his response to Lerner's model in the Review of Economic Studies, as well as Lerner's "Statics and Dynamics in Socialist Economics" in the June Economic Journal. These articles continued to emphasize that "in theory" socialism is as "possible" as capitalism (supposedly in contradiction with Mises's argument) and that "in practice" the Central Planning Board could be relied upon to "find" the optimum prices by its process of trial and error (supposedly contradicting Hayek's and Robbins's argument).

1938 went by and the silence of the Austrians was deafening. Lerner added yet another to his string of articles, this a rejoinder to Durbin in the Review of Economic Studies.<sup>7</sup> Once again the point was made that the only contribution economic theory can make to the question of socialism is to identify the conditions for optimality. Any issues concerning how such conditions could be realized in practice, into which Durbin and Lange had occasionally lapsed, were beside the point. Even more critical to the demise of the Austrian view, the classic Lange essay was reprinted in 1938 in a book published by the University of Minnesota Press along with the 1929 piece by Fred Taylor and a new introduction by Benjamin Lippincott ([1938] 1964). Lippincott repeated every

<sup>6</sup> Another important paper which appeared at this time but seemed to have no impact on the debate was Arnold Plant's "Centralize or Decentralize?" ([1937] 1974). This paper shows why the task of central planning cannot be delegated to decentralized decision makers without making a mockery of the whole idea of planning. See also Michael Polanyi's "The Span of Central Direction" (1951).

<sup>7</sup> It perhaps should be pointed out that from 1933 to 1938 these two journals, Review of Economic Studies and Economic Journal published debates among advocates of socialism, Dickinson, Dobb, Lerner, Durbin and Lange, but not between them and their critics. The Austrians' contributions to the English language debates, unlike the German debate of the 1920s, was almost entirely presented in books rather than professional journals.

aspect of the now standard Neoclassical story of what Mises and Hayek really meant. Mises, we are told, "had really been disproved early in the century by Barone" while Lange's and Taylor's contributions to this book conclusively answered Hayek's and Robbins's arguments. Even worse Lippincott lumps together the three branches of Neoclassical economics, and, ironically enough, accuses them all of the very formalism and inability to pay attention to real institutions of which Lange's article is in fact a prime example:

    Holding that the proper field of economic theory is the field of pure abstraction, where logic and mathematics can be rigorously applied, they have limited their analysis very largely to a condition of static equilibrium -- a condition where change is ruled out and economic forces are in balance. As a result of this, they have given little attention to institutional considerations ([1938] 1964, p. 6).

An obscure book was published in Oslo in 1938 by the Norwegian economist Trygve J. B. Hoff who by and large understood the Austrians' argument, but otherwise the Austrians had still provided no direct answer to the market-socialists in English. In 1939 Dobb contributed two more papers (1939a; 1939b) which began to move the discussion toward macroeconomic issues, while H. D. Dickinson published his full length book Economics of Socialism. The latter provided the most comprehensive statement to date of the market-socialist position. Dickinson explicitly retreats from his earlier equation-solving position and gives the superficial appearance of addressing the sorts of issues involving risk and entrepreneurship which the Austrians consider central. Actually Dickinson still failed to see the essential knowledge problem and contradicted himself repeatedly over such basic issues as whether genuine initiative is to be delegated to individual plant managers. Even so he managed to leave the impression of having dealt with many of the questions raised by the Austrians and, combined with all the other writings since 1936, the publication

of this book seemed to many to represent a successful completion of the debate for the market-socialists.

Then finally in 1940 the Austrians broke their silence with Hayek's specific response to Lange and Dickinson, "The Competitive 'Solution'" published in Economica.<sup>8</sup> Although this was a powerful counterargument, by the time it appeared most observers had already made up their minds about the debate and the emerging formalist view of economic theory was increasingly predisposing economists to favor Lange's way of posing the issues over Hayek's.

The Austrians were beginning to realize that the rug had been pulled out from under them by the formalist turn taken by the market-socialists. The Austrians had been thinking of real actors making choices in the real world while the market socialists were working out math problems. Hayek observed that reading Lange's and Dickinson's work "makes one almost doubt whether they have made a real effort to visualize their system at work" (1940, p. 191). Indeed, this is exactly the danger of formalist thinking that Dobb was warning about in 1933. But instead of articulating more clearly and persuasively why the problem was being improperly posed by the market-socialists, Hayek spent the bulk of his paper discussing in detail why their model fails to answer the problem as he understood it. Hayek does specifically explain that "the practical problem is not whether a particular method would eventually lead to a hypothetical equilibrium, but which method will secure the more rapid and complete adjustment to the daily changing conditions in different places and different industries" (1940, p. 188). This lucid statement, however, is buried in a long article that tried to grapple with many of the details of the market-socialists' model,

<sup>8</sup> One could also mention William H. Hutt's "Economic Institutions and the New Socialism," which also appeared in Economica in 1940, and which advanced an Austrian non-formalistic understanding of the calculation problem as an issue involving the nature of institutions.

whereas with hindsight it seems clear that the more fundamental question was what problem that model was supposed to address.

In 1942 Joseph Schumpeter added the substantial weight of his authority to Lange's interpretation of Mises, Hayek, and Robbins in his classic work  Capitalism, Socialism and Democracy. With this publication the standard view of Mises as making an institutionalist argument and of Hayek and Robbins as making formalist computation arguments was firmly established. When Abba Lerner's Economics of Control appeared two years later the market-socialists' victory over the Austrians seemed secure. Dore and Kaser (1984, p. 30) say that the debate was "conceptually completed" by Lerner's 1944 book. By 1948 when the welfare economist Abram Bergson provided his famous survey of the debate entitled "Socialist Economics," the controversy was widely declared to be closed and Lange's interpretation seemed to be solidified. Benjamin Ward expressed a commonly held view when he declared the debate to have "formally ended with Bergson's summary of the issues" (1967b, p. 30). Whichever of these works is taken to be the one that "completed" the debate, there is no question but that the 1940s witnessed a rapid decline of the Austrian side of the debate.

But though the Austrians were clearly down, they were not yet out. They began belatedly to elaborate on the fundamental issue of how to formulate the knowledge problem facing any social system rather than going over the pros and cons of various proposed models under the assumption that the problem such models address is understood. Especially important in this regard are Hayek's 1945 American Economic Review essay "The Use of Knowledge in Society" and his 1946 Princeton University lecture "The Meaning of Competition." Both of these essays were published in 1948 along with most of Hayek's other work related to the calculation debate in Individualism and Economic Order. Together these essays presented the best formulation yet of the Austrian challenge.

In 1949 Mises's 1940 magnum opus Nationalökonomie was published in English as Human Action ([1949] 1966), containing Mises's first major restatement of his position on the debate since the English edition of Socialism appeared in 1936. This work, Mises said in his autobiography, "finally afforded me the opportunity to present the problems of economic calculation in their full significance" (1978, p. 112). Economic calculation for Mises was only understandable in the full context of his theory of indirect exchange within a capitalistic economy, a theory which had been sketched in 1912 but only finished in 1940. Before Nationalökonomie, Mises said, "I had to content myself with demonstrating fallacies and contradictions of the proposals for socialist economic calculation." In other words the same weakness that can be ascribed to Hayek's 1940 response, that it spent too much time on details of purported solutions and too little on the misunderstood nature of the problem to be solved, was also a weakness of Mises's English language contributions until 1949. More important than this book's specific references to the debate was its clarification of how radically divergent from mainstream Neoclassicism the Austrian perspective was. After the publication of Individualism and Economic Order and Human Action it seems far more difficult to imagine the Austrians being identified with the perfect competition model.

Finally, as the decade was drawing to a close, Trygve Hoff's thorough account of both the German and English calculation debates entitled Economic Calculation in the Socialist Society ([1938] 1949) was translated from the Norwegian. At last an accurate description of the Austrians' argument was available in the English language literature, even if it was to be overshadowed for the next several decades by the much less accurate 1948 survey by the much more famous Bergson. Hoff recognized and criticized the chief weakness of most

of the market-socialist contributions, their determination to restrict themselves to formal rather than practical issues.

These publications of the 1940's by and in support of the Austrians were too late to turn the tide of the market-socialists' triumph that had been achieved in the last several years of the 1930s. The profession, as it became increasingly infatuated with formalism, was to remain virtually unanimous in favor of Lange's interpretation of Mises and Hayek for the next thirty years, and articles and textbooks continue to be published that uncritically perpetuate this point of view. But Hayek's 1940 critique of Lange and Dickinson, his 1945 and 1946 work on knowledge and competition, Mises's 1949 treatise, and Hoff's book can all be seen as laying a foundation for the current revival of the Austrians' challenge in the 1980s. Today, with a general revival of Austrian economics and with articles such as Armentano's "Resource Allocation Problems Under Socialism" (1969), Vaughn's "Economic Calculation under Socialism: the Austrian Contribution" (1980b), Peter Murrell's "Did the Theory of Market Socialism Answer the Challenge of Ludwig von Mises? A Reinterpretation of the Socialist Controversy" (1983), the reprinting of Hoff's book in 1981, and other recent efforts along these lines, there is perhaps some reason to expect a more understanding reception of the argument in the future than it received in the 1930s.

### Bibliography

- Armentano, Dominick T. (1969) "Resource Allocation Problems Under Socialism," in Snavely (1969).
- Barone, Enrico ([1908] 1935) "The Ministry of Production in the Collectivist State," in Hayek (1935a).
- Bergson, Abram (1948) "Socialist Economics," in Ellis (1948).
- Brutzkus, Boris ([1922] 1935) Economic Planning in Soviet Russia (London: Routledge).
- Dickinson, Henry Douglas (1933) "Price Formation in a Socialist Community" Economic Journal (June).
- \_\_\_\_\_ (1939) Economics of Socialism (London: Oxford University Press).
- Dobb, Maurice (1933) "Economic Theory and the Problems of a Socialist Economy," Economic Journal, 43 (Dec. 1933).
- \_\_\_\_\_ (1935a) "A Reply," Review of Economic Studies, 2 (Feb.).
- \_\_\_\_\_ (1935b) [review of Brutzkus (1922) and Hayek (1935a)], Economic Journal (Sep.).
- \_\_\_\_\_ (1939a) "Economists and the Economics of Socialism," in Dobb (1955).
- \_\_\_\_\_ (1939b) "Saving and Investment in a Socialist Economy," Economic Journal, 49 (Dec. 1939).
- \_\_\_\_\_ (1955) On Economic Theory and Socialism: Collected Papers (London: Routledge and Kegan Paul).
- Dore, M. H. and Kaser, M. (1984) "The Millions of Equations Debate: Seventy Years After Barone," Atlantic Economic Journal, 12, #3.
- Durbin, Evan Frank Mottram ([1936] 1968) "Economic Calculus in a Planned Economy," Economic Journal, 46 (Dec.), in Durbin (London: Routledge and Kegan Paul).
- \_\_\_\_\_ (1937) "A Note on Mr. Lerner's 'Dynamical' Propositions," Economic Journal, 47 (Sep. 1937).
- Ellis, Howard S. (ed.) (1948) A Survey of Contemporary Economics, vol. 1 (Homewood, Ill.: Richard D. Irwin).
- Goldman, Marshall I. (1971) Comparative Economic Systems: A Reader (New York: Random House).
- Halm, Georg (1935) "Further Considerations on the Possibility of Adequate Calculation in a Socialist Community," trans. H. E. Baston, in Hayek (1935a).

- Hayek, Friedrich A. (ed.) (1935a) Collectivist Economic Planning, Critical Studies on the Possibilities of Socialism (London: George Routledge & Sons).
- \_\_\_\_\_ (1935b) "The Nature and History of the Problem," in Hayek (1948).
- \_\_\_\_\_ (1935c) "The Present State of the Debate," in Hayek (1948).
- \_\_\_\_\_ (1937) "Economics and Knowledge," in Hayek (1948).
- \_\_\_\_\_ (1940) "The Competitive 'Solution'," in Hayek (1948).
- \_\_\_\_\_ (1942) "The Facts of the Social Sciences," in Hayek (1948).
- \_\_\_\_\_ (1945) "The Use of Knowledge in Society," in Hayek (1948).
- \_\_\_\_\_ (1946) "The Meaning of Competition," in Hayek (1948).
- \_\_\_\_\_ (1948) Individualism and Economic Order (Chicago: University of Chicago Press).
- Hoff, Trygve J. B. ([1938] 1949) Economic Calculation in the Socialist Society (London: William Hodge).
- Hutt, William H. (1940) "Economic Institutions and the New Socialism," Economica (Nov.).
- Knight, Frank H. (1936) "The Place of Marginal Economics in a Collectivist System," American Economic Review, 26 (supplement) (Mar.).
- \_\_\_\_\_ (1940) "Socialism: The Nature of the Problem," Ethics, 50 (Apr.).
- Lange, Oskar ([1936] 1964) "On the Economic Theory of Socialism," in Lippincott ([1938] 1964).
- \_\_\_\_\_ (1937) "Mr. Lerner's Note on Socialist Economics," Review of Economic Studies, 4 (Feb).
- Lavoie, Don (1981) "A Critique of the Standard Account of the Socialist Calculation Debate" Journal of Libertarian Studies, 5: 41-87.
- \_\_\_\_\_ (1985a) Rivalry and Central Planning: The Socialist Calculation Debate Reconsidered (New York: Cambridge University Press).
- \_\_\_\_\_ (1985b) National Economic Planning: What is Left? (Cambridge, Mass.: Ballinger Publishing).
- Lerner, Abba P. (1934) "Economic Theory and Socialist Economy," Review of Economic Studies, 2 (Oct.).
- \_\_\_\_\_ (1935) "A Rejoinder to Mr. Dobb," Review of Economic Studies 2.
- \_\_\_\_\_ (1936) "A Note on Socialist Economics," Review of Economic Studies (Oct.).

- \_\_\_\_\_ (1937) "Statics and Dynamics in Socialist Economics," Economic Journal (June).
- \_\_\_\_\_ (1938) "Theory and Practice in Socialist Economics," Review of Economic Studies, 6.
- \_\_\_\_\_ (1944) The Economics of Control: Principles of Welfare Economics (New York: Macmillan).
- Lippincott, Benjamin E. (ed.) ([1938] 1964) On the Economic Theory of Socialism (New York: McGraw-Hill).
- Mises, Ludwig von ([1912] 1981) The Theory of Money and Credit, trans. H. E. Batson (Irvington-on-Hudson, N.Y.: Foundation for Economic Education, 1971).
- \_\_\_\_\_ ([1920] 1935) "Economic Calculation in the Socialist Commonwealth," trans. S. Alder, in Hayek (1935a).
- \_\_\_\_\_ ([1922] 1936) Socialism: An Economic and Sociological Analysis, trans. J. Kahane (London: Jonathan Cape).
- \_\_\_\_\_ ([1949] 1966) Human Action: A Treatise on Economics (London: William Hodge, 1949).
- \_\_\_\_\_ (1978) Notes and Recollections (South Holland, Illinois: Libertarian Press).
- Murrell, Peter (1983) "Did the Theory of Market Socialism Answer the Challenged of Ludwig von Mises? A Reinterpretation of the Socialist Controversy" History of Political Economy, 15.
- Pierson, Nikolaas Gerard ([1902] 1935) "The Problem of Value in the Socialist Community," trans. G. Gardiner, in Hayek (1935a).
- Plant, Sir Arnold ([1937] 1974) "Centralize or Decentralize," in Some Modern Business Problems (London: Longmans Green, reprinted in Selected Economic Essays and Addresses London: Routledge and Kegan Paul).
- Polanyi, Michael (1951) Logic of Liberty (Chicago: University of Chicago Press).
- Robbins, Lionel (1934) The Great Depression (New York: Macmillan).
- Schumpeter, Joseph A. (1942) Capitalism, Socialism, and Democracy (New York: Harper & Row).
- Snavely, William P. (1969) Theory of Economic Systems: Capitalism, Socialism, and Corporatism (Columbus, Ohio: Charles E. Merrill).
- Sweezy, Alan (1936) "The Economist in a Socialist Economy," in Explorations in Economics: Notes and Essays Contributed in Honor of F. W. Taussig (London: McGraw Hill).

Taylor, Fred M. ([1929] 1966) "The Guidance of Production in a Socialist State," in Lippincott ([1938] 1964).

Vaughn, Karen (1980) "Economic Calculation under Socialism: the Austrian Contribution," Economic Inquiry (Summer).