

# Hayek and Socialism

BRUCE CALDWELL

*University of North Carolina at Greensboro*

*I have received many helpful comments on this paper from participants at the History of Economics Society meetings at the University of British Columbia, at seminars given at the University of Georgia, at the Austrian Colloquium at New York University, at the York University-University of Toronto Workshop on the History of Economics, and at the Duke University History of Political Economy Workshop. Extensive comments were also received from Peter Boettke, William Butos, Neil De Marchi, Greg Ransom, and George Selgin. All remaining errors are the responsibility of the author.*

## I. Introduction

**M**OST ECONOMISTS know that Friedrich A. Hayek was a life-long opponent of socialism. But who were his opponents, what were his arguments, and how did he come to develop them?

In the 1930s Hayek attacked the economic feasibility of socialism, drawing on arguments from an earlier German-language debate and taking to task a number of separate proposals for a socialist society. This drew a response from Oskar Lange, who advocated market socialism. The ensuing battle with Lange and others led Hayek to develop a distinctive “knowledge-based” critique of socialism.

Just before the onset of World War II Hayek began work on a series of articles whose ultimate result was the publication in 1944 of *The Road to Serfdom*, his most famous (and in some quarters, notorious) book. *The Road to Serfdom* contains Hayek’s political critique of socialism, but also the seeds of more positive work. The fruit was his description and defense of an alternative liberal

utopia in such works as *The Constitution of Liberty* (1960) and *Law, Legislation and Liberty* (1973–79).

During the war years Hayek also became fascinated with questions of methodology. This led him, apparently incongruously, to publish a book on the foundations of psychology. *The Sensory Order* (1952a) is, particularly among economists, Hayek’s least appreciated book, yet in a letter to an economist prior to its publication he described it as “the most important thing I have yet done . . .” (letter to John Nef, Nov. 6, 1948). The book provides a theoretical basis for the “limitations of knowledge” theme that has been recurrent in Hayek’s work. This claim in turn implies limits on the ambitions of socialist planners and other “rationalist constructivists,” and as such constitutes another set of arguments against socialism. It also implies limits on the ambitions of economists, and from an Austrian viewpoint, may help to explain why the models of economists have so often misled them about the prospects for socialism.

The paper attempts to answer the questions provided at the outset, to survey Hayek's various arguments against socialism and to provide some historical background on why he developed them when he did.

Recent interpretive literature provides the impetus for the emphasis on historical context. Since the events of 1989, the Soviet central planning model has largely been abandoned by academic advocates of socialism, and a renewed interest in market socialism has taken its place. Recent discussions of market socialism by economic theorists, both proponents and opponents, typically draw on insights derived from the "economics of information." This new perspective views general equilibrium approaches as inadequate, if not misleading, for understanding economic phenomena. Because many of the earlier debates on market socialism utilized a general equilibrium framework, they are from the perspective of the economics of information otiose.

A new interpretation of the debates over socialism, one that highlights the contributions of the economics of information, has begun to emerge (Pranab Bardhan and John Roemer, eds. 1993, pp. 3–9; Joseph Stiglitz 1994). These interpretations are designed to provide context for recent work, but they typically run into difficulties when they try to characterize Hayek's contribution. Though it is evident that Hayek (like the information theorists) was critical of using static general equilibrium models for assessing the merits and limitations of socialism, it seems clear (and this despite his frequent invocation of the concept of "knowledge") that Hayek did not directly participate in the development of the economics of information.

How, then, to characterize Hayek's contribution? From a modern perspective, his work seems "fuzzy" (Louis

Makowski and Joseph Ostroy, in Bardhan and Roemer, eds. 1993, p. 82). Many may well be tempted to conclude with János Kornai (in Bardhan and Roemer 1993, p. 63) that "the warnings of a Mises or a Hayek about market socialism" should be viewed as "brilliant guesses" rather than as anything resembling "scientific propositions," or with Robert Heilbroner (1990, p. 1098) that "the successes of the farsighted seem accounted for more by their prescient 'visions' than by their superior analyses."

In the final section an alternative, more positive interpretation of Hayek's contribution is offered. As he became ever more deeply entangled in the debates over socialism, Hayek decided that a more integrative approach to the study of complex social phenomena was necessary, that standard economic analysis taken alone might itself be inadequate, if not misleading, for understanding the problems of socialism. To be sure, his decision to branch out was based in part on his recognition of the limitations of the static "equilibrium theory" of his day. But his emphases on the market as a discovery process, his concern with the limits of human cognition, and above all his fascination with questions of knowledge, what John Gray (1986, p. 134) has aptly called his "epistemological turn," led Hayek to insights that may well be different in kind from those advanced by proponents of the economics of information.

If this alternative account is correct, it means at a minimum that those who would try to read history backwards, who would assess Hayek's contribution solely in terms of whether and how he anticipated the later literature on the economics of information, will perforce misunderstand his arguments against socialism. So one point of the final section is to plea for a less ahistorical his-

tory. But it may also be the case that Hayek actually provided an independent set of claims against market socialism, one that has been missed by modern information theorists. If so, then Hayek's apparently "fuzzy" arguments may well prove to be of more than "merely historical" interest today.

## II. *Hayek and the Market Socialists*<sup>1</sup>

Friedrich August von Hayek was born in Vienna on May 8, 1899. Following war service he entered the University of Vienna, where he completed degrees in 1921 and 1923. After 14 months of study in the U.S., Hayek returned to Austria in 1925. He spent the rest of the decade studying monetary history and developing a theory of the trade cycle. Hayek's life and the academic milieu of Vienna in the 1920's is documented in Hayek (1984, Introduction; 1992, Prologue; 1994, pp. 47–72) and Earlene Craver (1986).

In the spring of 1931 Hayek was invited by Lionel Robbins to deliver a series of lectures on the trade cycle at the London School of Economics (LSE). The next year he was appointed to the Tooke Chair of Economic Science and Statistics at the LSE, a position he would hold until he moved to the United States in 1950, where he ultimately accepted a position on the Committee on Social Thought at the University of Chicago. During the early 1930s Hayek had exchanges with John Maynard Keynes and Piero Sraffa on monetary and trade cycle theory and with Frank Knight on capital theory (Hayek 1994, pp. 75–98; 1995). His debates with the socialists began in 1935 with the publication of *Collectivist Economic Planning: Critical Studies on the Possibilities of Socialism*. The book con-

tained translations of four articles with introductory and concluding essays provided by Hayek as editor.

### A. *Prelude—Mises and the German Language Debates*

The most important of the translated contributions was an article by Ludwig von Mises that had originally appeared in 1920. The collapse of the German and Austro-Hungarian Empires at the end of the First World War opened the door for a variety of socialist proposals for reorganizing society. Prior to the war Mises was known as a monetary theorist and for his unyielding devotion to liberalism. He was as good a person as any to challenge the socialists; in so doing he initiated the German-language socialist calculation debate. David Steele (1992, ch. 4) identifies some of Mises' predecessors, and a number of writers (Trygve Hoff, 1949; Judith Merkle 1980, ch. 6; Don Lavoie 1985; Günther Chaloupek 1990) examine the debates as well as the specifics of various proposals.

The proposal that most provoked Mises was made by the sociologist and philosopher Otto Neurath. Neurath is remembered today as a member of the Vienna Circle of logical positivists and as the inventor of ISOTYPE, the International System of Typographical Picture Education. Before World War I he began to make a reputation as a proponent of a new academic subfield, "war economy." He also participated, along with Mises, in Eugen von Böhm-Bawerk's famous economics seminar. Among the other seminar participants were Joseph Schumpeter, Otto Bauer, who would lead the Austrian Socialist Democratic party in the 1920s, and Rudolf Hilferding, one of the leading Marxian theoreticians of the 20th century.

According to Neurath, during peace-

<sup>1</sup> Parts of this section are adapted from the introduction I wrote as editor for Hayek (1997).

time, production in market economies is driven by the search for profits, but this leads to recurrent periods of overproduction and unemployment. In wartime, by contrast, production is no longer driven by profit-seeking, and the war effort ensures that productive capacity is always fully utilized. Another characteristic of the war economy is the suppression of the price system, which is replaced by extensive planning of materials management from the center. This is all to the good, because for Neurath the monetary system, the search for profits, and the disorderliness of capitalist production all go hand in hand.

Neurath argued that the central planning that emerges within war economies should continue in peacetime. He proposed that a “natural accounting center” be set up to run the economy as if it were one giant enterprise. Most controversially, he insisted that money would be unnecessary in the new planned order: because production would be driven by objectively determined needs rather than by the search for profits, all calculation regarding the appropriate levels of inputs and output could be handled in “natural” physical terms. In Neurath’s opinion, attempts to employ monetary calculations within a planned society would render impossible scientific economic management, which had to be conducted in terms of “real” physical quantities.<sup>2</sup>

Mises (1978, pp. 39–41, 133) plainly

<sup>2</sup> For more on his views, see Neurath (1973, ch. 5), Nancy Cartwright et al. (1996, ch. 1), and Agnes Miklós-Illés (1996). The resurgence of interest in Neurath among philosophers is chiefly due to his pluralistic and anti-foundationalist approach to unified science. Austrian economists focused on his physicalism, his insistence that, to be meaningful, scientific terms must refer to observable phenomena. The Austrian economists’ opposition to positivism and scientism in the social sciences derives in part from their arguments with such opponents.

had a strong negative reaction to Neurath personally, and as a monetary theorist he found his economic claims fantastic. (As Chaloupek 1990, pp. 668–70, has shown, most socialists also soon rejected Neurath’s proposals for a moneyless economy.) But he wanted to make a more general case against socialism, one that could be used against other proposals as well, including those that retained a role for some form of money. Mises took as a starting premise that under most forms of socialism “production-goods” (factors of production) are owned by the state, and that as such there is no market for them. But this basic feature of socialism has substantial consequences:

because no production-good will ever become the object of exchange, it will be impossible to determine its monetary value. Money could never fill in a socialist state the role it fills in a competitive society in determining the value of production-goods. Calculation in terms of money will here be impossible. (Mises, in Hayek, ed. 1935, p. 92)

Even if money is retained, in the socialist state no prices for factors of production exist. As such, socialist managers have no way to tell when choosing among a huge array of technologically feasible input combinations which are economically feasible. Without some knowledge of relative scarcities, they are left “groping in the dark.” As Mises put it: “Where there is no free market, there is no pricing mechanism; without a pricing mechanism, there is no economic calculation” (in Hayek, ed. 1935, p. 111).

### B. *Hayek’s Initial Arguments*

In his introductory chapter Hayek recounted the debates that had taken place in the German language literature a decade before. In his conclusion he turned to the current scene.

English socialism in the 1930s was a

mixed bag. The Fabians, whose leaders included Sidney and Beatrice Webb and George Bernard Shaw, had been arguing for an evolutionary style of socialism since the late 1880s. The British Labour Party, formed in 1906, officially endorsed socialism in its platform. Labour had prevailed in the general election of 1929, but had faltered with Britain's abandoning of gold in 1931 and spent the remainder of the decade regrouping. Though interest in Guild Socialism, a form of syndicalism, had declined following World War I, academic advocates like R. H. Tawney and G. D. C. Cole were still active. Barbara Wootton was the Director of Tutorial Studies at the University of London, and under her influence a "tutorial version of history," one which emphasized the deterioration of the position of the working class under capitalism, was taught in adult education courses throughout Britain. Maurice Dobb was the leading spokesman among economists for Marxism, and a number of prominent natural scientists favored communism. Finally, there existed a nascent interest in market socialism, dubbed "pseudo-competition" by Hayek.<sup>3</sup> With no idea which of his many opponents might respond, Hayek offered a diversity of criticisms of socialism.

He began with a review of "the Russian experiment," basing his criticisms on the writings of a Russian émigré Boris Brutzkus. This would serve as a counterweight to a more appreciative assessment of the experiment offered by the Webbs, whose massive study (it filled two volumes) was titled *Soviet Communism: A New Civilization?* when

it was published in 1935. With incredibly bad timing, they chose to drop the question mark in the 1937 edition.

Next Hayek took up the argument of Henry D. Dickinson (1933), who claimed that Mises was wrong, that rational calculation under socialism was at least theoretically possible. Because any economy could be formally represented by a Walrasian system of equations, Dickinson claimed that on a theoretical level there is no difference between capitalism and socialism: In a capitalist system the equations are "solved" by the market, whereas in a socialist system they could be solved by the planning authorities.

In his rebuttal, Hayek enumerated many difficulties associated with "the mathematical solution," or any regime that relied on formulating and solving a giant system of equations for the relevant prices and quantities. He mentioned the staggering amount of information that would need to be gathered; the immense difficulty of formulating the correct system of equations; the hundreds of thousands of equations that would then need to be solved, not just once but repeatedly; and the inability of such a system to adapt to change.

Should socialist authorities decide to "solve" the system using a trial and error method, an approach also mentioned by Dickinson, other problems would arise. The most important of these is the inability of any price-changing mechanism to replicate the automatic adjustments that occur in a competitive free market system in response to underlying changes in supply and demand:

Almost every change of any single price would make changes of hundreds of other prices necessary and most of these other changes would by no means be proportional but would be affected by the different de-

<sup>3</sup> See Elizabeth Durbin (1985) on British socialism in the interwar years, Gary Werskey (1978) on socialism among the natural scientists, and the essays in Philip Bean and David Whyne, eds. (1986) on Wootton. Hayek, ed. (1954) may be read as a response to the tutorial version of history.

degrees of elasticity of demand, by the possibilities of substitution and other changes in the method of production. (Hayek, ed. 1935, p. 214)

Next Hayek took up the arguments of the Marxist Dobb (1933), who noted that if consumption decisions were also subjected to central control, most of the problems associated with central planning would be alleviated. Hayek pointed out that the abrogation of consumer sovereignty implied in such an approach would presumably be repellant to most Britons, and that even under such a regime, prices to help guide production would still be necessary.

In the last half of his chapter Hayek explicitly engaged market socialism. Because no concrete proposals were yet on the table, he had to imagine the forms of market organization that his opponents might propose. One possible arrangement is for managers of monopolized industries to be directed to produce so that prices covered marginal costs, thereby duplicating the results of competitive equilibrium. Hayek's most original argument here is that in the real world (as opposed to the static world of perfect competition models) it is typically difficult to know exactly what "true" marginal costs are (Hayek, ed. 1935, pp. 226–31). In a market socialist regime in which firms within an industry do compete, a different problem arises: in decisions concerning capital allocation, central planners would have to take over the role played by thousands of entrepreneurs in a market system (Hayek, ed. 1935, pp. 233–37). Hayek clearly considered this to be a disadvantage, but did not specify the nature of the problem. Finally, he noted that the absence of private ownership in the means of production creates incentive problems for managers, who will put off making difficult decisions and who will tend toward risk-

aversion in making investment decisions (Hayek, ed. 1935, pp. 235, 237).

Though Hayek's two early pieces contain fleeting glimpses of his mature position, the modern reader must work to find them. As Israel Kirzner has convincingly argued, the socialist calculation debate served as a

catalyst in the development and articulation of the modern Austrian view of the market as a competitive-entrepreneurial process of discovery. . . . it was through the give-and-take of this debate that the Austrians gradually refined their understanding of their own position. (Kirzner 1988, p. 1; cf. Lavoie 1985)

### C. Lange's Rebuttal

Market socialists are critics of capitalism, but they also acknowledge that under certain conditions perfectly competitive markets have desirable efficiency characteristics. An essential premise of market socialism is the denial that market structures under late capitalism resemble, in any meaningful way, perfect competition. According to this view few competitive industries exist anymore, having been replaced by corporate giants, cartels, and monopolies. Contemporary capitalism thus lacks the beneficial efficiency characteristics of competition, while retaining all of its defects. With careful planning market socialism can replicate the benefits of truly competitive markets, correct for remaining problems regarding efficiency, and all the while avoid capitalism's pernicious distributional effects. The chief spokesman for this view in the later 1930s was a Polish émigré to America, Oskar Lange, whose two-part paper appeared in the *Review of Economic Studies* in 1936–37, and was soon reprinted in a book of the same title, *On the Economic Theory of Socialism* (1938).

Lange's first argument was directed against Mises. Lange agreed with Mises

that prices are necessary for rational calculation. Mises' mistake was to think that prices must be formed in markets. If one instead understands that the correct definition of prices is "terms on which alternatives are offered," and that their determination in markets is not essential but rather a peculiarity of a particular institutional arrangement (capitalism), then Mises' argument collapses. Accounting prices could be supplied by the Central Planning Board, and these could be taken by socialist managers as parameters in their decision making. Rational calculation under socialism is not "impossible" after all (Lange 1938, p. 60–62).

Lange's next step was to demonstrate how a socialist commonwealth could be made to yield the same results as a true competitive market system. In his model there exists a free market for both consumer goods and labor, but (because of public ownership of the means of production) no market for non-labor productive resources like capital. Because labor incomes would still be market-determined, income inequality would not be eliminated. But because capital ownership is a principal source of income disparities, its elimination would serve to reduce inequality. Individual incomes would also be supplemented by receipt of some share of the "social dividend," the income that had previously gone to owners of capital.

The sticking point for this variant of market socialism is the absence of profit maximizing firms and of a market (and hence of prices that reflect relative scarcities) for non-labor productive resources. Lange proposed that the Central Planning Board provide provisional "prices" for all goods and factors of production. Managers of socialist firms would be instructed to choose, on the basis of these "given" prices, the

combination of inputs that minimized their costs and the level of output that maximized profits. Planners in charge of industries would likewise expand or contract them as necessary, thereby replicating the beneficial effects of free entry and exit under competition.

Lange's proposal begged a key question: What if the Central Planning Board fails to choose prices that accurately reflect underlying relative scarcities? Here Lange suggested that planners follow a "trial and error" procedure, one similar to that used in actual markets, adjusting prices up or down in any factor or product markets in which gluts or shortages existed. Through the trial and error method the "right" set of accounting prices will ultimately be found (Lange 1938, pp. 86–89).

Lange responded to Hayek's concerns about replacing entrepreneurs with central planners as follows:

the trial and error procedure would, or at least could, work *much better* in a socialist economy than it does in a competitive market. For the Central Planning Board has a much wider knowledge of what is going on in the whole economic system than any private entrepreneur can ever have, and, consequently, may be able to reach the right equilibrium prices by a *much shorter* series of successive trials than a competitive market actually does. (Lange 1938, p. 89, emphasis in the original)

What about the skewing of incentives under socialism? Acknowledging the importance of the problem, Lange offered two responses. First, he denied that such agency questions are a proper topic for economists to study: "The discussion of this argument belongs to the field of sociology rather than of economic theory and must therefore be dispensed with here" (Lange 1935, p. 109). Second, he insisted that the real problem was one of *bureaucracy*. But

bureaucratization, he continued, is a generic problem that afflicts both capitalism and socialism. Because of the absence of competition, the managers of a bureaucratic modern capitalistic corporation are as likely to be inefficient as are their counterparts under socialism. The separation of ownership from control exacerbates this: the modern capitalist corporation is increasingly run by a professional managerial class whose members care more about their own welfare than about running an efficient firm. Bureaucracy is a problem of modern life, not one that is unique to socialism (Lange 1938, pp. 109–10, 120). To support his case Lange cited Adolf Berle and Gardiner Means (1933), the classic study of the separation of ownership from control in the modern corporation and a forerunner of the modern principal-agent literature. Lange's argument underlines again the crucial importance for socialists of the claim that old-style atomistic competition is rare under late capitalism.

D. *Answering Lange—Mises on Appraisalment and the Entrepreneur*

Mises never directly replied to Lange. But it is clear from his later writings that he rejected Lange's claim that prices are nothing more than "terms on which alternatives are offered." For Mises, prices are social phenomena "brought about by the interplay of the valuations of all individuals participating in the operation of the market" (Mises 1966, p. 331). They reflect the plans and appraisements of millions of acting individuals at a particular moment in time.

Given its origin in the appraisements of millions of people, the price structure is constantly changing. Even so, it is an essential tool used by entrepreneurs to make calculations about the highest-valued use of scarce resources.

Crucially, such calculations are always future-oriented.

In drafting their plans the entrepreneurs look first at the prices of the immediate past which are mistakenly called *present* prices. Of course, the entrepreneurs never make these prices enter into their calculations without paying regard to anticipated changes. The prices of the immediate past are for them only the starting point of deliberations leading to forecasts of future prices. . . . The prices of the past are for the entrepreneur, the shaper of future production, merely a mental tool. (Mises 1966, pp. 336–37, emphasis in the original)

Entrepreneurs must make decisions about resource use in a world in which production takes time and in which the constant evolution of human plans creates a constantly changing structure of prices. In such an environment errors clearly are unavoidable. But they do not persist, because every mistake made by one entrepreneur is simultaneously a profit opportunity for another: "it is the competition of profit-seeking entrepreneurs that does not tolerate the preservation of *false* prices of the factors of production" (Mises 1966, pp. 337–38, emphasis in the original). Thus the ever-changing structure of prices that exists within a market system, the messy groping that appears so anarchic, ends up being a passably efficient system for revealing relative scarcities. And paradoxically, though the price system operates through the self-interested actions of thousands of individuals, its end result is social cooperation: Paris gets fed.

For Mises, the entrepreneur is the essential actor of the piece, but equally important is that his actions take place within a specific institutional framework. Absent a market system with well-defined and enforced property rights, the entrepreneur would have neither the necessary information nor the proper incentives to perform his es-

sential function.<sup>4</sup> Mises acknowledged that Lange's attempt to introduce prices and competition into a socialist framework showed some recognition of all this (Mises 1966, p. 706). But without the rest of the requisite institutional setting, such efforts must ultimately fail.

#### E. *Answering Lange—Hayek on Computation and on Knowledge*

Hayek initially responded to Lange in a book review (Hayek [1940] 1948), then elaborated on and extended his argument in a series of articles (Hayek [1945, 1946] 1948; [1968a] 1978).

1. The Computation Problem and "Trial and Error"—Recall that Hayek had in 1935 already provided arguments against such approaches as "the mathematical solution" and, more importantly given Lange's arguments, against the feasibility of trial and error methods. In his review he wondered why Lange had failed to address his objections about the latter, and why his opponent had even neglected to answer the obviously important question of how often prices were to be adjusted under his proposed system. Hayek ([1940] 1948, p. 188) added that,

it is difficult to suppress the suspicion that this particular proposal has been born out of an excessive preoccupation with problems of the pure theory of stationary equilibrium.

Hayek's point was a simple one: static equilibrium theory concentrates on end-points, on a system that has

<sup>4</sup> Joseph Salerno (1990) recently sparked a lively debate with the provocative claim that the Misesian emphasis on appraisal and entrepreneurship differs from, and is more fundamental than, Hayek's arguments about knowledge. Leland Yeager (1994) and Kirzner (1997) contend that the two positions are better considered complementary, while Boettke (forthcoming) argues that any differences of emphasis that may exist between Mises and Hayek are due to their responding to different audiences.

achieved a state of rest. But the notion of a system moving toward some "final" end-point as determined by "given" data is radically at odds with the situation in the real world, "where constant change is the rule" (Hayek [1940] 1948, p. 188). Hayek was suggesting that Lange's use of an equilibrium model had misled him into thinking that the movement toward some final equilibrium set of accounting prices would be a one time adjustment, whereas in reality it would be a never-ending process.

Hayek's arguments about the difficulties of coming up with the necessary data have been challenged by each new generation of socialists, as first input-output analysis, then planometrics, then computable general equilibrium models, then the advent of supercomputers all promised finally to provide an instrument that could replace the market's price adjustment mechanism. As a mature Lange (1967, p. 158) provocatively put it:

Were I to rewrite my essay today my task would be much simpler. My answer to Hayek and Robbins would be: so what's the trouble? Let us put the simultaneous equations on an electronic computer and we shall obtain the solution in less than a second.

More recently, Allin Cottrell and W. Paul Cockshott (1993) and Steven Horwitz (1996) have offered contrasting assessments of the feasibility of socialist computational proposals.

As a practical matter, though, few convincing examples of the successful replacement of markets exist. Ironically, the practical effects of the computer revolution so far seem to have been to undermine the ability of totalitarian states to restrict access to information, and to enable entrepreneurs to engage in the sort of "atomistic competition" that socialists of the 1930s had assumed had died out. It is also noteworthy that within the artificial intelli-

gence literature the relationship between markets and computers is becoming very nearly the opposite of that imagined by Lange: rather than regarding markets as primitive forms of computers, efforts are aimed at making computers replicate the allocational and adaptative characteristics of markets (Lavoie 1990, p. 76).

2. Hayek's "Knowledge" Arguments—Hayek provided an example of the consequences of taking static theories too seriously in a discussion of Lange's cost minimization rule. Hayek asked: how will planners come to know what the minimum costs are ([1940] 1948, p. 196)? His basic contention was that only through the workings of a rivalrous market process are ever lower cost methods of production discovered or created (cf. Hayek, [1946] 1948, pp. 96–97). Standard equilibrium theory misleads by assuming that an end-state is already reached, so that cost minimizing input combinations are already known. This obscures the process by which they come to be known, and may lead to the erroneous belief that one can dispense with the very process (rivalrous market competition) that generates the knowledge. More generally, the static theory of perfect competition "starts from the assumption of a 'given' supply of scarce goods. But which goods are scarce goods, or which things are goods, and how scarce or valuable they are—these are precisely the things which competition has to discover" (Hayek [1968a] 1978, p. 181). In a phrase: Market competition constitutes a discovery procedure.

Lange had also argued that, because entrepreneurs have knowledge about only a limited set of markets and prices, a Central Planning Board (which would have access to more knowledge than would individual entrepreneurs) could make better capital allocation decisions.

In his 1937 article "Economics and Knowledge" Hayek noted that though standard equilibrium theory assumes that all agents have access to the same, objectively correct information, in reality there is a "division of knowledge." Actually-existing knowledge is dispersed; different individuals have access to different bits of it. Their actions are based on their varying subjective beliefs, beliefs that include assumptions about future states of the world and about other people's beliefs and actions. The "central question of all social science" ([1937] 1948, p. 54) is how such dispersed knowledge might be put to use, how society might coordinate the knowledge that exists in many different minds and places. Equilibrium theory with its emphasis on end-states assumes that the process of coordination has already taken place. By doing so, it assumes away the most important question.

A number of authors (Caldwell 1988a; Kirzner 1988; Meghnad Desai 1994) have argued that "Economics and Knowledge" was a seminal piece both in the development of Hayek's ideas and for its implications for the calculation debate. In his review, Hayek cited the article to show that Lange had again been misled by "equilibrium theory."

As I have tried to show on another occasion, it is the main merit of real competition that through it use is made of knowledge divided among many persons which, if it were to be used in a centrally directed economy, would have all to enter the single plan. To assume that all this knowledge would be automatically in the possession of the planning authority seems to me to miss the main point. (Hayek [1940] 1948, p. 134)

Tracing out the implications of the "dispersion of knowledge" would become another major theme in Hayek's work. In the present context, three related strands may be identified. First, freely

adjusting market prices that reflect relative scarcities are profoundly important when errors in perception exist, because they help market participants to bring their subjectively formed expectations in line with the actual state of the world. Next, much knowledge (particularly of business conditions) is localized, what Hayek came to call “knowledge of the particular circumstances of time and place” ([1945] 1948, p. 80). Finally, certain knowledge is tacit; it is “knowledge how” rather than “knowledge that” ([1968b] 1978, p. 38). Localized and tacit knowledge is difficult (and may be impossible) to pass on to others, even if one wanted to.

Modern theorists were quick to pick up on Hayek’s insight that, in a world of dispersed knowledge, prices convey information. The same cannot be said about his writings on localized and tacit knowledge, the importance of which is well captured in the following example provided by Leland Yeager:

Often an entrepreneur makes business decisions partly on his intuition or feel for technology, the attitudes and tastes of consumers and workers, sources of financing, and conditions in markets for inputs and for consumer goods and services—all in the future as well as the present. The entrepreneur receives information for judgments about such matters by reading specialized and popular publications, watching television and movies, experiencing various services and products personally, chatting with innumerable people, and strolling through town or the shopping mall. Much of what he thereby observes—or senses—he could not express in explicit words or numbers. A socialist system would let much such entrepreneurial knowledge go to waste even if it emerged in the first place. (Yeager 1996, p. 138)

The idea that “the pure theory of stationary equilibrium” is inadequate as a tool for understanding the workings of a market economy, and that it should be replaced by a view of the market as a competitive-entrepreneurial process for

the discovery and coordination of knowledge, has become a central tenet of Austrian thought.<sup>5</sup> Hayek’s arguments are probably most effective if one considers centrally controlled soviet-style economies, where price fixing is extensive and, as a result, the coordination of plans is hindered. But they also apply to many market socialist regimes. In Lange’s proposal, for example, prices were still set by central authorities; this is why Hayek insisted that Lange must reveal how often prices would be adjusted under his “trial and error” regime. And Hayek’s arguments about discovery, error correction, and the coordination and communication of localized and tacit knowledge apply whenever entrepreneurs acting within an institutional context of market competition make decisions that differ from those of their socialist manager counterparts.

Because of its connection to recent debates on the economics of information, we will delay until the last section our discussion of Hayek’s response to Lange on the incentives question. Instead, we will next examine Hayek’s political arguments against socialism. He began developing the argument in articles written in the late 1930s, but more famous is the analysis contained in *The Road to Serfdom* ([1944] 1976).

### III. The Road to Serfdom

#### A. *Origins of the Book*

*The Road to Serfdom* carries the dedication, “To the Socialists of All

<sup>5</sup> For more on “market process theory” see Kirzner (1973, ch. 1; 1997); Ludwig Lachmann (1976); and Esteban Thomsen (1992). Hayek’s was not a blanket rejection of general equilibrium theory. He thought that even the static Walrasian model contained important insights about market interdependence, and he spent much of the later 1930s in an unsuccessful attempt to develop a dynamic intertemporal general equilibrium model of a capital-using monetary economy, as Jack Birner (1994, pp. 2–5) discusses.

Parties.” This was not just a rhetorical swipe; in the 1930s most British intellectuals (Hayek’s presumed audience) *were* sympathetic to socialism (Arthur Marwick 1964). The many differences that might ordinarily separate a Liberal-Labour centrist from a member of the Communist Party of Great Britain were intentionally downplayed once the Popular Front, a union of leftist groups against fascism, emerged in the middle 1930s. In their own way even the Conservatives joined in. In 1938 future Prime Minister (then the Conservative MP from Stockton-on-Tees) Harold Macmillan published *The Middle Way* (1938), in which extensive government control of the economy was extolled. Hayek had little sympathy for such views, dubbing them “the muddle of the middle.”

Hayek later reminisced that the original impetus for the book was comments made by Lord Beveridge (Hayek 1994, p. 102). But he was also fighting against the widely accepted view that National Socialism and other fascisms were a natural outgrowth of capitalism, and that only by adopting socialism could the remaining western democracies avoid a similar fate. Karl Mannheim, an academic who had fled Frankfurt in 1933 and who soon gained an appointment in the Department of Sociology at the LSE, was one of the more sophisticated proponents of this position.

Mannheim outlined the causal mechanisms at work in a lecture before his British colleagues first published in 1937. His starting premise was that monopoly capitalism was the root cause of widespread and sustained unemployment. In an age of mass democracy, orators skilled in the use of the latest propaganda techniques can manipulate public opinion. Demagogues emerge who play on the collective

insecurity of the masses, providing scapegoats and offering escape into symbols of past glories. There is a gradual breakdown of societal responsibility, and totalitarian forms of government step in to fill the vacuum. The breakdown is aided by capitalists, whose allegiances are few and fleeting, and who see new profit opportunities in every change of regime (Mannheim 1940, ch. 3).

Reflecting on the recent experience of Germany, Mannheim concluded that the nascent democracies of Middle Europe were lost. He held out some hope for England, but only if it would give up liberal democracy and embrace a comprehensive system of planning. In the latter half of the book a variety of modern methods of social control are outlined, all of which could be used to make the transition from a liberal to a planned society. What implications did Mannheim think such planning had for freedom?

At the highest stage freedom can only exist when it is secured by planning. It cannot consist in restricting the powers of the planner, but in a conception of planning which guarantees the existence of essential forms of freedom through the plan itself. For every restriction imposed by limited authorities would destroy the unity of the plan, so that society would regress to the former stage of competition and mutual control. (Mannheim 1940, p. 378)

Mannheim’s book was received well. The reviewer in *Economica* described it as “epoch-making,” adding that “it is devoutly to be wished that the teaching of the book may, through various channels, filter down from the specialist readers and seep into the popular mind, especially into the political mind” (F. Clarke 1940, pp. 330–31).

Hayek’s political works of the late 1930s and early 1940s may be read as

an attempt to turn arguments like Mannheim's on their head.<sup>6</sup>

Rather than the only means of *countering* totalitarianism, Hayek argued that planning itself constituted a significant step along the road toward the totalitarian state.

The main point is very simple. It is that comprehensive economic planning, which is regarded as necessary to organize economic activity on more rational and efficient lines, presupposes a much more complete agreement on the relative importance of the different social ends than actually exists, and that in consequence, in order to be able to plan, the planning authority must impose upon the people the detailed code of values that is lacking. (Hayek [1939] 1997, p. 193; cf. [1944] 1976, p. 57)

\*\*\*\*\*

In the end agreement that planning is necessary, together with the inability of the democratic assembly to agree on a particular plan, must strengthen the demand that the government, or some single individual, should be given powers to act on their own responsibility. It becomes more and more the accepted belief that, if one wants to get things done, the responsible director of affairs must be freed from the fetters of democratic procedure (Hayek [1939] 1997, p. 205; cf. [1944] 1976, pp. 62–63)

Because of the absence of a shared code of values, authoritarian government tends inevitably to expand beyond the economic and into the political domain, even under those forms of socialism that may have started out as democratic. Mannheim was wrong to think that only under planning would freedom persist. It was just the opposite: Only if democracy is allied with a free market system will freedom of choice be permitted to exist.

<sup>6</sup> Hayek explicitly identifies Mannheim as an opponent in the second chapter of *The Road to Serfdom* ([1944] 1976, p. 21); and also mentions him in his ([1941–44] 1952b, pp. 156, 166n) and ([1970] 1978, p. 6).

Democratic government has worked successfully where, and so long as, the functions of government were, by a widely accepted creed, restricted to fields where agreement among a majority could be achieved by free discussion; and it is the great merit of the liberal creed that it reduced the range of subjects on which agreement was necessary to one on which it was likely to exist in a society of free men. It is now often said that democracy will not tolerate "capitalism." If "capitalism" means here a competitive system based on free disposal over private property, it is far more important to realize that only within this system is democracy possible. When it becomes dominated by a collectivist creed, democracy will inevitably destroy itself. ([1944] 1976, pp. 69–70; cf. [1939] 1997, pp. 205–06)

### B. *Prediction or Warning?*

Hayek's book found a large popular audience (in America after *The Reader's Digest* came out with a condensed version in April 1945, and among later generations in Eastern Europe when samizdat copies circulated), but its reception within much of the Anglo-American academic community was negative. A common criticism focused on Hayek's apparent prediction that planning must necessarily and inevitably lead to authoritarianism; the last sentence in the quotation above is the sort of passage that gave rise to the criticism.

This criticism was repeatedly raised, for example, by Wootton in *Freedom Under Planning* (1945, e.g., pp. 28, 36–37, 50).<sup>7</sup> Wootton's courteous book was explicitly written as a response to *The*

<sup>7</sup> Wootton was not unique; such diverse figures as George Stigler (1988, pp. 140, 147) and Paul Samuelson came away with similar readings. At one point Hayek sent Samuelson a strongly worded letter objecting to the latter's repetition of the inevitability thesis in the 11th edition of his *Principles* text. In a letter dated January 2, 1981, Samuelson graciously apologized and promised to try to represent Hayek's views more accurately in any future work. See the Samuelson file, Box 48, number 5, in the Hayek Archives, Hoover Institution, Stanford, CA.

*Road to Serfdom*. It is also representative of its genre regarding questions of “human nature.” In the first nine chapters Wootton assumes that “planners are public-spirited people who seek only to discover the common good, and to do their best for it” (1945, p. 19). Only in the last chapter is this assumption dropped; but even there she invokes such devices as a better informed electorate, more forthright political parties, and oversight by bodies of concerned citizens to accomplish the manifold goals of planning.

Hayek objected to the criticism, arguing that *The Road to Serfdom* was meant to be a warning, not an historical prediction. He noted that the book’s introduction contains such caveats as “no development is inevitable” (p. 1); “the danger is not immediate” (p. 2); and, most significantly, “Nor am I arguing that these developments are inevitable. If they were, there would be no point in writing this. They can be prevented if people realize in time where their efforts may lead” (p. 4).

Certain of Hayek’s other writings, and in particular his methodological critique of “historicism,” may also be mentioned in his defense. Historicism includes the claim that human history consists of “a necessary succession of definite ‘stages’ or ‘phases,’ ‘systems’ or ‘styles,’ following each other in historical development.” But Hayek rejected this historicist endeavor “to find laws where in the nature of the case they cannot be found . . .” ([1941–44] 1952b, p. 128). Given his clear statements that there exist no immutable laws dictating inevitable historical trends, he was surprised to find others claiming that he had sought to demonstrate the existence of such a trend.

One can see why the “prediction or warning” issue is an important one. If one takes Hayek’s words as predictions

of inevitable trends, the events foretold obviously did not come to pass in England, the country Hayek had in mind when writing the book. If one takes them as warnings, however, his later remarks about the negative “psychological effects” of postwar Labour rule in Britain become more comprehensible, perhaps even apposite (Hayek [1944] 1976, pp. x–xvi).

A final point may help put the dispute into perspective: Neither Mannheim’s nor Hayek’s books were unique in their times. The western world was turned upside down, and all manner of intellectuals, from journalists like Walter Lippmann (1937), to economists like Schumpeter ([1942] 1950) and Karl Polanyi (1944), to philosophers like James Burnham (1941), to historians like Edward H. Carr (1945), felt compelled to ruminate on its past development, present dilemmas, and future prospects.

None of the other authors, though, quite shared Hayek’s fate. He had a hard time finding a publisher for the book, when it finally appeared some of his critics’ reactions bordered on the libelous (e.g., Herman Finer 1945), and Hayek later was to claim that the book “went so far as to completely discredit me professionally” (1994, p. 103). This is one reason why the book should be read today. Readers who know it only by its reputation will be surprised to find that it contains a number of recommendations for state intervention in the economy, as is evident in the following (admittedly qualified) passages:

There is no reason why in a society which has reached the general level of wealth which ours has attained the first kind of security [he had earlier mentioned “security against severe physical privation, the certainty of a given minimum of sustenance for all”] should not be guaranteed to all without endangering general freedom. There are difficult questions about the precise standard which should thus be assured; there is particularly the im-

portant question whether those who thus rely on the community should indefinitely enjoy all the same liberties as the rest. An incautious handling of these problems might well cause serious and perhaps dangerous political problems; but there can be no doubt that some minimum of food, shelter, and clothing, sufficient to preserve health and the capacity for work, can be assured to everybody.

\*\*\*\*\*

Nor is there any reason why the state should not assist the individuals in providing for those common hazards of life against which, because of their uncertainty, few individuals can make adequate provision. Where, as in the case of sickness and accident, neither the desire to avoid such calamities nor the efforts to overcome their consequences are as a rule weakened by the provision of assistance—where, in short, we deal with genuinely insurable risks—the case for the state’s helping to organize a comprehensive system of social insurance is very strong. (Hayek [1944] 1976, pp. 120–21)

Hayek’s remarks *are* qualified, but it seems clear that, at least in 1944, he was willing to countenance some level of “safety net” policy. In a new preface for the book prepared in 1976, however, Hayek wrote that “I had not wholly freed myself from all the current interventionist superstitions, and in consequence still made various concessions which I now think unwarranted” ([1944] 1976, p. xxi).

### C. *Liberty and Knowledge—Hayek’s Alternative Liberal Utopia*

Hayek’s initial arguments prompted one socialist critic (Dickinson 1940) to challenge him to describe his ideal liberal society in more detail. After reading *The Road to Serfdom*, Keynes also challenged Hayek to state clearly the criteria he would use to distinguish acceptable from pernicious government intervention (Jeremy Shearmur 1997). Though these tasks were begun in his 1944 book, Hayek’s most refined response to his critics may be found in

*The Constitution of Liberty* (1960).<sup>8</sup> And indeed, Hayek’s prolonged effort to explore the origins, nature, and sustainability of a liberal market order is probably the most important legacy of *The Road to Serfdom*.

Hayek (1960, p. 11) began by defining “liberty” as a condition “in which coercion of some by others is reduced as much as possible in society.” This produces a dilemma, because the best way to avoid coercion is to set up a coercive power that is strong enough to prevent it. Free society has met the problem by defining a private sphere of individual activity, granting the state a monopoly on coercion, then constitutionally limiting the power of the state to those instances where it is required to prevent coercion. The state’s coercive actions are constrained by the rule of law: the laws it makes in protection of the private sphere must be prospective, known, certain, and equally enforced (pp. 205–10). Hayek contrasts these with laws that seek specific outcomes within the private sphere, such as certain redistributive patterns (p. 232). What especially rankled him was the attempt to turn what Hayek viewed as legitimate “safety net” insurance schemes into explicit instruments of redistribution aimed at securing “social justice” (e.g., p. 289). In his discussions of old age and health insurance policy, some of his dark warnings about intergenerational political strife make for timely, if uncomfortable, reading today (e.g., pp. 295–98).

In his political writings Hayek frequently stated that he was no fan of *laissez-faire*. By this he meant that a

<sup>8</sup> Hayek’s other major contribution was the trilogy *Law, Legislation and Liberty* (1973–79), which contained his diagnosis of why liberal democracies were being taken over by special interests, and a proposed legislative reform aimed at strengthening liberal constitutionalism.

market system must be embedded in a set of other institutions—a democratic polity, with strong constitutional protection of a private sphere of individual activity, with enforced and exchangeable property rights—if it is to work. The problems of the Eastern European transition have made these ideas seem almost obvious, and they *are* ancient ideas. But Hayek was stressing them before they (re)gained popularity.

Hayek also linked liberty to his recurring theme, the problem of how to make use of dispersed knowledge. As society progresses the division of knowledge increases, as does our dependence on the knowledge possessed by others: “When we reflect how much knowledge possessed by other people is an essential condition for the successful pursuit of our individual aims, the magnitude of our ignorance of the circumstances on which the results of our action depend appears simply staggering” (p. 24). The most successful societies are those in which each individual is able to put his own local knowledge to its best uses. From this perspective, *The Constitution of Liberty* describes the complex of institutions and beliefs that promote the discovery, transmission, and use of knowledge so that individuals might have the best chance to have success in pursuing their own goals. Chief among the enabling conditions is liberty itself:

The rationale of securing to each individual a known range within which he can decide on his actions is to enable him to make the fullest use of his knowledge, especially of his concrete and often unique knowledge of the particular circumstances of time and place. The law tells him what facts he may count on and thereby extends the range within which he can predict the consequences of his actions. (pp. 156–57)

Hayek’s political philosophy is not uncontroversial. Critics have pointed out that he mixes a number of different

ethical and political philosophies together, positions that may not cohere and all of which have been independently criticized; that in particular it is difficult to square his Kantian ethical ideas about universalizability with his Humean epistemological pessimism; and that the characteristics he requires that laws possess are not adequate to guarantee liberty (Arthur Diamond 1980; Chandran Kukathas 1989; Gray 1986, ch. 6). If one is judging his work against the standard of whether he provided a finished political philosophy, Hayek did not succeed though Shearmer (1996) contains a diagnosis of what would need to be done to build a coherent liberal political philosophy starting from Hayek’s foundations, and an admittedly preliminary attempt to begin that enterprise. It nonetheless remains an impressive attempt to construct an integrated system of social philosophy, one that blends insights from such diverse fields as economics, political philosophy, ethics, jurisprudence, and intellectual history. And it is hard to deny Hayek’s foundational contention that a liberal order allows individual knowledge to be better used than does socialism.

#### IV. *Hayek and Spontaneous Orders*

##### A. *The Critique of Rationalist Constructivism*

Hayek’s final set of arguments against socialist planning begin from the premise that the market system and certain other social institutions are examples of spontaneously organized complex phenomena, spontaneous orders which generate unintended beneficial consequences for those lucky enough to live under them. Now especially in mid-century, most of Hayek’s readers would have thought it quaint to consider the market system as a paradigmatic exam-

ple of a self-organizing system. For them it was more like a machine that had broken down, something that required radical repair, if not outright replacement. Hayek labeled this opposing viewpoint “rationalist constructivism,” located its origins in the French rationalist variant of Enlightenment thought, and used it as a kind of foil in many later writings. Thus, according to Hayek, rationalist constructivists believed:

that human institutions will serve human purposes only if they have been deliberately designed for these purposes, often also that the fact that an institution exists is evidence of its having been created for a purpose, and always that we should so redesign society and its institutions that all our actions will be wholly guided by known purposes. To most people these propositions seem almost self-evident and to constitute an attitude alone worthy of a thinking being. (1973, pp. 8–9; also see his [1964a] 1967; [1970] 1978)

Hayek’s earliest critique was aimed at “the engineering mentality” (1952b, ch. 10) of the “men of science” ([1941] 1997; cf. Editor’s Introduction), but his target was later broadened to include proponents of rationalism, empiricism, positivism and utilitarianism (1988, pp. 60–62). Hayek’s apparently creative historiography has been challenged by both Diamond (1980) and Gray (1988).

Following Carl Menger ([1883]1985, Book 3), Hayek argued that spontaneous social orders are products of human action but not intentionally designed. Such institutions evolved gradually, and only after they emerged were their advantages recognized, first by certain of the Scholastics, then by various members of the Scottish Enlightenment, and then again by Menger. Hayek’s fascination with such orders began back in the 1930s ([1933] 1991, pp. 17–34; Caldwell, 1988b, discusses the importance of the piece), and indeed is evi-

dent in the question he broached in “Economics and Knowledge” about how human action gets coordinated even in the absence of a central controlling authority. In his early writings the coordinating role of freely adjusting market prices was highlighted. But soon Hayek began including all sorts of practices, norms, rules and other forms of institutions as aiding social coordination. Thus he would argue that such institutions as language, the law, and money emerged because they contributed to the ability of individuals to pursue their own goals; that our morals went through a similar sort of cultural evolution; and that (as we shall soon see) even the ordering of neural networks within the human brain develops analogously.

Hayek employed his account of cultural and institutional evolution to criticize the view that society can reconstruct institutions or moral codes to be more rational. As always, knowledge questions played a prominent role in the argument. Hayek believed that spontaneously emerging practices, norms and institutions not only allow humans to use knowledge better, they also permit knowledge gained in the past to be preserved, because they are artifacts reflecting the experimentation of many people over long periods of time:

Far from assuming that those who created the institutions were wiser than we are, the evolutionary view is based on the insight that the result of the experimentation of many generations may embody more experience than any one man possesses. (1960, p. 62)

As a result, attempts to radically alter or reconstruct these institutions are fraught with dangers; we simply do not have enough knowledge about what they do and how they do it. Given our ignorance, only “the hubris of reason” would lead one to believe that we can rebuild society from the ground up (1973, p. 33).

“Reason properly used” understands the limits of what reason can do; like David Hume before him, Hayek sought to “whittle down the claims of reason by the use of rational analysis” (1960, p. 69). The implication for economic analysis was for Hayek straightforward: “what we can know in the field of economics is so much less than people aspire to” (1983, p. 258).

Hayek’s evolutionary arguments have been extensively criticized (particularly his reliance in later work on the idea of “group selection”), perhaps most effectively by those like Viktor Vanberg (1994, chs. 5–7 & 12) who believe that the design of constitutions is an essential element in the improvement of liberal orders. And Hayek, after all, was not averse to making proposals about constitutional design himself (1979, ch. 17), in apparent violation of his own strictures concerning constructivism. But he was also concerned with how specific instances of liberal market orders ever came to be created in the first place, particularly because they sit so uneasily with, as he put it (1988, ch. 1), both our “instinct and reason.” This is a question that his critics have thus far left unanswered.

In any event, one particular exemplar of Hayek’s treatment of spontaneous orders, his book on the foundations of theoretical psychology, *The Sensory Order* (1952a), has not been much studied by economists (exceptions include William Butos and Roger Koppl 1993; Horowitz 1994; and Steve Fleetwood 1995). The book does not deal even peripherally with socialism. But properly understood it provides a key for comprehending the nature and extent of Hayek’s divergence from mainstream economics in the postwar period, and so may help to explain why modern information theorists writing about market socialism have had such a hard time un-

derstanding him. As such, a short digression follows.

#### B. A Digression—The Sensory Order

During the war Hayek began a major project, one with both historical and methodological dimensions, on “the abuse of reason.” As he later explained (1952b, pp. 10–11), the larger project was never completed, but he did finish an extended piece on methodology entitled “Scientism and the Study of Society” (reprinted in Hayek, 1952b). The essay contains a critique of the idea that the methods that had been so successful in the natural sciences should also be applied in the social sciences; “scientism” refers to what Hayek called the “slavish imitation” (1952b, p. 24) by social scientists of (what often turned out to be a caricature of) such methods. He also offered a positive methodological alternative to scientism. His starting point was to describe what he took to be the central subject matter of the social sciences: the acting individual. Hayek outlined some fundamental premises about the mind of such an individual, and about the relationship between beliefs and action. Among the premises were: the structure of the human mind is everywhere the same; our actions are based on our “opinions” (presumably these include both perceptions and beliefs); these opinions are subjectively held (and as such, some are wrong); finally, perceptions and beliefs differ among individuals.

Turning from a description of the subject matter of the social sciences to a discussion of how best to study it (that is, from ontology to methodology), Hayek proposed a “compositive” methodology in which the social scientist’s task is to show how the actions of many such individuals come to constitute broader, more complex social phenomena. In his examination of the issues,

Hayek reached a crucial conclusion: when studying complex phenomena, typically one cannot predict individual actions. Pattern predictions, or explanations of the principle underlying the composition of social phenomena, are usually the best one can do (Hayek 1952b, chs. 3 & 4; cf. Caldwell 1989).

Hayek's next step was to try to provide a firmer basis for his statements about the nature of mind. In the summer of 1945 he dug out a manuscript on psychology that he had written during his student days in Vienna nearly a quarter of a century earlier. The essay formed the basis for his next major contribution, *The Sensory Order* (1952a).

It appears that Hayek viewed *The Sensory Order* as providing the physiological underpinning for the various theses he had advanced concerning the relationship between mind, knowledge, and human action in the "Scientism" essay.<sup>9</sup> Hayek began by distinguishing between the physical order existing in the external world and our phenomenal experience of it. Our sensations, our perception of the qualities of objects, our whole mental image of the world, start from stimuli received through our central nervous system. This central nervous system constitutes the common "structure of the mind" shared by all individuals that had been posited in "Scientism."

The system provides a relational ordering of stimuli: the sensory order. The qualitative differences in perceptions and sensations that we experience depend on the specific pattern of neuron firings that a given stimulus produces within various neural networks. The experiences and beliefs of individu-

als will differ according to the pattern of neural firings that each develops. Thus though the structures of our minds are the same, there is a physiological basis for the notion of a dispersion of perceptions and experiences and, ultimately, of knowledge. The sensory system that results as the individual interacts with and receives feedback from the environment is both self-organized and adaptive, one that is constantly adjusting (strengthening certain pathways and connections, while diminishing the strength of others) as new stimuli come in. The adaptations represent "learning" by the individual.

### C. *The Significance of The Sensory Order*

*The Sensory Order* clearly heralds the full emergence of complex "spontaneous orders" as a theme in Hayek's work. But for our purposes, its import lies in viewing it as Hayek's decisive step away not just from the study of economics, but from standard economic reasoning, as well.

To see this note that, first, *The Sensory Order* provides a naturalistic ontological grounding for a number of methodological prescriptions. Both the recourse to ontology and the specific methodological prescriptions Hayek derived were diametrically opposed to the philosophical world view not just of most mainstream economists of his day, but of psychologists as well.

In mid-century, positivism and instrumentalism were the philosophical doctrines that most influenced the methodological self-consciousness of psychologists and economists. Positivists eschewed talk of ontology or metaphysics, and measured the veracity of theories not by their ontological grounding but by their ability to allow scientists to control or predict phenomena. This was the reasoning that al-

<sup>9</sup> Hayek links the two essays in a retrospective piece (1982a, p. 289), and in his letter to John Nef (cited earlier). Further, the "Scientism" essay is the only work by Hayek cited in *The Sensory Order*.

lowed behaviorist psychologists to deny scientific status to any and all attempts to “get beneath” observable behavior to discover its origins in human consciousness. Likewise, both Paul Samuelson’s recourse to “revealed preference” and Milton Friedman’s “as if” methodology (that is, the claim that the realism of a theory’s assumptions is unimportant compared to its ability to predict) share the positivist emphasis on observable phenomena and prediction. (The methodological positions of both Samuelson and Friedman are examined in detail in Caldwell [1982] 1994.)

This aversion to ontology was exactly the sort of view that Hayek attacked in both the “Scientism” essay and in *The Sensory Order*. Furthermore, by providing a grounding for his methodological claims in physiological psychology, Hayek believed that he was the one who was truly being “scientific.” Hayek’s psychological work is now recognized as an early challenge to behaviorism (e.g., Gerald Edelman 1987, ch. 1; Donald Hebb 1949 was another early dissenter), and his ontological boldness explains his attractiveness to scientific realists of today like Tony Lawson (1994) and Fleetwood (1995).

The specific methodological conclusions that Hayek drew also contradicted the positivistic dogma of the time. As noted above, when considering complex phenomena, Hayek claimed that typically the best that we can do is to explain the principles by which they work. To the extent that prediction is possible at all, only broad “pattern predictions” may emerge (1952b, ch. 8; cf. [1955] 1967, [1964b] 1967). Such pessimistic claims about the ability of economists to predict may sound a bit less controversial today. But when he was writing and for a number of decades to come it would separate him from nearly all mainstream economists, even those, like

his colleagues at the University of Chicago, whose views on policy were often very similar to his.

Finally, *The Sensory Order* marked Hayek’s further movement away from the constructs used by economists to understand the market order. For mainstream economists, the concepts of “equilibrium” and “rationality” are virtually coextensive with economic analysis. By the middle of the century Hayek believed that neither one shed much light on the most important questions.

Recall that in “Economics and Knowledge” Hayek had asked: How does human action get coordinated when knowledge is limited and dispersed? In light of this question, he felt that the “equilibrium theory” of his day was of little use: in equilibrium, full coordination has already occurred. Standard theory also assumed the presence of rational agents who all share the same, objectively correct information. The individual described by Hayek in *The Sensory Order* had little in common with this “rational (and fully informed) economic man” construct.

Hayek never explicitly tried to change economics, he never argued that his own description should replace “rational economic man” within economic models. And certainly a central question is what difference Hayek’s various departures all might make. One way to see is briefly to examine the latest installment of the market socialism debates.

## V. *Market Socialism and the Economics of Information*

### A. *A New Chapter in the History of the Debate over Socialism*

There is renewed interest in market socialism, and emerging with it has been a new stylized history of the debates, one that highlights the contribu-

tions of the economics of information (Bardhan and Roemer, eds. 1993, pp. 3–9; Stiglitz 1994).

The first part of this history incorporates the conventional story that had been told about the socialist calculation debate through about the 1970s, with Abram Bergson (1948) being the classic early statement (see Lavoie 1985, however, for a modern revisionist reply). In that account, the debate was opened by von Mises, who declared the “impossibility” of rational calculation under socialism. The “mathematical solution” of Dickinson, which utilized the Paretian or Walrasian general equilibrium model to show the formal similarities between a socialist and capitalist regime, undermined Mises’ claim of impossibility. Hayek’s contribution via his “complexity argument” was to question the practical feasibility of solving a general equilibrium system. Lange’s proposed “trial and error method” undercut Hayek’s claim, and the actual feasibility of socialism then became viewed as an empirical matter. Later the emergence of supercomputers and of computable general equilibrium models suggested that the complexity problem might well be solvable, so that the actual establishment of a viable socialist state might only be a matter of time.

But this was not to be. The poor performance of communist regimes suggested that the chief problem was not one of computation, but of “incentive compatibility.” In the new account the Walrasian general equilibrium model (or its more recent counterpart, the Arrow-Debreu model) became the villain of the piece, and particularly its implication that a purely competitive system will yield efficient market outcomes, albeit once a stringent set of marginal conditions is met. If information is asymmetric, however, deviations from a Pareto-efficient outcome can occur.

While economists in earlier periods may occasionally have hit upon specific instances of information problems (e.g., Berle and Means 1933), the Arrow-Debreu framework posed an obstacle, directing attention away from questions of information.

In contrast, the economics of information provides a systematic means of identifying and classifying the wide array of problems that informational asymmetries can produce. For example, within a planned economy various monitoring problems may arise: production managers might decide to feather their own nests, to seek patronage, to practice favoritism, or in other ways to deviate from the plan; product quality, being multidimensional, is difficult to monitor; and so on. Nor is it an easy matter for the government to design and enforce a system of constraints to prevent managers from behaving opportunistically. A government that is in any way responsive to an electorate will find it difficult to commit itself credibly to stringent actions, such as raising prices for consumer goods, shutting down production lines when product demand declines, firing well-liked but incompetent (or worse, unlucky) managers, or informing redundant workers that they must be retrained or transferred. But plant managers confronted with such “soft budget constraints” (so dubbed by Kornai 1986) are less likely to take their production goals seriously. Investment decisions also pose problems, because it is difficult to avoid either too much or too little risk-taking behavior, and without competing projects, it becomes problematical even to assess whether an investment once undertaken is in fact economic (Roemer 1993, pp. 91–92).

As these brief examples suggest, the economics of information provides a powerful set of tools for identifying and analyzing the problems of a socialist

economy. According to the new history, current models greatly improve on those of the past because they contain a sophisticated understanding of agency problems. Indeed, if one accepts this account, the evolution of the various positions in the socialist calculation debate becomes a paradigmatic example of how theoretical progress can occur, and has occurred, in economics.

Perhaps inevitably, historical accounts that emphasize progress tend toward Whiggism: the work of economists in the past is but a prelude to developments in the present. Stiglitz, for example, invokes the debates of the 1930s, but mostly as window dressing. His book *Whither Socialism?* (1994) is best read as a celebration of the economics of information, one that uses the question of the viability of socialism as its chief application.<sup>10</sup>

Other accounts treat the arguments of the 1930s more carefully (e.g., Bardhan and Roemer 1993, pp. 3–9). Because of their reliance on a full information general equilibrium framework, Lange and other market socialists fare poorly because they (inevitably) ignored the question of incentives. Hayek makes for a harder interpretive case. To be sure, he did understand that the price system is a mechanism for conveying information, and modern theorists are quick to acknowledge this. Thus in his collection *The Informational Role of Prices* (1989), Sanford Grossman quotes in three different articles the same pas-

sage from Hayek's "The Use of Knowledge in Society" (1945) about the price system as a communication mechanism. In a popular textbook, Hayek is credited with having provided the initial insight later formalized by Leonid Hurwicz about the low informational requirements of a decentralized price system (Paul Milgrom and John Roberts 1992, p. 85).

But this only raises a new set of questions. Given the limited nature of his tools, how was it that Hayek stumbled onto the insights that he did? And given that Hayek's critique of Lange focused on how changing relative prices convey *knowledge*, why did he make so little headway toward developing an economics of *information*? This last question is pointedly raised by Makowski and Ostroy who, noting that the field of "mechanism design" differentiates between (i) the information/communication requirements of mechanisms, and (ii) the incentive properties of mechanisms, are led to the following assessment of Hayek's contribution:

Failing to emphasize incentives as he did and concentrating on the problem of communication, Hayek should have arrived at a conclusion much closer to market socialism than he did. Of course it could be noted that whereas the division between (i) and (ii) may be analytically useful, it is clearly artificial—any mechanism is a composite of (i) and (ii). If, as it seems to us, Hayek did not recognize the need to separate the two functions (equivalently, to separate communication of information from elicitation of information), his critique of market socialism is "fuzzy." (in Bardhan and Roemer, eds. 1993, p. 82)

From this perspective, Hayek's major contribution was to point out that in an environment of scarcity in which information is disaggregated or dispersed, the price system is a low-cost mechanism for its aggregation and transmittal. Later theorists formalized this insight, in the course of which it became clear that

<sup>10</sup>To be fair to Stiglitz, the book was adapted from his Wicksell lectures and was originally to be on the economics of information, which affected its format. But even so, there is reason for historians to be uneasy when in the bibliography of a book on the economics of socialism, Mises and Robbins, Dickinson and Dobb go uncited and Hayek, Lange, Abba Lerner, and Fred M. Taylor get only one entry each (Hayek's citation is to *The Fatal Conceit*). By way of contrast, there are 122 articles or books written or co-authored by Stiglitz listed in his bibliography.

Hayek (and his opponents) failed to grasp a second problem, that of opportunistic behavior in situations of informational asymmetries. Because Hayek (and the Austrians in general) failed to see the importance of incentives, and of the necessity of developing mechanisms to overcome problems associated with asymmetric information, they could not move the field forward. They missed the salient fact that information problems plague *both* market and socialist regimes, and as a result their analyses were at best incomplete, and at times deficient. These informational issues are the very problems that a new generation of more sophisticated models are able to address.

I will argue that though there is some truth in this account, it also constitutes a paradigmatic example of Whig history, where earlier contributions that do not fit well with contemporary theory perforce are diminished or misunderstood. I will then try to show how such present-centered interpretations of the historical record may have significant consequences for a proper understanding of the issues.

### B. *The Incentives Question*

First, is it true that Austrians had had no appreciation of the question of incentives? The evidence here is mixed.

Hayek frequently mentioned incentive issues in the final chapter of *Collectivist Economic Planning* (1935). He pointed out that the “Russian experiment” provided a concrete example of the “obvious difficulty of making people follow out the plan loyally” (p. 206). He raised the question of whether private ownership of property is necessary for managers to be properly motivated, and asked what criteria should be used to assess managerial decision making (pp. 219–20, 231–32). Hayek was particularly concerned with the investment de-

cision, and the “tendency to prefer the safe to the risky enterprise” that he believed would prevail among socialist managers (p. 234).

Mises, too, recognized the problem. His 1920 paper contains a section entitled “Responsibility and Initiative in Communal Concerns,” where he wrote: “It is now universally agreed that the exclusion of free initiative and individual responsibility, on which the successes of private enterprise depend, constitutes the most serious menace to socialist economic organization” (Mises in Hayek, ed. 1935, p. 116). Other early work that mentioned the incentive problems facing socialism (John Rae 1891, ch. 11, section 4; William H. Mallock 1907) provides evidence for Mises’ claim that this limitation of socialist systems had long been recognized.

A concern for incentives is also implicit in some of the later Austrian writings. For example, Boettke (1995) argues that certain sections of *The Road to Serfdom* anticipated some of the public choice literature on government failure. Furthermore, the notion that certain institutional arrangements (i.e., free markets operating under a regime of enforced and exchangeable private property rights) spur and reward entrepreneurial alertness is a direct recognition of how institutions affect the incentives agents face. And as Hayek himself wrote in a late piece,

We have come to understand that the market and the price mechanism provide in this sense a sort of discovery procedure which both makes the utilization of more facts possible than any other known system, and which provides the incentive for constant discovery of new facts which improve adaptation to the ever changing circumstances of the world in which we live. ([1976] 1978, p. 236)

The conclusion, no matter how convenient, that the Austrians ignored incentives questions must be rejected.

On the other hand, it is also clear that the Austrians made no sustained systematic contribution to the now enormous literature on the economics of information. More interesting, it is also evident that Hayek sometimes dropped the argument even when he could have used it. Thus in his rebuttal to Lange he was willing to grant, “for the purpose of this argument,” that socialist managers “will be as capable and as anxious to produce cheaply as the average capitalist entrepreneur” ([1940] 1948, p. 196). The real question for the historian is: Given Hayek’s unrelenting opposition to socialism, given his readiness to develop political and even evolutionary arguments against it, and given his evident knowledge of this line of attack, why was it not pursued more vigorously?

A number of plausible explanations exist. Recall that Lange had offered two responses to Hayek’s claim that a socialist regime would be plagued by incentive problems, namely: 1) the only real agency problem is one of bureaucracy, but this is a generic problem that exists whenever corporations are large and competition is absent, and 2) such “sociological” issues are not properly included within the domain of economics.

Hayek never bought the first argument, denying Lange’s premise that the emergence of large corporations necessarily implied the end of competition. In “The Meaning of Competition” (1946) Hayek argued that market rivalry is the key to true competition, and that such rivalry can exist even when the conditions for perfect competition do not hold. The assumptions of the theory of perfect competition misled people like Lange to conclude that, because so few markets in the real world satisfy the assumptions, they must be monopolistic. Once again

static equilibrium theory obscured the nature of reality.<sup>11</sup>

It may be, however, that Hayek at least in part accepted Lange’s second argument. Questions of “bureaucracy” had indeed traditionally been the domain of sociologists (e.g., Max Weber 1978, pp. 956–1005). Though the line between economics and fields like sociology was less clearly drawn when Weber was writing before the First World War, by the 1930s under the dual influence of positivism and the professionalization movement the disciplinary divisions were hardening.

It was also an article of faith among intellectuals living in the 1930s that human behavior was supremely malleable. Time and motion studies, techniques of mass propaganda, and other methods of behavior modification were being studied and perfected everywhere; even Lenin had come grudgingly to admire the Taylor System of Scientific Management (Merkle 1980, ch. 4). Who was to say that an appropriately “educated” or “conditioned” manager might not someday be “socially engineered,” one whose actions would be indistinguishable from one who was responding to the carrot and stick of pecuniary profits and losses? And what special insight could an economist bring to this question of “psychology”? Indeed, Hayek himself occasionally used the adjective “psychological” when discussing issues of incentives (e.g., 1935, pp. 206, 232).

Had Hayek pressed his argument, he would at a minimum have opened himself up to the charge that he was speak-

<sup>11</sup>Economists continue to disagree, of course, about the consequences of the fact that few real world markets meet the assumptions of perfect competition. Discussions of “workable competition” in the 1940s and of “countervailing powers” in the 1950s, and the development of “contestable market” theories in the 1970s and of the “imperfect competition” and “strategic trade” theories in the 1980s, all appear to share this common origin.

ing outside of his area of expertise. That very claim was made at one point. Hayek's occasional reference to "human nature" in *The Road to Serfdom* elicited the following admonition from Evan Durbin (1945, p. 359): "It is a pity that Professor Hayek makes no use of the light that has been thrown upon these matters by scientific inquiry in recent years; and remains content with old-fashioned and unsupported, yet dogmatic, generalizations about human nature and emotional behaviour." It is no small irony, given Durbin's remarks, that Hayek would within a decade complete his book on the foundations of theoretical psychology (Hayek 1952a).

Hayek would also have to contend with the old socialist belief that the opportunistic behavior that gives rise to agency problems is *itself* a product of capitalist society. Marx had long ago argued that one's consciousness was determined by one's social condition, rather than the reverse. While capitalism promoted greed, under socialism a new socialist man, one willing to sacrifice his own comfort for the greater good, was supposed to emerge.<sup>12</sup> Though this utopian vision has long been challenged by opponents,<sup>13</sup>

<sup>12</sup> Even the usually hard-headed modern socialists Bardhan and Roemer (1993, p. 8) exhibit occasional nostalgia for these earlier arguments, leaving the door open a crack for the emergence of the long-hoped-for socialist economic man(ager): "it may be the case that the culture of management in a market-socialist economy, with its *Weltanschauung* of egalitarianism, would be different, at least to some extent, from the culture of capitalist management."

<sup>13</sup> Mises (1935, p. 119) made the point with characteristic flair: "All socialist systems . . . proceed from the assumption that in a socialist society a conflict between the interests of the particular and the general could not possibly arise. . . . The obvious objection that the individual is very little concerned whether he himself is diligent and enthusiastic, and that it is of greater moment that everybody else should be, is either completely ignored or is insufficiently dealt with by them. They believe they can construct a socialist commonwealth on the basis of the Categorical Imperative alone."

there is no way to falsify it, because it refers to an unspecified point in time in a supposedly radically altered future.

Hayek knew that socialism faced incentive problems, but he didn't want to be drawn into what promised to be an unproductive debate, so he did not pursue the question. The reasons behind his action were complex and subtle, and current historical treatments have not shed much light on them.

Modern theorists might concede the historical point. But they would still insist that the significance of the incentives question has less to do with its history than with the adequacy of Austrian analysis. Because of their failure to provide a systematic analysis of the problems arising from asymmetric information, Austrians have missed certain limitations of markets. As a result, their confidence is misplaced; their defense of the market system is naive.

It is true that, except for the occasional aside (e.g., Hayek [1982b], in Chiaki Nishiyama and Kurt Leube, eds. 1984, p. 61), Mises and Hayek never engaged the economics of information literature. A number of younger Austrians *have* begun that task, however, among them Stephen Boehm (1989), Thomsen (1992), and several of the authors in Boettke and David Prychitko, eds. (1996). And surely it is uncontroversial that the Austrians have much to gain from a continuation of their interaction with this literature.

But the coin may be flipped: mainstream analysts have seldom engaged (and when they have, have not always understood, as is evident in the exchange between Hurwicz 1984 and Kirzner 1984; compare Boehm 1989; Kirzner 1997) the Austrian position, and thus may also have something to gain from a better understanding of the Austrian insights. For those who might doubt that this advice about the advan-

tages of better mutual comprehension is anything more than a bromide, let us get down to cases by examining how Hayek might have responded to the latest iteration of the market socialism debate.

### C. *An Austrian View of the New Debate on Market Socialism*

Information theorists differ over whether some form of market socialism, one that is cognizant of incentive compatibility problems and takes steps to resolve them, can survive or even prosper. We may take the works of Stiglitz and Roemer as representative of the opposing views.

Stiglitz, representing the mainstream, admits that market economies are themselves plagued with agency problems, particularly when it comes to the classic problem of the separation of management from ownership in large corporations. The economics of information provides both the glasses to see what the problems are and, as progress occurs, the tools with which to fix them. The prospects for market socialism, however, are less bright. Because they lack both the market discipline provided by competition and the innovation that a decentralized market economy promotes, socialist regimes invariably will be less successful than their market counterparts (Stiglitz 1994, chs. 7–9).

Roemer demurs, believing that the economics of information can be used to fix socialist regimes, too. Roemer is daring in the sorts of innovations he is willing to countenance. For example, because of the commitment credibility problems that governments face, he does not believe that state ownership of the means of production is necessary (or even desirable) under socialism: “Socialists should be eclectic in their attitude toward property relations: there

may be many forms of ownership more amenable to socialism’s goals than traditional state ownership of the means of production” (Roemer 1994, pp. 6–7). In the place of the competition that is provided naturally within market economies, he envisions foreign competition, or even separate free market sectors co-existing within socialist economies, as doing the job.

Not all of the proposals put forward by market socialists are as “radical” as Roemer’s in terms of the leeway they would permit to markets; indeed, some might question whether Roemer’s proposals even qualify as socialism. But all do seek to face the problem of incentives squarely. The middle section of his book with Bardhan (1993), entitled “Microincentives,” is devoted to the solution of a variety of incentive compatibility problems that afflict market socialist regimes. For economists who might dismiss these proposals as utopian, Roemer and Bardhan (1994, p. 179) rightly point out that cynicism about reform flies in the face of “much of modern economic theory, which is devoted to designing institutions that will lead self-interested players to arrive at efficient outcomes . . .”

The specifics of the new proposals have been criticized: N. Scott Arnold (1996) claims that monitoring problems would persist even were Roemer’s reforms enacted. But surely, from a theoretical standpoint Roemer and Bardhan are right to insist that if the economics of information can help make mixed market economies work better, there is nothing in principle to prevent it from being employed to modify and reform market socialist economies. Unfortunately, because he takes the Arrow-Debreu model as his foil rather than the more recent work of sophisticated market socialists, Stiglitz does not even address this issue. In a

review, Roemer (1995) pointedly notes that Stiglitz' *Whither Socialism?* should really be read as an attack on the conventional general equilibrium model rather than on recent models of market socialism.<sup>14</sup>

It certainly seems plausible that if the chief difficulty facing market socialism is the presence of the sorts of incentive problems that the economics of information identifies, then it should be possible to construct a model of an efficient market socialist system. In this sense, there is a *similarity* between the economics of information and its theoretical predecessor. (This is ironic, given the frequent emphasis by Stiglitz and other proponents of the economics of information approach on how it differs from general equilibrium theory.) Within the general equilibrium model there was no way on theoretical grounds to distinguish a competitive free market system from a market socialist one. In a like manner, there is no way *within the model* provided by the economics of information to distinguish between a free market system and a market socialist one in which all agency problems have been identified, and to the extent possible, corrected.

It is here that the contributions of the Austrians may make a difference. This has been recognized by advocates of the Austrian view like Boettke (forthcoming), who considers the Austrian analysis of socialism to be *the* most important Austrian contribution to economics, as well as by detractors like Fikret Adaman and Pat Devine (1996),

<sup>14</sup> It is strange, however, that Roemer (1995) should characterize Stiglitz' book "An Anti-Hayek Manifesto" rather than, say, "An Anti-Walras Manifesto." Roemer bases his characterization on a few remarks made by Stiglitz in one of his last chapters, in which Hayek's *The Fatal Conceit* is briefly critically discussed. It does not seem to this reader that either Roemer or Stiglitz has fully comprehended Hayek's evolutionary arguments.

who nonetheless view the Austrian challenge as more fundamental than those provided by neoclassical economics. Precisely because they were at times willing to grant, for the sake of argument, Lange's claim that questions of incentives were not the concern of economists, the Austrian arguments concentrate on areas that are different from those emphasized by information theorists.<sup>15</sup> They focus instead on concerns that lie, as it were, *outside of the model*. The sorts of issues that they would raise are as follows:

1. *Knowledge is different from information.* Hayek's writings about the ability of the price system to convey information in a world in which knowledge is dispersed may well have inspired others to investigate the design of mechanisms for resource allocation within such environments. But it should also be clear that when he used the term "knowledge," he was referring to something that is different in kind from the concept of "information" as it is used by current theorists.

For Hayek, knowledge is dispersed, as mechanism design theorists picked up on. But some knowledge, especially that generated as a result of day to day contact within specific local markets, is also tacit. Tacit knowledge is not di-

<sup>15</sup> To be sure, some of the points mentioned below have been made by information theorists, including Stiglitz, whose remarks (1994, p. 134) on the importance of the institutional framework in which competition is embedded could have been written by Hayek. What is less clear is *how such insights follow analytically from the models found in the economics of information literature.*

One referee commented that many of the Austrian insights have been incorporated within other areas in economics, such as in the "bounded rationality" literature. It may be noted, however, that Thomsen (1992, ch. 4) argues that Austrian market process theory differs significantly from Herbert Simon's early work on bounded rationality, and Esther-Mirjam Sent (1997) suggests that the more recent literature on bounded rationality may face historiographical problems of its own.

rectly communicable. Theories that treat “information” as if it was contained in little packets that can be “elicited” once the appropriate mechanism is “designed” misunderstand the fundamental fact that no mechanism can elicit tacit knowledge. Furthermore, tacit knowledge is important: it affects and informs the decisions of entrepreneurs and ultimately gets reflected in the prices that emerge in a competitive price system. In proposed systems in which entrepreneurial decision making is eliminated, or replaced by managerial processes, this knowledge gets lost. One still has “prices” in such systems, but they contain less “information.”

The mainstream often focuses on how markets “convey information.” Though Hayek considered this role important, he was concerned additionally with the creation, discovery, and conservation of knowledge. Furthermore, the Austrian notion of “discovery” is quite different from the neoclassical idea of “search.” A neoclassical economist like Stiglitz (1994, p. 8) can ask: Are “the expenditures on information acquisition too little, too much, or just right?” To answer this question one must be able to compare the expected costs of additional search against expected benefits. Contrast this with Kirzner’s (1997, p. 62) characterization of entrepreneurial discovery:

For the Austrian approach imperfect information is seen as involving an element which cannot be fitted at all into neoclassical models, that of “sheer” (i.e., unknown) ignorance. . . . the discovery which reduces sheer ignorance is necessarily accompanied by the element of *surprise* . . . one had not hitherto realized one’s ignorance. Entrepreneurial discovery is seen as gradually but systematically pushing back the boundaries of sheer ignorance . . . (emphasis in the original)

2. *The market process is not well captured by mainstream theories of*

*competition*. Hayek, like modern information theorists, believed that the theoretical tools of his day were inadequate for understanding the limitations of socialism, and he identified the unrealistic treatment of knowledge as a prime defect. But his response was not to add a more sophisticated account of information to the neoclassical model. Rather, he rejected the ideas of “given” data and of perfect competition, putting in their place the notion of a dynamic market process in which rivalry among participants ensures that knowledge is continually generated and discovered. In doing so, Hayek was actually harking back to an earlier tradition, one whose eclipse in the twentieth century is demonstrated, and lamented, by Frank Machovec (1995).<sup>16</sup>

The Austrian analysis of the market process is not utopian; there is no guarantee of coordination. But it does insist that a system in which prices determined in competitive markets are free to adjust to reflect relative scarcities is one in which the coordination of agents’ plans is least likely to be hindered. Soviet-style central planning ignored this insight completely, but the “trial and error” solutions proposed by Lange and others also misunderstand the point. All such proposals underestimate the difficulty of playing “catch-up” with a system in which the acts of millions of individual decision makers produce a continuous process of adjustment.

Competition is a key institutional feature within a market system. It is needed to provide incentives, as the economics of information emphasizes. But the “discipline of the marketplace” also assists the process of discovery: of

<sup>16</sup> Makowski and Ostroy (1993, p. 74) refer to competition as market rivalry, but it is less clear from their brief paper how what they call an “old and seminal idea” links up to the analytics of their Perfectly Competitive Equilibrium model.

errors, of new processes and products, of knowledge itself.

Competition never has been “perfect,” nor need it be. The dual claim of the early market socialists (that atomistic competition was necessary for a market system to work, and that it had disappeared) was not true when they made it, and subsequent history has done little to support a revised judgment. In particular, perfect competition is an inappropriate benchmark for policy, one that is bound to mislead us into thinking that we can accomplish much more with interventions than we really can. To the extent that Austrians accept an efficiency welfare norm, their emphasis is on the dynamic adaptive efficiency of a system (that is, how fast it adapts to the introduction of emerging or new information) rather than on static allocational efficiency, which focuses on the use of existing, known information.

In the real world errors occur all the time. Mainstream theorists typically treat errors as disequilibrium phenomena, so their models seldom directly incorporate this ubiquitous aspect of reality. But as Thomsen (1992) and Kirzner (1997) emphasize, the actions of entrepreneurs in disequilibrium situations constitute a fundamental aspect of the Austrian characterization of the market process. Like their real world counterparts, the entrepreneurial decision makers in the Austrian account also make errors all the time. These errors result in profit opportunities, and the search for profits works to reveal and eliminate divergent expectations. The mainstream emphasis on equilibrium states obscures the fact that one of the chief advantages of a market system is that it contains a built-in mechanism, imperfect to be sure, but constantly operating, for the correction of errors. From an Austrian perspective, mainstream economists tend to overestimate the in-

formational content of equilibrium prices, and to underestimate the informational content of disequilibrium prices (Boettke 1996, pp. 189–90).

3. *The rejection of homo economicus.* Though homo economicus is a crucial assumption of neoclassical analysis, Hayek had doubts about its usefulness, and even ridiculed it on occasion (1960, pp. 60–61). Rather than continuing to employ the construct, he sought to provide in his psychological work a physiological foundation for perception and, ultimately, for knowledge formation. The mind of the individual described in *The Sensory Order* is a complex adaptive self-organizing neural order, and this is what leads to differences in perceptions and beliefs among people, to our ability to adapt to new environments, and to the possibility of the growth of our knowledge. This is a different creature altogether from homo economicus.

One way to put the contrast is as follows. In standard neoclassical analysis, one starts out with rational agents who by assumption optimize over all the relevant margins, including those that have to do with acquiring more information. In cases in which information is asymmetric, the chief goal is to design mechanisms that will either elicit information or provide an incentive structure to prevent inefficient social outcomes. If the world were really populated by agents resembling homo economicus, such approaches might make some sense.

For Hayek, though, the world does not look like this. Humans are purposeful but imperfect beings, they have limited knowledge, they make mistakes, and whatever knowledge that exists is dispersed, fragmented, and often difficult to communicate. Many of the things that neoclassical economics assumes (at the most fundamental level,

the ability of individuals to engage in rational behavior, and to perform marginal analysis) are, from the Austrian perspective, properly viewed as the *results* of certain institutional arrangements rather than as assumptions of the analysis (Hayek 1979, pp. 74–77; Boettke, forthcoming). Austrians ask: what combination of institutions can best assist imperfect individuals to make better decisions and better use of their knowledge? By starting with rational agents, standard analysis gets things exactly backwards.

4. *The role of institutions.* Instead of studying the design of alternative *allocation* mechanisms (a project that would anyway smack of rationalist constructivism to him), Hayek proposed that we examine the role of various institutions in assisting the creation, discovery, use, conveyance, and conservation of *knowledge*. This led him to make some proposals of his own. It was his focus on knowledge that led Hayek to endorse a system of free markets, operating within a liberal democratic polity, a system with established, enforced and exchangeable property rights, all protected by a strong constitution.

Though he made proposals, Hayek also recognized that the conscious construction or imposition of social institutions is a tricky business. Many such institutions are the product of a long process of evolutionary development; they are themselves examples of complex self-organized adaptive orders. They have histories, and they perform functions that are not well-understood by outside observers. Their emergence was certainly not inevitable, nor is their continuance: this led Hayek to explore why certain institutional forms persist, even though they might not accord well with either our instincts or our reason. But he also saw that those societies in which the right combination of liberal

institutions happened to emerge have both prospered and permitted a considerable amount of individual liberty to be exercised.

Attempts to alter such institutions, be it by piece-meal or by full-scale social engineering, will often generate unintended, unanticipated, and unwelcome consequences. “Mechanism design” may be feasible within firms that then face the test of market competition. It is much less likely that one can successfully mimic markets as a whole, or redesign entire societies. As a general rule, those who hope to redesign institutions are over-optimistic about the amount of knowledge that is available to them. It is precisely because knowledge is not readily available that evolutionary processes typically do better than our reason in the area of institutional design. This argument, if true, should make one pessimistic about the prospects for socialism. But it should also give pause to market reformers who hope overnight to install new institutions in countries formerly under communist rule. If such reforms are to have any hope of working, a sensitivity to the previously existing institutional framework is critical. Bardhan and Roemer (1993, p. 16), Boettke (1994), and Peter Murrell (1995, pp. 175–77) offer pertinent observations.

In the end Hayek concluded that many institutions, from our moral codes to the market system, are themselves examples of complex adaptive phenomena. In this regard, though he may have shared the complaints of the information theorists about static equilibrium models, Hayek’s basic observations are more in line with recent developments in complexity theory and evolutionary biology than they are with the later development of neoclassical theory. The similarity between Hayek’s work and these other areas of research has so far

only just begun to be explored (Lavoie 1989; Birner, forthcoming; Mirowski, forthcoming; Ransom 1992, 1996).

### VI. Conclusion

Though the Austrians knew about incentives problem, they did not systematically pursue them. For modern day information theorists, this means that, no matter how prescient their conclusions may have been, Austrian analysis is of limited value. If the Austrians were right, they were right for the wrong reasons, because their models ignored the insights revealed by the economics of information.

This final section suggests at a minimum that modern information theorists have not fully understood why the Austrians chose not to pursue the incentives problem. As a doctrinal historian, I cannot help adding that such misunderstanding is virtually inevitable in a profession that, at least in the United States, has nearly systematically eliminated the study of history of economic thought from graduate curricula.

But a different point was also made. Getting the history right matters. It matters not only for historical accuracy, but because one can draw the wrong conclusions if one only has recourse to Whig history. If one reads one's history backwards from the present, where today's theoretical analysis provides the sole possible benchmark against which to assess a program, then only one conclusion is possible about Austrian "analysis": it is deficient. But if one goes back and looks at the record, what is immediately apparent is *that the Austrians went another way*. Their path really was different. Furthermore, the mainstream might have something to learn from that alternative path.

The virtue of the economics of information is to permit economists to dis-

cuss questions of agency with analytical precision and rigor. Like all theories, its analytic rigor is purchased at the price of an oversimplified picture of reality. This poses a danger if it leads one to think that the only problems facing socialism are agency problems, problems that can be overcome once the requisite incentive compatibility mechanisms are put into place.

Hayek was no opponent of theory; indeed, he frequently defended it from its historicist detractors. But he also understood the limitations of theory. A half century ago well-intentioned socialists demonstrated with simplistic mathematical models that market socialism could duplicate the workings of a competitive market system, plus remove its deficiencies. More elegant models are available today for correcting a system with informational problems. Over 60 years ago Hayek warned about the dangers of an "excessive preoccupation with the conditions of a hypothetical state of stationary equilibrium" (1935, p. 226). It is not altogether outrageous to suggest that today he might warn against an excessive preoccupation with questions of information.

### REFERENCES

- ADAMAN, FIKRET AND DEVINE, PAT. "The Economic Calculation Debate: Lessons for Socialists," *Cambridge J. Econ.*, Sept. 1996, 20(5), pp. 523-37.
- ARNOLD, N. SCOTT. "The Monitoring Problem for Market Socialist Firms." in PETER J. BOETTKE AND DAVID L. PRYCHITKO, eds., 1996, pp. 41-58.
- BARDHAN, PRANAB, AND ROEMER, JOHN E., eds. *Market socialism*. New York and Oxford: Oxford U. Press, 1993.
- \_\_\_\_\_. "On the Workability of Market Socialism," *J. Econ. Perspectives*, Spring 1994, 8(2), pp. 177-81.
- BEAN, PHILIP AND WHYNES, DAVID, eds. *Barbara Wootton—Social science and public policy: Essays in her honour*. London: Tavistock, 1986.
- BERGSON, ABRAM. "Socialist Economics," in a *Survey of contemporary economics*. Ed.: HOWARD ELLIS. Homewood, IL: Irwin, 1948, pp. 412-48.

- BERLE, ADOLF A. AND MEANS, GARDINER C. *The modern corporation and private property*. New York: Macmillan, 1933.
- BIRNER, JACK. "Introduction: Hayek's Grand Research Programme," in JACK BIRNER AND RUDY VAN ZIJP, eds. London: Routledge, 1994, pp. 1-21.
- . "The Surprising Place of Cognitive Psychology in the Work of F. A. Hayek," *Hist. Econ. Ideas*, forthcoming.
- BIRNER, JACK AND VAN ZIJP, RUDY, ed. *Hayek, co-ordination and evolution: His legacy in philosophy, politics, economics and the history of ideas*. London and New York: Routledge, 1994.
- BOEHM, STEPHEN. "Hayek on Knowledge, Equilibrium and Prices," *Wirtschafts Politische Blätter*, 1989, 36(2), pp. 201-13.
- BOETTKE, PETER J. "The Reform Trap in Economics and Politics in the Former Communist Countries," *Journal des Economistes et des Etudes Humaines*, June/Sept. 1994, 5(2/3), pp. 267-93.
- . "Hayek's *The Road to Serfdom* Revisited: Government Failure in the Argument Against Socialism," *Eastern Econ. J.*, Winter 1995, 21(1), pp. 7-26.
- . "Book Review: Joseph Stiglitz's *Whither Socialism?*" *J. Econ. Lit.*, Mar. 1996, 34(1), pp. 189-91.
- . "Economic Calculation: The Austrian Contribution to Political Economy," in *Advances in Austrian economics*. Vol. 5. Greenwich, CT: JAI Press, forthcoming.
- BOETTKE, PETER J. AND PRYCHITKO, DAVID L., eds. *Advances in Austrian economics*. Vol. 3. Greenwich, CT: JAI Press, 1996.
- BURNHAM, JAMES. *The managerial revolution: What is happening in the world right now*. New York: John Day, 1941.
- BUTOS, WILLIAM N. AND KOPPL, ROGER G. "Hayekian Expectations: Theory and Empirical Applications," *Constitutional Polit. Econ.*, Fall 1993, 4(3), pp. 303-29.
- CALDWELL, BRUCE J. *Beyond positivism: Economic methodology in the twentieth century*. London: Routledge, [1982] 1994.
- . "Hayek's Transformation," *Hist. Polit. Econ.*, Winter 1988a, 20(4), pp. 513-41.
- . "Hayek's 'The Trend of Economic Thinking,'" in *The review of Austrian economics*. Vol. 2. Eds.: MURRAY N. ROTHBARD AND WALTER BLOCK. Washington, DC: Ludwig von Mises Institute, 1988b, pp. 175-78.
- . "La Méthodologie De Hayek: Description, Evaluation, et Interrogations," in *Friedrich Hayek: Philosophie, économie et politique*. Eds.: GILLES DOSTALER ET DIANE ETHIER. Paris: *Economica*, 1989, pp. 71-85.
- CARR, EDWARD H. *Nationalism and after*. London: Macmillan, 1945.
- CARTWRIGHT, NANCY ET AL. *Otto Neurath: Philosophy between science and politics*. Cambridge: Cambridge U. Press, 1996.
- CHALOUPEK, GÜNTHER K. "The Austrian Debate on Economic Calculation in a Socialist Society," *Hist. Polit. Econ.*, Winter 1990, 22(4), pp. 659-75.
- CLARKE, F. "Book Review: Mannheim's *Man and Society in an Age of Reconstruction*," *Economica*, N.S., Aug. 1940, 7(27), pp. 329-32.
- COTTRELL, ALLIN AND COCKSHOTT, W. PAUL. "Calculation, Complexity and Planning: the Socialist Calculation Debate Once Again," *Rev. Polit. Econ.*, 1993, 5(1), Pp. 73-112.
- CRAVER, EARLENE. "The Emigration of the Austrian Economists," *Hist. Polit. Econ.*, Spring 1986, 18(1), pp. 1-32.
- DESAL, MEGHNAD. "Equilibrium, Expectations and Knowledge," in JACK BIRNER AND RUDY VAN ZIJP, eds. 1994, pp. 25-50.
- DIAMOND, ARTHUR. "F. A. Hayek on Constructivism and Ethics," *J. Libertarian Stud.*, Fall 1980, 4(4), pp. 353-65.
- DICKINSON, HENRY D. "Price Formation in a Socialist Economy," *Econ. J.*, June 1933, 43(170), pp. 237-50.
- . "Review: Hayek's *Freedom and the Economic System*," *Economica*, N.S., Nov. 1940, 7(28), pp. 435-37.
- DOBB, MAURICE. "Economic Theory and the Problems of a Socialist Economy," *Econ. J.*, Dec. 1933, 43(172), pp. 588-98.
- DURBIN, ELIZABETH F. *New Jerusalem: The Labour Party and the economics of democratic socialism*. London: Routledge, 1985.
- DURBIN, EVAN. "Professor Hayek on Economic Planning and Political Liberty," *Econ. J.*, Dec. 1945, 55(220), pp. 357-70.
- EDELMAN, GERALD M. *Neural Darwinism: The theory of neuronal group selection*. New York: Basic Books, 1987.
- FINER, HERMAN. *The road to reaction*. Chicago: Quadrangle Books, 1945.
- FLEETWOOD, STEVE. *Hayek's political economy: The socio-economics of order*. London: Routledge, 1995.
- GRAY, JOHN. *Hayek on liberty*. 2nd ed. Oxford: Blackwell, 1986.
- . "Hayek, the Scottish School, and Contemporary Economics," in *The boundaries of economics*. Eds.: GORDON C. WINSTON AND RICHARD F. TEICHGRAEBER. Cambridge: Cambridge U. Press, 1988, pp. 53-70.
- GROSSMAN, SANFORD J. *The informational role of prices*. Cambridge, MA: MIT Press, 1989.
- HAYEK, FRIEDRICH A. VON. "The Trend of Economic Thinking," [1933]; reprinted in FRIEDRICH VON HAYEK 1991.
- , ed. *Collectivist economic planning: Critical studies on the possibilities of socialism*. London: G. Routledge, 1935.
- . "Economics and Knowledge," [1937]; reprinted in FRIEDRICH VON HAYEK, ed. 1948, pp. 33-56.
- . "Freedom and the Economic System," [1939]; reprinted in FRIEDRICH VON HAYEK 1997, pp. 189-211.
- . "Socialist Calculation: the Competitive

- 'Solution',” [1940]; reprinted in FRIEDRICH VON HAYEK, ed. 1948, pp. 181–208.
- . “Planning, Science, and Freedom,” [1941]; reprinted FRIEDRICH VON HAYEK 1997, pp. 213–20.
- . *The counter-revolution of science: Studies on the abuse of reason*. Glencoe: IL: Free Press, [1941–44] 1952b.
- . *The road to serfdom*. Chicago: U. of Chicago Press, [1944] 1976.
- . “The Use of Knowledge in Society,” [1945]; reprinted in FRIEDRICH VON HAYEK, ed. 1948, pp. 77–91.
- . “The Meaning of Competition,” [1946]; reprinted in FRIEDRICH VON HAYEK, ed. 1948, pp. 92–106.
- , ed. *Individualism and economic order*. Chicago: U. of Chicago Press, 1948.
- . Letter to John Nef, Dated November 6, 1948, Located in Box 55, Number 1, in the Hayek Archives, Hoover Institution, Stanford, CA.
- . *The sensory order: An inquiry into the foundations of theoretical psychology*. Chicago: U. of Chicago Press, 1952a.
- , ed. *Capitalism and the historians*. Chicago: U. of Chicago Press, 1954.
- . “Degrees of Explanation,” [1955]; reprinted in FRIEDRICH VON HAYEK, ed. 1967, pp. 3–21.
- . *The constitution of liberty*. Chicago: U. of Chicago Press, 1960.
- . “Rules, Perception and Intelligibility,” [1962]; reprinted in FRIEDRICH VON HAYEK, ed. 1967, pp. 43–65.
- . “Kinds of Rationalism,” [1964a]; reprinted in FRIEDRICH VON HAYEK, ed. 1967, pp. 82–95.
- . “The Theory of Complex Phenomena,” [1964b]; reprinted in FRIEDRICH VON HAYEK, ed. 1967, pp. 22–42.
- , ed. *Studies in philosophy, politics and economics*. Chicago: U. of Chicago Press, 1967.
- . “Competition as a Discovery Procedure,” [1968a], in FRIEDRICH VON HAYEK, ed. 1978, pp. 179–90.
- . “The Primacy of the Abstract,” [1968b], in FRIEDRICH VON HAYEK, ed. 1978, pp. 35–49.
- . “The Errors of Constructivism,” [1970], in FRIEDRICH VON HAYEK, ed. 1978, pp. 3–22.
- . Law, legislation and liberty: A new statement of the liberal principles of justice and political economy. Vols. 1–3. Chicago: U. of Chicago Press, 1973–1979.
- . “The New Confusion about ‘Planning’,” [1976], in FRIEDRICH VON HAYEK, ed. 1978, pp. 232–46.
- , ed. *New studies in philosophy, politics, economics and the history of ideas*. Chicago: U. of Chicago Press, 1978.
- . “The Sensory Order after 25 Years,” in *Cognition and the symbolic processes*. Vol. 2. Eds.: WALTER WEIMER AND DAVID PALERMO. Hillsdale, NJ: Lawrence Erlbaum Associates, 1982a, pp. 287–93.
- . “Two Pages of Fiction: the Impossibility of Socialist Calculation,” in *The essence of Hayek*. Eds.: CHIAKI NISHIYAMA AND KURT R. LEUBE. Stanford: Hoover Institution Press, [1982b] 1984a, pp. 53–61.
- . “Nobel Prize-winning Economist.” Transcript of an Oral History Interview Conducted in 1978 under the Auspices of the Oral History Program, University Library, UCLA, Regents of the U. of California, copyright 1983.
- . *Money, capital, and fluctuations: Early essays*. Ed.: ROY MCCLOUGHRY. Chicago: U. of Chicago Press, 1984b.
- . *The collected works of F. A. Hayek*. Vol. 1. *The fatal conceit: The errors of socialism*. Ed.: W. W. BARTLEY. London: Routledge, 1988.
- . *The collected works of F. A. Hayek*. Vol. 3. *The trend of economic thinking: Essays on political economists and economic history*. Eds.: W. W. BARTLEY III AND STEPHEN KRESCE. Chicago: U. of Chicago Press, and London: Routledge, 1991.
- . *The collected works of F. A. Hayek*. Vol. 4. *The fortunes of liberalism: Essays on Austrian economics and the ideal of freedom*. Ed.: PETER G. KLEIN. Chicago: U. of Chicago Press, 1992.
- . *Hayek on Hayek*. Eds.: STEPHEN KRESCE AND LEIF WENAR. Chicago: U. of Chicago Press and London: Routledge, 1994.
- . *The collected works of F. A. Hayek*. Vol. 9. *Contra Keynes and Cambridge: Essays, correspondence*. Ed.: BRUCE CALDWELL. London: Routledge, 1995.
- . *The collected works of F. A. Hayek*. Vol. 10. *Socialism and war: Essays, documents, reviews*. Ed.: BRUCE CALDWELL. London: Routledge, 1997.
- HEBB, DONALD O. *The organization of behavior: A neuropsychological theory*. N.Y.: Wiley, 1949.
- HEILBRONER, ROBERT. “Analysis and Vision in the History of Modern Economic Thought,” *J. Econ. Lit.*, Sept. 1990, 28(3), pp. 1097–1114.
- HOFF, TRYGVE J. B. *Economic calculation in the socialist society*. London: W. Hodge, 1949.
- HORWITZ, STEVEN. “From *The Sensory Order* to the Liberal Order: Mind, Economy and the State in the Thought of F. A. Hayek.” A paper presented at the Mount Pélèrin meetings, Cannes, France, 1994.
- . Money, Money Prices, and the Socialist Calculation Debate,” in PETER J. BOETTKE AND DAVID L. PRYCHITKO, eds., 1996, pp. 59–77.
- HURWICZ, LEONID. “Economic Planning and the Knowledge Problem: A Comment,” *Cato J.*, Fall 1984, 4(2), pp. 419–25.
- KIRZNER, ISRAEL M. *Competition and entrepreneurship*. Chicago: U. of Chicago Press, 1973.
- . “Economic Planning and the Knowledge Problem,” *Cato J.*, Fall 1984, 4(2), pp. 407–18.

- . "The Economic Calculation Debate: Lessons for Austrians," *The review of Austrian economics*. Vol. 2. Eds.: MURRAY N. ROTHBARD AND WALTER BLOCK. Washington, DC: Ludwig von Mises Institute, 1988, pp. 1–18.
- . "Entrepreneurial Discovery and the Competitive Market Process: an Austrian Approach," *J. Econ. Lit.*, Mar. 1997, 35(1), pp. 60–85.
- KORNAI, JAÑOS. "The Soft Budget Constraint," *Kyklos*, 1986, 39(1), pp. 3–30.
- . "Market Socialism Revisited," in PRANHAB K. BARDHAN AND JOHN E. ROEMER, eds. 1993, pp. 42–68.
- KUKATHAS, CHANDRAN. *Hayek and modern liberalism*. Oxford: Clarendon, 1989.
- LACHMANN, LUDWIG M. "On the Central Concept of Austrian Economics: Market Process," in *The foundations of modern Austrian economics*. Ed.: EDWIN G. DOLAN. Kansas City: Sheed and Ward, 1976, pp. 126–32.
- LANGE, OSKAR. *On the economic theory of socialism*. Ed.: BENJAMIN E. LIPPINCOTT. Minneapolis: U. of Minnesota Press, 1938, pp. 57–143.
- . "The Computer and the Market," in *Socialism, capitalism and economic growth: Essays presented to Maurice Dobb*. Ed.: C. H. FEINSTEIN. Cambridge: Cambridge U. Press, 1967, pp. 158–161.
- LAVOIE, DON. *Rivalry and central planning*. Cambridge: Cambridge U. Press, 1985.
- . "Economic Chaos or Spontaneous Order? Implications for Political Economy of the New View of Science," *Cato J.*, Winter 1989, 8(3), pp. 613–35.
- . "Computation, Incentives, and Discovery: The Cognitive Function of Markets in Market Socialism," *Ann. Amer. Acad. Polit. Soc. Sci.*, Jan. 1990, 507, pp. 72–79.
- LAWSON, TONY. "Realism and Hayek: A Case of Continuing Transformation," in *The economics of F. A. Hayek*. Vol. 2. *Capitalism, socialism, and knowledge*. Eds.: MARINA COLONNA, HARALD HAGEMANN, AND OMAR F. HAMOUDA. Aldershot: Elgar, 1994, pp. 131–59.
- LIPPMAN, WALTER. *An inquiry into the principles of the good society*. Boston: Little, Brown & Co., 1937.
- MACHOVEC, FRANK M. *Perfect competition and the transformation of economics*. London: Routledge, 1995.
- MACMILLAN, HAROLD. *The middle way: A study of the problem of economic and social progress in a free and democratic society*. London: Macmillan, 1938.
- MAKOWSKI, LOUIS AND OSTROY, JOSEPH. "General Equilibrium and Market Socialism: Clarifying the Logic of Competitive Markets," in PRANHAB K. BARDHAN AND JOHN E. ROEMER, eds. 1993, pp. 69–88.
- MALLOCK, WILLIAM H. *A critical examination of socialism*. NY: Harper, 1907.
- MANNHEIM, KARL. *Man and society in an age of reconstruction: Studies in modern social structure*. London: Kegan Paul, 1940.
- MARWICK, ARTHUR. "Middle Opinion in the Thirties: Planning, Progress and Political 'Agreement'," *English Hist. Rev.*, Apr. 1964, 79(311), pp. 285–98.
- MENGER, CARL. *Investigations into the method of the social sciences with special reference to economics*. Translated by FRANCIS J. NOCK. New York: New York U. Press, [1883] 1985.
- MERKLE, JUDITH A. *Management and ideology: The legacy of the international scientific management movement*. Berkeley: U. of California Press, 1980.
- MIKLÓS-ILLÉS, AGNES. "Otto Neurath's War Economics." Manuscript, 1996.
- MILGROM, PAUL AND ROBERTS, JOHN. *Economics, organization and management*. Englewood Cliffs, NJ: Prentice Hall, 1992.
- MIROWSKI, PHILIP. "Machine Dreams: Economic Agents as Cyborgs," in *The new economics and its history*. Ed.: JOHN DAVIS. Durham, NC: Duke U. Press, forthcoming.
- MISES, LUDWIG VON. "Economic Calculation in the Socialist Commonwealth," in FRIEDRICH VON HAYEK, ed., 1935, pp. 87–130.
- . *Human action: A treatise on economics*. 3rd rev. ed. Chicago: H. Regnery Co., 1966.
- . *Notes and recollections*. South Holland, IL: Libertarian Press, 1978.
- MURRELL, PETER. "The Transition According to Cambridge, Mass.," *J. Econ. Lit.*, Mar. 1995, 33(1), pp. 164–78.
- NEURATH, OTTO. *Empiricism and sociology*. Eds: MARIE NEURATH AND ROBERT S. COHEN. Dordrecht, Holland: D. Reidel, 1973.
- POLANYI, KARL. *The great transformation*. New York: Farrar & Rinehart, 1944.
- RAE, JOHN. *Contemporary socialism*. 2nd ed. New York: C. Scribner's Sons, 1891.
- RANSOM, GREG. "Insuperable Limits to Reduction in Biology." Manuscript, Apr. 1992.
- . "The Significance of Myth and Misunderstanding in Social Science Narrative: Opening Access to Hayek's 'Copernican' Revolution in Economics." Manuscript, June 1996.
- ROEMER, JOHN E. "Can There Be Socialism after Communism?" in PRANHAB K. BARDHAN AND JOHN ROEMER, eds. 1993, pp. 89–107.
- . *A future for socialism*. Cambridge, MA: Harvard U. Press, 1994.
- . "An Anti-Hayek Manifesto," *New Left Review*, May-June 1995, 211, pp. 112–29.
- SALERNO, JOSEPH. "Ludwig von Mises as Social Rationalist," *The review of Austrian economics*. Vol. 4. Eds.: MURRAY N. ROTHBARD AND WALTER BLOCK. Dordrecht and London: Kluwer Academic, 1990, pp. 26–54.
- SCHUMPETER, JOSEPH. *Capitalism, socialism and democracy*. 3<sup>rd</sup> ed. New York: Harper & Row, [1942] 1950.
- SENT, ESTHER-MIRJAM. "Bounded Rationality on the Rebound." Manuscript, 1997.

- SHEARMUR, JEREMY. *Hayek and after: Hayekian liberalism as a research programme*. London: Routledge, 1996.
- . "Hayek, Keynes and the State," *Hist. Econ. Rev.*, Winter 1997, 26, pp. 68–80.
- STEELE, DAVID RAMSAY. *From Marx to Mises: Post-capitalist society and the challenge of economic calculation*. La Salle, Il: Open Court, 1992.
- STIGLER, GEORGE. *Memoirs of an unregulated economist*. NY: Basic Books, 1988.
- STIGLITZ, JOSEPH. *Whither socialism?* Cambridge, MA and London: MIT Press, 1994.
- THOMSEN, ESTEBAN F. *Prices and knowledge: A market process perspective*. London and New York: Routledge, 1992.
- VANBERG, VIKTOR. *Rules and choice in economics*. London: Routledge, 1994.
- WEBB, SIDNEY AND WEBB, BEATRICE. *Soviet communism: A new civilization?* London: Longmans, Green, 1935.
- WEBER, MAX. *Economy and society: An outline of interpretive sociology*. Eds.: GUENTHER ROTH AND CLAUS WITTICH. Berkeley: U. of California Press, 1978.
- WERSKEY, GARY. *The visible college: A collective biography of British scientific socialists of the 1930s*. New York: Holt, Rinehart and Winston, 1978.
- WOOTTON, BARBARA. *Freedom under planning*. Chapel Hill, NC.: U. of North Carolina Press, 1945.
- YEAGER, LELAND B. "Mises and Hayek on Calculation and Knowledge," *Rev. Austrian Econ.*, 1994, 7(2), pp. 93–109.
- . "Salerno on Calculation, Knowledge, and Appraisal: Rejoinder," *Rev. Austrian Econ.*, 1996, 9(1), pp. 137–39.