

Scientific realism and Austrian explanation*

Uskali Mäki *University of Helsinki*

In the recent writing on the methodology of economics there has been a shortage of systematic analyses of realism and explanation and an absence of analyses of their inter-relationships. This article attempts to provide a detailed account of the structure of economic explanation built upon realist and essentialist premises. Invisible-hand explanations characteristic of Austrian economics and the question of using the quantity theory for explaining inflation are used as illustrations. From another perspective, the analysis amounts to providing a reconstructive interpretation of the deep structure of the Austrian approach to explaining economic phenomena. It is suggested that realist-essentialist explanations be analysed in terms of redescription, reduction, ontological identification, and unification: Austrian (as well as some other) explanations can be analysed as reductive theoretical redescriptions of economic phenomena using ontological identification statements and pursuing ontological unification of apparently diverse phenomena. Among these and other things, questions related to the deductive-nomological model, prediction, the implications of subjectivism and the role of common sense are discussed.

I Introduction: from instrumentalism to Austrian explanation

a: Most contemporary methodologists of economics seem to hold two general views about instrumentalism in economics. One of these is a descriptive statement, in fact a generalization, about the methodological views of economists themselves. According to it, it is a common attitude among economists that their theories are nothing but instruments for prediction,

*Ancestors of this paper have been presented at the Twelfth Annual Convention of the Eastern Economic Association in Philadelphia, 10–12 April, 1986, and to audiences at New York University, Duke University, University of Helsinki, and Helsinki School of Economics.

Thanks for helpful comments on earlier drafts are due to Bruce Caldwell, Daniel Hausman, Israel Kirzner, Roger Koppl, Don Lavoie, Neil de Marchi, Ingo Pellingahr, Mario Rizzo, Raimo Tuomela and Lawrence White.

Financial support from the Austrian Economics Program at New York University, the Academy of Finland, the Finnish Cultural Foundation and Yrjö Jahnsson Foundation is gratefully acknowledged.

organization of empirical data, control of the stream of economic events, or what have you. It is suggested that economists do not think of their theories as plausible and possibly true or truthlike descriptive statements about what is really going on in the economy. If economists are observed to claim explanatory functions for their theories, this is shown by methodologists to presuppose a view of the nature of explanation which makes explanation logically equivalent to prediction.

The other view held by most methodologists of economics is the normative statement that instrumentalism is not, after all, a very healthy attitude for the advancement of economics. Economists are advised rather to take theorizing more seriously as a descriptive and explanatory project and to give up their presumed sole concentration on predictive success. In the same tenor, the view that there prevails a logical equivalency between explanation and prediction is criticized as flawed, not giving full credit to the ambitions of scientific explanation: explanation, in fact, is logically irreducible to prediction.¹

In light of these two views, it is surprising how little has been done in the way of clarifying the precise nature of the traditional opponent of instrumentalism, namely scientific realism, and the accompanying notion of explanation.² So far methodologists of economics have provided, for the most part, negative prescriptions (suggesting that economists had better avoid instrumentalism) and negative characterizations (of what explanation is not).

b: What we seem to need now is a positive analysis, in the context of economics, of two things: 1) scientific realism as the major alternative to instrumentalism in the sciences and in philosophy; and 2) notions of explanation that satisfy the canons of realism. By performing these two inter-related tasks, we may acquire a noninstrumentalist and realist understanding of economics (what it is or is not, and/or what it could or should be). Understandably, only initial steps in this direction will be taken in this paper.

¹ For approximations to these two views – the descriptive and the normative – about instrumentalism in economics, see, e.g., Blaug (1980), Caldwell (1982) and Boland (1982).

² Systematic examination of (scientific) realism in the context of economics is in its initial stages (see Lawson, 1989; 1990; Mäki, 1988a; 1988b; 1989; 1990a; 1990b). Some may find this claim startling, but the fact is that most of the traditional discussion on what I propose calling the ‘realisticness’ of economic theories and their assumptions does not directly tackle the issue of realism in the present sense. Analysis of economic explanation is not in much better shape (see, however, Hausman, 1981). This assessment of the situation about explanation may also sound surprising to some, considering the subtitle of Blaug’s (1980) well known book, ‘or how economists explain’. The subtitle is misleading, as there is very little about explanation in the book; perhaps it should more appropriately be subtitled, ‘or how economists should select among competing explanations’. The same delusion is amplified in an anthology (Marr and Raj, 1983) for whose title the subtitle of Blaug’s book has served as a model.

As for the first task, we can benefit from the fact that there are schools of economic thought whose methodological pronouncements and substantial theories contain important elements which it seems possible to interpret in the spirit of scientific realism. If this were not the case – if instrumentalism were the dominant methodology throughout all segments of economics – we would have to present scientific realist principles merely as wishful prescriptions. This article, however, is more concerned with interpretation and reconstruction as descriptive projects. There are streams of economic thought that are obviously amenable to realist interpretation and reconstruction, such as the Marxian and the Austrian tradition. Of these I will focus on the Austrian approach.³

Consequently, in regard to the second task, the discussion to follow will be restricted to the Austrian way of explaining economic phenomena. To narrow down the scope of this article, two more specifications will be made. First, I will concentrate my reconstructive efforts on what have been called genetic-causal explanations (Mayer, 1932) and invisible-hand explanations (Ullman-Margalit, 1978) as characteristically Austrian explanations. The core idea is to explain economic phenomena and institutions as unintended outcomes of interactive individual actions. Secondly, I will restrict my discussion merely to those aspects of Austrian explanations which are of special interest from a realist point of view.

c: Unfortunately, in these efforts to understand the nature of Austrian explanation, we are left almost unaided by Austrian economists themselves. Indeed, it is surprising that Austrians share with many instrumentalist economists (and noninstrumentalist methodologists of economics) an almost sole concentration on questions of prediction instead of explanation in their methodological discussions.⁴ The difference is that while many instrumentalists present predictive success as a defining feature of scientific economics, Austrians deny this and seek to expose the radical limits to predicting human affairs. Thus, it seems to me that Austrians have restricted themselves to *negative* characterizations of the limits of economics with respect to *prediction*, and have provided us with very little *positive*

³ When talking about 'Austrians' and 'Austrian economics' I refer to the tradition constituted by the work of economists such as Carl Menger, Ludwig von Mises, Friedrich von Hayek, Ludwig Lachmann, Murray Rothbard, Israel Kirzner and a group of scholars in the younger generation. For introductions to the constitutive ideas of the tradition, see, e.g., Dolan (1976), Spadaro (1978), Reekie (1984), O'Driscoll and Rizzo (1985). For an informative discussion of some themes of the methodology of Austrian economics, see Nozick (1977).

⁴ Occasionally, it is also possible to find plain instrumentalist (though also nonpredictivist) formulations of their views about the nature of economic theory in the writings of Austrian economists. For instance, Hayek (1948: 73) writes: 'All that a theory of the social sciences attempts is to provide a technique of reasoning which assists us in connecting individual facts, but which, like logic or mathematics, is not about the facts.'

discussion of how *explanation* is to be conceived as the aim of economic theorizing.⁵

Yet it seems to me obvious both from their methodological discussions and their substantive work in economics that most Austrians subscribe to the view that: 1) it is the task of economics to provide explanations; 2) explanation and prediction are very different endeavours; and 3) Austrian theories are explanatory. It is only the precise nature of economic explanation that has largely remained unanalysed.

d: As there has been some critical discussion on Austrian methodology recently,⁶ I wish to point out that, compared to those discussions, this article is based on redirecting the angle in an essential way. Previous discussions have been concerned mostly with questions of justification – particularly with the nonfallibilist *apriorism* of many Austrian economists, and the resulting reluctance to expose their theories to econometric or other empirical tests. In contrast, this paper focuses on questions of explanation. In the final section I will make some remarks about the relation between these two sets of questions. Since I think there is a large measure of relative independence between them, I do not have anything to say about the issue of justification until near the end of the story. As will become clear, it is the essentialism of many Austrians which is relevant to my problem.⁷

e: The article is organized as follows. In the second section, I will introduce some philosophical preliminaries concerning scientific realism and scientific explanation. The emphasis will be placed on the realist idea that it is the way the world is that should condition our ways of thinking about it, including our methods of explanation. The third section will be devoted to a discussion of some aspects of scientific explanation and to a suggested reconstruction of aspects of Austrian explanation from what I take to be a scientific realist perspective. Among the basic notions to be introduced are those of redescription, reduction, identification, and unification. It is by their means that I propose to reconstruct the notion of explanation in Austrian

⁵ This situation is reflected in the composition of the subject indexes of several books on Austrian theory and methodology that have been published recently. 'Prediction' is a typical entry, while I have not found 'explanation' in any one of them.

⁶ See, for example Blaug (1980: 91–93), Hutchison (1981: 176–232), Caldwell (1981: 117–38; 1984; 1986), Hirsch (1986), Rotwein (1986).

⁷ As the reader may have noticed, I have talked about 'many Austrians' and 'most Austrians' instead of 'the Austrians'. This is because Austrians have been far from unanimous in their methodological views. For a presentation which reveals this heterogeneity within the tradition, see White (1977). This lack of uniformity means that, when providing my reconstructions, I cannot speak on behalf of all Austrian economists, past and present. However, I think this does not make the importance of reconstructive work less significant – on the contrary, it is only through reconstructive interpretation that the terms of divergence can be made explicit. After all, it seems that it is the founding father of Austrian economics, Carl Menger, who comes closest to the ideas presented in this paper.

economics. At the end of the section, some more light will be shed on Austrian explanation by drawing a contrast between explanation and prediction. The fourth section will view the relationship between explanation and the way the world is from a reversed angle. The question is, what should we infer in regard to our beliefs about the constitution of the world from the explanatory success of our theories? Austrian answers to this question will reveal important features of Austrian realism. In the final section, a few remarks will be made on the meaning of 'essentialism' and on the proper way of constructing methodologies of justification, as well as on the problem of the limits to explanation.

f: I hope the article will serve a double purpose. First, by using one theoretical approach as an example, the article attempts to give, in the context of economics, a taste of one variety of scientific realism and a related notion of explanation, thus providing some preliminary steps towards performing tasks 1) and 2) above. Secondly, by using one philosophical theory of science as a perspective, the article attempts to interpret and reconstruct some aspects of the methodology of Austrian economics, especially those related to explanation.

II Philosophical preliminaries

1 Scientific realism

a: There is not only one doctrine that can be characterized as realism, but many. The same applies to scientific realism: a whole range of scientific realism exists. Versions of realism and scientific realism can be understood as answers to different questions or as different answers to the same questions. It is both impossible and unnecessary for the purposes of this article to discuss all of these questions and answers. I will select only a few of them in order to provide, in rough outlines, an impression of the kind of scientific realism which may then be used for reconstructing the notion of explanation in Austrian economics (see also Mäki, 1989; 1990a.)

b: In contrast to typical forms of instrumentalism, any version of scientific realism has to subscribe to the minimum idea that theoretical entities or *scientific objects* – i.e., entities postulated or hypothesized in scientific theories – *exist*. This can be specified in various ways. One may think that all, or most, or only some scientific objects exist. In addition, one may have in mind objects postulated in all scientific theories, or only in present scientific theories, or in some grand future theory which will emerge as the progress of science reaches its imaginary limit. Furthermore, the extension of 'science' can be specified in many ways, so as to include or exclude present

economics, for example. For our analysis of Austrian economics, it is sufficient to note the possibility of the version which says that *some* theoretical entities of *present* science, economics included, do exist.

c: The next question of relevance concerns the nature of existence and existents. Only one aspect of this question will be considered, namely that related to material and mental entities. Let us begin with the obvious remark that *mental entities* should have a place among legitimate scientific objects if a reconstruction along scientific realist lines is to make any sense. Austrians characterize an essential element in their approach as ‘subjectivism’, and the import of this is simply that reference to mental entities such as valuations, purposes and expectations of human individuals should have a prominent role in economic theories and explanations.

Consequently, the relevant version of scientific realism should allow mental entities to exist as scientific objects. To exist in what sense? Clearly, we have to put aside those versions of realism which specify the concept of existence merely in terms of externality or independence with respect to the human mind. Mental entities – unlike material entities – do not exist externally to and independently of human minds. We can, however, say that purposes, expectations, etc. of economic agents may exist *objectively*, that is, independently of and unconstituted by economists’ beliefs about them. Thus, it is the notion of existence as objective existence which should be part of the relevant version of scientific realism (see also Mäki, 1990a: Section 3).

d: Our next question concerns the membership of universals and modalities in the set of permissible scientific objects. Do scientific theories postulate (or, can they be allowed to postulate) properties and types, essences and natural kinds, possibilities and necessities as objectively, that is (as it is important to emphasize in this connection), nonlinguistically, existing? While it is possible to be a nonrealist about these matters and still be considered a scientific realist (about particular things, for instance), I think a stronger version is needed to understand aspects of a great deal of Austrian economics. This stronger version is realist about essences in a way which requires further specification. This version is a kind of *essentialist* scientific realism. In a sense, Section III of this paper will be devoted to an explication of some aspects of the essentialist component in the Austrian approach.⁸

e: We also have to face the question concerning the extent to which we are prepared to delegate ontological authority to scientific theories. Are there any other objects besides the scientific ones, or are the theoretical entities of science the only existents? Let us begin with what may be called common-

⁸ As an instance of methodological heterogeneity within the tradition, it is worth noting that not all Austrians (e.g., Hayek, Lachmann) seem to consistently espouse essentialism.

sense realism. According to common-sense realism, the observable objects encountered by us in our everyday lives and characterized by means of natural languages exist. Thus, minimally, while scientific realism maintains that scientific objects exist, common-sense realism says that common-sense objects exist. Both of them can be stated in more radical formulations: only scientific objects exist, or only common-sense objects exist. The either/or situation to which these radical formulations lead cannot be advocated by an Austrian economist. Only some minimal version of scientific realism could be compatible with Austrian economics: there has to be room for common-sense objects in the Austrian ontology. As I will show in Section IV, there has to be a remarkable role reserved for common sense in any reconstructed realism of Austrian economics. In the very final section I will point out a problem which this implies.

f: It follows from what has been said above that, to our variety of scientific realism, scientific theorizing is an indispensable way to find out the way the world is. The idea can also be stated in normative terms: it should be the task of science to find out the way the world is. Further, the other side of this normative coin is the statement that the way we theorize in science should be essentially conditioned by the way the world is. Let it be added that the burden of these principles is to be carried by theoretical representations. This is important to distance our version of scientific realism from any form of instrumentalism: it is the representational role of theories which has a crucial role.⁹ As this paper should make clear, these noninstrumentalist principles are shared, to a remarkable degree, by Austrian economists.

2 *Views of explanation*

a: To put our discussion of Austrian explanation in perspective, I will briefly outline some features of three general views of scientific explanation. The first of them characterizes explanation in formal (syntactic and semantic) terms: explanation is a matter of relations between sentences of certain kinds. The second brings the human subject into the picture and defines explanation in pragmatic terms: explanation is a matter of our relations to linguistic entities and to each other. The third views explanation largely in metaphysical terms: to explain is to expose real relations in the world. To call them three ‘views’ may be misleading, because they are far from mutually exclusive in all respects; it might be better to term them ‘orientations’. The first, however, will be presented in what follows as a view, as an instance of

⁹ This implies that we shall not here follow Ian Hacking’s (1983) advice about how to understand realism about modern science: the key activity of economic scientists relevant to our version of realism is representing rather than intervening, theoretical description rather than experimental manipulation.

an orientation; the other two will be sketched out as general orientations. In order to be brief, I will simplify.

b: As an instance of the formal orientation, I will consider an inferential version of the empiricist covering law model. According to it, a singular phenomenon type or token (the *explanandum*) is to be explained by inferring its description from a conjunction of general statements and singular initial conditions, both being about phenomena (the *explanans*).¹⁰ The general statements may take on the form of either nonprobabilistic or probabilistic conditional statements, and the explanatory relation may consist of either deductive or inductive inference. The general statements can be taken either as lawlike empirical generalizations¹¹ which are highly confirmed or true (in the latter case they state laws), or as types of ‘inference tickets’ without truth values as their semantic properties (the latter alternative represents a variety of instrumentalism about lawlike generalizations).

Here is a simple example of a deductive-nomological explanation for the phenomenon that *a*, a piece of matter, expands:

Copper expands when heated.	
<i>a</i> is copper & <i>a</i> is heated.	
∴ <i>a</i> expands.	(1)

Thus, singular phenomena are explained by means of empirical generalizations. These, in turn, are to be explained, in the same way, by deriving them from still more general lawlike statements. For instance:

All metals expand when heated.	
Copper is a metal.	
∴ Copper expands when heated.	(2)

If the lawlike statements are formulated in terms of metric variables, and values (or changes in values) of some of those variables are provided as initial information, numerical explanations can be constructed in the same way. Take an example from classical thermodynamics. Boyle-Charles’s law of ideal gases, $PV = RT$ (where *P* is the pressure, *V* is the volume, and *T* is the temperature of a body of gas, while *R* is a constant), can be transformed so

¹⁰ Occasionally, economists in the Austrian tradition have lapsed into formulations which accord well with empiricist views of explanation. I will provide some documentation in the footnotes, beginning here with Menger (1963: 44–45): ‘We understand a concrete phenomenon in a theoretical way . . . by recognizing it to be a special case of a certain regularity (conformity to law) in the succession, or in the coexistence of phenomena.’ This is not exactly the inferential version, but shares with it empiricist points of departure.

¹¹ An empiricist view of science seems to be implied in Lachmann’s (1977: 88) statement: ‘Like other scientists, economists attempt to formulate systematic generalizations about observable phenomena.’

as to yield a deductive-nomological explanation of the phenomenon that the temperature of a gas has risen by $q\%$. For instance:

An increase in P (of a body of gas) will result in the rise of T (of the same body of gas) by the same proportion, *ceteris paribus*.

P increases on $q\%$ & *ceteris paribus*.

$\therefore T$ rises by $q\%$. (3)

Similarly, we can use a version of the equation of exchange, $MV = PT$ (where M is the stock of money, V is the transactions velocity of money, P is the price level, and T is the quantity of goods transacted during a time period), for explanatory purposes. As such, the equation is an accounting identity, but by making a few factual assertions (such as that V and T are not affected by changes in M , and that, if M does not change, V and T are constant or change negligibly slowly or at least predictably), we can turn it into a lawlike generalization, usually called the quantity 'theory' of money. It can be used for explaining changes in the price level. A simplified deductive-nomological explanation of a rise in the price level by $p\%$ might look like this:¹²

An increase in M (of an economy) will result in a rise of P (in the same economy) by the same proportion, *ceteris paribus*.

M increases by $p\%$ & *ceteris paribus*.

$\therefore P$ rises by $p\%$. (4)

Two essential features of the inferential model need to be emphasized for the purposes of later discussion. First, explanation is here primarily characterized syntactically. The most important properties of a purported explanation are the logical forms of the statements involved and their inferential relations. Explanation is essentially derivation. Explanations are essentially arguments. Secondly, theories are not needed for explanations of particular phenomena. These are explained by empirical generalizations. Theories may explain some of the generalizations only.

The structural identity of explanation and prediction fits neatly in the picture. They have the same logical form, the only difference being that of temporal asymmetry: the phenomenon to be explained has already occurred,

¹² Rothbard (1951: 944–45) once thought that praxeology provides covering law explanations, those laws being of the usual conditional form and explanations being logical deductions. 'Praxeology furnishes laws in the form of: if X, and if Y remains unchanged, then Z.' As an example of a praxeological law he cites: 'If the supply of a medium of exchange increases; and if the demand for that medium remains the same; then, the purchasing power of that medium will decline.' He then construes a non-numerical covering-law explanation (with a causal interpretation) of an observed fact that a fall in the purchasing power of the medium of exchange has taken place.

while the phenomenon to be predicted has yet to occur.¹³ Thus, argument (4) above may serve both as an explanation for and as a prediction of a rise in the price index by $p\%$. If an economist has, by means of (4), correctly predicted a particular increase in the inflation rate, he has, by that same token, explained it. This would mean, generally, that economists could concentrate on prediction without additional concern about explanation: explanations take care of themselves once predictive success has been achieved.

c: In the second orientation, the human subject enters the notion of explanation. Not inferential relations between statements, but pragmatic relations between persons and linguistic items adopt the central role in this account of the concept of explanation. Explanation is essentially a subjective-social and context-dependent affair. Explanations are answers to questions in contexts characterized by the interests and background beliefs of the questioners and answerers. Thus, what counts as a correct explanation depends on the context.¹⁴

d: The third orientation places an emphasis on the idea that explanation is or should be conditioned more by objectively real than by subjective factors. It is the way the world is which ultimately should determine the limits to conditions for correct explanations. Scientific explanation is primarily an attempt to reveal some essential relationships in the real world; in this way it is able to render phenomena understandable for questioners. Explanation is a matter of genuine theory with successful reference to and representation of some apparently nonobvious real grounds for occurrences in the world. Thus, theories are essential for explaining phenomena. Explanation of phenomena is not derivation from empirical generalizations.¹⁵

e: In sum, we have three orientations which take inferring, answering or representing as the basic component activity in the composite act of explaining. Although I think any satisfactory account of scientific explanation should incorporate all of these three insights, in what follows I will concentrate on the third one in an attempt to reconstruct what I take to embody a realist presupposition in Austrian explanation. At the end of the following lengthy section, I have a few words to say about the roles of the other two insights.

¹³ Hayek (1955: 215n) used to accept this idea: '... prediction and explanation are merely two aspects of the same process ...'

¹⁴ The set of representatives of this pragmatic orientation include, among others, Michael Scriven, Sylvain Bromberger, Peter Achinstein and Bas van Fraassen.

¹⁵ To list a few advocates of this realist orientation, let me mention Jerrold Aronson, Baruch Brody, Robert Causey, Michael Friedman, Rom Harré, Wesley Salmon and Wilfrid Sellars. No homogeneous school is in question here: there are as many detailed theories of explanation as there are names on the list.

III Towards a reconstruction of Austrian explanation

The strategy of this section is to introduce a few key notions – those of redescription, reduction, identification and unification – and, in terms of them, to outline a realist view of scientific explanation, while, at the same time, showing how these notions can be used to illuminate what is going on in Austrian economics.

1 *Explanation as redescription*

a: Explanation, according to the version of realism pursued here, involves redescription of explananda. The idea of something being *redescribed* presupposes an antecedent description of that something. Let us call this prior description ‘empirical’ or ‘phenomenological’ description. In its terms we are able to characterize the manifest features and behaviour of the objects under consideration. We can recognize them on the basis of their outward properties, and correlate their observed behaviour with that of other, likewise empirically described objects. This is the source of empirical generalizations used as premises in allegedly explanatory arguments such as (1) and (4): items are classified as copper and money supply, and their behaviour is correlated with that of heat and the price index.

Before proceeding to the notion of redescription, let us give the floor to Carl Menger (1963: 43; 1883: 14):

The goal of scholarly research is not only the *cognition* [*Erkenntnis*] but also the *understanding* [*Verständnis*] of phenomena. We have *gained cognition* of a phenomenon when we have attained a mental image of it. We understand it when we have recognized the reason for its existence and for its characteristic quality (the reason for its *being* and for its *being as it is*).

As an interpretation of this important passage, I suggest that it was just the above kind of empirical or phenomenological description that Menger had in mind when he talked about *Erkenntnis* as an inferior form of knowledge. But what did he have in mind when he insisted on *Verständnis* as the genuine aim of economics? I suggest this term is best understood as referring to a kind of explanatory redescription of objects of *Erkenntnis* which makes assertions about the ‘deeper’ nature of those objects. Objects of empirical descriptions at the level of *Erkenntnis* are redescribed at the level of *Verständnis* as something else. This something else is purported to be what those objects really are. This is often referred to as the ‘essence’ or ‘nature’ of objects. This terminology is used also by Menger (1963: 37n), for whom the aim of theoretical research was to accomplish ‘investigations into the *nature* of the commodity, into the *nature* of economy, the *nature* of value, of price and similar things’.

b: The notion of explanation as redescription involves a number of important ideas.¹⁶ First, explaining something is thought to entail telling what it is – what it really is. What it is is manifested in its phenomenologically describable features. By redescribing it adequately, we can explain those features as such manifestations. The point is that we attempt to explain *the way an entity is* by describing *what it is*: an entity behaves the way it does because it is what it is, i.e., it behaves according to its nature. Let us look at arguments (1) and (2). From the point of view under discussion, no genuine, deep explanations are provided by those arguments, because of the poverty of the conceptual resources employed. Everything is described within the same, empirical framework (as copper, metal, heating and expanding). An account of the explananda in question in a genuine sense would involve redescribing copper in terms of molecular structure and heating in terms of molecular motion. Similarly, in the case of (4), further steps might be required in order to redescribe money stock and the price level, for instance: we do not understand a particular increase in the rate of inflation if we do not understand what the (ultimate) nature of money and inflation is.

c: Secondly, it is primarily the task of scientific theory to do the explanatory work. Singular phenomena cannot be explained by deriving their descriptions from empirical generalizations – which then, in turn would be explained by deriving them from theories. It is rather the case that theories account for empirical facts directly. It is only by means of the conceptual resources of a theory – not being reducible to the observational language of empirical facts and generalizations – that empirical facts can be redescribed in a way which reveals what those facts really are.¹⁷ This makes theorizing – that is, hypothesizing about theoretical entities – indispensable for attaining the goals of science. It is clear that the irreducible and indispensable status of theory in economics has been emphatically endorsed in the Austrian tradition; recall, e.g., the crucial distinction between ‘theory’ and ‘history’ insisted on by Menger and von Mises, and the statement by von Mises (1949: 39) that ‘[w]ithout theory, . . . there is no comprehension of the reality of human action’.

d: Thirdly, theories are to be understood in a realist fashion, that is, as purportedly referring to and representing really existing – though possibly unobservable – things. More strongly, the role of ontological commitments

¹⁶ For a discussion of some aspects and some advocates (primarily Sellars and Aronson) of the idea, see Mäki (1987).

¹⁷ It is one of the central ideas in Sellars’s criticism of the covering-law model – which he calls the ‘levels view’ – that, contrary to that model, theories explain phenomena directly. For presentations of these ideas, see Sellars (1963) and Sellars (1967).

in scientific explanation now becomes crucial, while it is largely irrelevant for the covering-law model (and completely irrelevant for the instrumentalist version of the model). If theories explain phenomena by telling what they are, no explanations are forthcoming if scientists using those theories do not take seriously the picture they provide about the fundamental (or perhaps the allegedly ultimate) constituents of the domain under study. Not merely the derivational properties, but, most importantly, the ontological properties of theories are essential for scientific explanation.¹⁸ It is well-known what the ontic furniture of the world depicted by Austrian theories consist of: human individuals, their wants, intentions, beliefs, actions etc. As I will show later on, realism about these objects and theories of them is typically espoused in the Austrian tradition.

e: Fourthly, explanation in the above sense is closely related to reduction. We explain a phenomenon by reducing it to a 'world' built up of what are regarded as more fundamental entities. At the same time, the phenomenological description of that phenomenon is reduced to a description of that more fundamental world.¹⁹ Again, it has to be emphasized that mere deductive derivation of one description from another does not suffice for an explanatory reduction in the present sense. The relevant notion here is that of *ontological reduction*: the referents of one description are being reduced to those of another (the notion of identification, to be introduced shortly, will specify this idea). Since Austrian economists regularly declare themselves as champions of individualism, we may conclude from this that they insist on one kind of reduction as a necessary condition for economic explanation, namely microreduction. Explananda of economics are to be reduced to the individualist furniture listed above. Since what we have here is an idea of ontological microreduction, Austrian individualism is to be characterized not only as methodological but as metaphysical individualism as well.

¹⁸ On the relationship between explanation and ontology, see Aronson (1984), Pitt (1981), Spector (1978) and Hooker (1980). In one of his typically obscure passages, von Mises (1976: 130) apparently seems to deny the intimate connection between explanation and ontology and to subscribe to something reminiscent of the covering law view: 'We explain a phenomenon when we trace it back to general principles. Any other mode of explanation is denied to us. Explanation in this sense in no way means the elucidation of the final cause, the ontological basis, of the being and becoming of a phenomenon.' Of course, much depends on what von Mises means by the 'ontological basis'. Perhaps he is here more concerned with the limits of explanation - a question to which I will return in a later section - than with the nature of explanation, indeed, to the extent that the latter becomes obscured.

¹⁹ The linguistic aspect of this is, in effect, what has been called 'heterogeneous' reduction, since there is no homogeneity across the two descriptions with respect to their vocabularies: the reducing description contains (it has to, in order to be explanatory) terms not contained in the reduced description.

2 Explanatory identification

a: In order to see more clearly what the idea of explanation as redescriptive reduction amounts to, I have to introduce the notion of identification. In the process of explanation we identify an explanandum (the object of an empirical description) with the object of its theoretical redescription by means of an identification statement. It is precisely this identification statement which tells us what the explanandum is.²⁰ It also takes care of the ontological reduction involved in explanation. The statement is of the form, 'x is y', where x is the (or part of the) explanandum described in the reduced phenomenological framework 'y' (the redescription of x) has the form, 'appearance of ____', 'form of ____', 'aspect of ____', 'manifestation of ____' etc. These expressions are to be completed by adding expressions referring to theoretical objects (see Aronson, 1984: 175–76.) In addition, the structure of the relation of appearance, manifestation etc., is often in need of theoretical specification. This is the case in our application to be introduced shortly.

b: It is important to understand the meaning of the verb 'is' in explanatory identification statements. No mere coextensionality of two definite descriptions is asserted by means of the term. Rather, its meaning is to be specified by such phrases as 'is really', 'is at bottom', 'is nothing but', 'is ultimately' etc. This sense of 'is' makes the identification in question a reductive identification. It implies that the relation expressed by such an 'is' is asymmetrical: we are not permitted to say that objects of theoretical redescrptions *are* objects of empirical descriptions (in fact, this would amount to the phenomenalist strategy). This also implies that explanatory identifications under consideration are different from such paradigmatic examples of identity statements as:

Hesperus is Phosphorus (V)

where 'Hesperus' and 'Phosphorus' are proper names that name the same object, namely the planet Venus (at one point in time, it was discovered that the evening star, named 'Hesperus', and the morning star, named 'Phosphorus', in fact are one and the same object). (V) is different from the sort of explanatory identification statements we have been discussing in that the 'is' in (V) expresses a symmetrical relation and that no theoretical redescription takes place. (V) does not state a reductive relation. 'Phosphorus' does not purport to represent the essential nature of the object named 'Hesperus'. In this respect, (V) is different from:

²⁰ There is a variety of different analyses of the nature and function of identification statements in reduction and explanation (see, e.g., Causey, 1972; 1977; Enç, 1976; Spector, 1978; Hooker, 1981; Pitt, 1981; Aronson, 1984).

Water is H₂O, (W)

another paradigmatic example of identification statements. (W) delivers the message that, in fact, samples of water as common-sense objects are composed of H₂O molecules, and that this constitutes the essence of water. Here, 'is' expresses an asymmetrical relation. (W) is an instance of reductive identification.

c: I think I do not go astray if I suggest that, as a matter of fact, Austrian economists at least implicitly subscribe to the following two general identification statements as part of their approach:

Social entities *are* aggregates or averages of individual entities, these latter entities being invested with meaning by acting individuals. (A)

Social entities *are* unintended consequences of actions by human individuals. (C)

d: Let me comment, beginning with the notion of a social entity. First, it is used here as a generic concept for items of various metaphysical sorts in order to avoid unnecessary involvement in the question of what those sorts might be in the domain of economics. Secondly, the set of those sorts may be collected out of such candidates as things (e.g., the money stock, Finnish pulp industry), powers (e.g., the general purchasing power of items of money, the productivity of Soviet agriculture), states (e.g., demand for money, the division of labour in Zambia), events (e.g., an act of exchange, Black Monday), processes (e.g., the market process, the production of the first Concorde) etc. The set of suggested candidate instances is also open for reconsideration. Thirdly, the set of social entities comprises both entity types (e.g., the labour market, the price level, fluctuations in the GNP) and entity tokens (e.g., the Bundesbank, the inflation rate of Iceland last year, the fact that pieces of metal in my pocket now have general purchasing power).

e: Then a few words about the distinction between (A) and (C). First, these two identification statements can be understood as stating two principles of the constitution of social entities; they may be called the aggregative and the causal principle of constitution. Secondly, (A) and (C) are formulated as general principles which allow for and require different specifications, not only of the notion of social entity, but also of the specific relation of aggregation or causation that various social entities have to facts about individual agents. Thirdly, (A) and (C) are to be understood as having a complementary relation: some social entities are to be identified with aggregates or averages, some others with causal effects. Fourthly, the distinction between (A) and (C) should not be taken as exhaustive of all possible alternative principles of constitution. For instance, some social entities clearly are intended results of human action. However, (A) and (C) would seem to express the general vision characteristic of Austrian economics.

f: Not much is needed to clarify the contents of the aggregative principle of constitution. First, when saying that some social entities are ‘aggregates’ of other entities I do not want to exclude the possibility of a minimum amount of organization among these other entities.²¹ Secondly, not all entities can be aggregated or averaged so as to constitute social entities. It is part and parcel of what Austrians call their ‘subjectivism’ that those entities have to be selected and defined in terms of the beliefs, expectations, valuations and purposes (in short, meanings) attached to them by acting individuals.

g: The causal principle of constitution requires more attention. First, (C) is clearly the most distinctive ingredient in the Austrian way of explaining economic phenomena. It gives expression to the very idea of ‘causal-genetic’ explanation. Secondly, the point of the redescriptive part of (C) is that although many social entities are claimed to be *consequences* of individual actions (which is to say that they are distant causal products of individual beliefs and intentions), they are not among the *results* that any single individual or group of individuals intended to bring about. Thus, there is an important distinction between consequences of intentions and intended results. Those unintended consequences of individual actions that are of interest to social scientific explanation are spontaneous, undesigned outcomes that have been moulded by the so-called invisible-hand process, while intended results have not. Austrian explanation involves essentially the notion of the invisible hand.²²

Thirdly, not all social entities to which statement (A) does not apply are unintended consequences of individual action. Some of them may be intended results. These may be divided into two types with regard to the way they are to be explained. Intended results of the first type are to be explained as such results of human action. As examples of social entities of this kind, we may think of a purchase of a loaf of bread by a housewife, or a devaluation of a nation’s currency by central bank authorities. Explanations of these sort of entities are not Austrian explanations in the sense of this article (which does not imply that Austrian economists are unable to provide explanations for them consistently within their theoretical framework). Intended results of the second type are peculiar in that they are to be explained as unintended consequences of individual action, because, Austrians claim, it is the fact that they are outcomes of invisible-hand processes that characterizes their essential nature. Their being intended

²¹ This would be the case if I used ‘aggregate’ only in the narrow sense of an additive sum of elements. However, neither is this narrow sense to be taken as being excluded by (A).

²² Hayek’s (1967) distinction between results of human action and results of human design is close to that of mine between consequences of human action and results of human action (for discussions of the role of the notion of the invisible hand in economic explanation, see, e.g., Ullman-Margalit, 1978; Langlois, 1986; Koppl, 1988; Mäki, 1990c). For an argument for the causal nature of the invisible-hand process, see Mäki (1990c).

results is regarded as just an accidental, contingent fact. They belong to a category of social entities of which a major part is, as an actual fact, unintended consequences moulded by the invisible hand. To give an example, Menger admits that money, i.e., the generally accepted medium of exchange, may sometimes somewhere emerge as an intended result. However, Menger insists that it is part of the essence of money that it is a spontaneous outgrowth of an unplanned process of individual interaction (see, e.g., Menger, 1892.)

h: I argue that, implicitly at least, specifications of identification statements (A) and (C) play a constitutive role in Austrian explanations. (A) and (C) serve as a general foundation or vision on which specific explanations of economic phenomena or institutions are built. The existence and behaviour of relative prices and price levels, money and money stock, capital and interest etc. are traced back to meaningful individual action by identifying them with specific kinds of aggregates, averages or causal consequences thereof. As an example of the aggregative principle of constitution, I quote von Mises's statement that '[t]he demand for money of the economic community is *nothing but the sum of the demands for money of the individual economic agents composing it*' (von Mises, 1953: 131–32 emphasis added). Here is an example of the causal principle from Menger's theory of imputation, his explanation of the value of the inputs of production: 'the value of goods of higher order is, therefore, in the final analysis, *nothing but a special form of the importance we attribute to our lives and well-being*' (Menger, 1976: 152 – emphasis added). For a microreductionist identification of the market, I quote from Rothbard (1979: 16):

. . . the 'market' is not some sort of living entity making good or bad decisions, but is simply a label for individual persons and their voluntary interactions. If A thinks that the 'impersonal market' is not paying him enough, he is *really* saying that individuals B, C, and D are not willing to pay him as much as he would like to receive. The 'market' is individuals acting.

i: Let us return to our illuminating, analogous pair of empirical lawlike statements, used in would-be explanatory arguments (3) and (4) above. Viewed from the perspective under discussion, in order to obtain genuine explanations, the objects of those statements should be redescribed in terms of expressions referring to microentities. Indeed, this is what in fact takes place. Reduction of classical thermodynamics to the kinetic theory of gases is a paradigmatic example of allegedly successful physical reduction using identifications. The central pillar of classical thermodynamics is Boyle-Charles's law, $PV = RT$. This law is concerned with gases as macro-objects and their properties such as pressure and temperature. The microeducation of this phenomenological law (which, in Menger's terminology, would provide us with *Erkenntnis* only) to the kinetic theory employs the following identifications about things and properties:

- A body of gas *is* a collection of molecules. (GT)
 Temperature of a gas *is* the mean kinetic energy of individual gas molecules.
 Pressure of a gas *is* the mean time rate of momentum change per unit area of the gas molecules. (GP)

The descriptions which follow the word 'is' in each of these statements (i.e., redescrptions of gas, temperature and pressure), use a vocabulary which appears only in the kinetic theory of gases. Only with this theory can we acquire explanatory understanding (Mengerian *Verständnis*) of what is really going on under thermodynamic descriptions.

The situation is analogous with the case of argument (4). An Austrian economist is dissatisfied with any claim to restrict the explanatory story to (4), because it seems to suggest that nonindividualist entities like the total money supply and the price level can lead a life of their own with mutual causal relations. From the Austrian perspective, this is not the way the world is. I quote from Hayek (1935: 4), who does not accept the idea suggested by the use of argument (4) that:

. . . we try to establish *direct* causal connections between the *total* quantity of money, the *general* level of all prices and, perhaps also the *total* amount of production. For none of these magnitudes *as such* ever exerts an influence on the decisions of individuals: yet it is on the assumptions of a knowledge of the decisions of individuals that the main propositions of non-monetary economic theory are based. . . . If . . . monetary theory still attempts to establish causal relations between aggregates or general averages, . . . [it] lags behind the development of economics in general. In fact, neither aggregates nor averages do act upon one another . . .

Explanation based on Austrian beliefs in the way the world is requires that objects which appear to have a role in (4) be identified with objects of their individualist redescrptions. Thus, an economy is to be identified with an aggregate or collection of acting individuals; the total money stock is to be identified with the sum of the cash balances held by individuals and valued by them because they have general purchasing power, i.e., serve as generally accepted media of exchange; the change in that stock is to be identified with an intended result or with an unintended consequence of actions by central bank authorities and other individuals; the general purchasing power of items in the money stock is to be identified with a spontaneous consequence of an invisible-hand process; the quantitative value of this property and the price level and their changes are to be individualistically redescrbed etc. Only by so doing could we pursue Austrian understanding of what is really going on in the world where relations occurring in (4) appear to hold.

Such individualist redescrptions make it both possible and natural for an Austrian economist to specify the mechanism or process by which a change in the supply of money is transformed into a change in prices. They help Austrian economists overcome the fiction of 'helicopter money', distributed to agents simultaneously and in direct proportion to the amount of money

they had previously. Austrians think that, as a matter of fact, an increase in the amount of money first reaches the hands of a limited number of agents. The increased real cash balances exceed the amount demanded by these agents with the result that they are able and willing to offer more money for those goods that they decide to purchase, this decision being based on their subjective valuations concerning economic goods and additional units of money. Others who receive this money in exchange will, again on the basis of their subjective valuations, demand more intensively those goods that they wish to buy, thus also causing their prices to rise. And so on. The price level will rise. The exchange value of money will fall. However, there is no reason why all prices would rise equiproportionally to the increase in money supply. In the process, there will have occurred changes in relative prices and relative incomes. Changes in the quantity of money are not neutral in this respect (see von Mises, 1953: 138ff). The individualist redescription of the explanandum of argument (4) has to take this into account. It cannot be ignored that there is no uniform increase in 'the price level'; the exchange value of money does not change in the same proportion with respect to all goods. In other words, the rise of P by $p\%$ cannot be identified with the rise of the price of each individual item by $p\%$. Rather, it is to be identified with a spontaneously caused and uneven rise of individual prices by an approximate average of $r\%$.²³ As can be seen, here both principles (C) and (A) are employed.

The 'mechanical' version of the quantity theory of money used in argument (4) implies the 'proportionality theorem' which says that changes in the quantity of money are accompanied by exactly proportionate changes in the price level. Austrians are critical of this idea. They claim (and this claim would be impossible without identification statements such as (A) and (C)) that during the process whereby the additional money enters the economy, changes will take place in the 'microstructure' of the system (valuations and expectations of individuals, distribution of incomes, exchange ratios between goods) with the result that r may not be equal to p . This implies the rejection of the proportionality theorem (see von Mises, 1953: 141–44; Moss, 1976: 30–36). I will return to this point briefly in Section III.4c.

j: The character of identification statements like (GP) has raised discussion among philosophers. It is a typical view that they do not denote causal relations (e.g., Causey, 1972; 1977). However, Enç (1976) has argued that there

²³ Note that no presumptions are made here about how the measurement of these entities might be accomplished in practice. Austrian economists are highly sceptical about the prospects of such measurements (by means of a statistical price index, for instance). Even more importantly, the whole notion of the price level and its changes is in doubt among Austrians. One reason is that the process of change is not restricted to changes in the prices of existing goods; in addition, people's valuations change, goods come and go etc. Perhaps the formulation of the identification of the rise in P in terms of an *approximate* average will do to modify, if not settle these problems.

is a measure of causation involved. He suggests that identification statements in reduction are best understood as expressing 'generative relations' between the objects of the two descriptions. As an example, he considers the statement, '[t]he weight of an object (on earth) is the gravitational force exerted on the object by the earth' (Enç, 1976: 288), and suggests that the generative relation implied can be expressed as follows: 'the fact that the gravitational force exerted on the object of *F* brings it about that (or results in the fact that; or makes in the case that) the object has the weight *w*' (Enç, 1976: 292).

The issue concerning the relationship between identification and causation turns out to be of importance to our reconstructive efforts, as we recall the Austrian aspiration for causal-genetic explanation in economics. Economic phenomena and institutions are to be explained as undesigned products of individual actions, mediated by a causal mechanism of the invisible hand, the picturing of which is the task of economic theory to provide. Thus, causal talk is essential for Austrian explanations. Causation should have a role in Austrian identifications.

Hence, it would seem that Enç's proposal is in order. However, it appears to be unnecessary. The worry has already been taken care of. Look at (C). Causation has been built into the redescriptive part of the identity. Social entities are claimed to be causal consequences of individual actions. Recall also our general formulations of identification statements in Section III.2a. We did not stop with '*x* is *y*' but went on to make explicit the internal structure of '*y*' as 'manifestation of *z*', for instance. The causal contents of redescriptions like 'aspect of *z*' or 'form of *z*' is not very obvious.²⁴ But as we extend the list with expressions like 'outgrowth of *z*', 'alloy of *z*' etc., we will have a storage of description forms from which we may choose whichever we believe is most adequate for our purpose to understand real relations, causal or otherwise, in the fragment of the world at hand.

3 *Explanation as ontological unification*

a: One of the virtues of explanation as redescriptive reduction is that it also brings about unification of our understanding of the world.²⁵ The idea of unification is best clarified by imagining an initial situation where the phenomena we observe seem to be diverse, independent of each other. At most, contingent relations seem to prevail between them. Often this kind of situation is a sign of our lack of understanding of those phenomena. We

²⁴ It may be that Enç's suggestion is sometimes needed for interpreting identities using such redescriptions. But I see no reason why this should always be the case.

²⁵ For different proposals about the nature and role of explanatory unification in sciences, see, e.g., Friedman (1974), Kitcher, (1981), Aronson, (1984). See also Mäki (1987).

gain understanding only by constructing a theory which explains those phenomena as manifestations of one and the same set of theoretical entities. After having been so related to an underlying common ontic basis, diversity among phenomena disappears. This is why Aronson (1984) talks about explanation as 'reducing the number of independent phenomena'. Ontological unification emerges as a result of identifying phenomena with aspects or manifestations of a common set of objects.

b: Striving for ontological unification appears to have been a permanent feature in the Austrian tradition of economics. Among the first expressions of it was Menger's (1976: 173) criticism of classical economics of not being able to provide a uniform explanation for prices of both factor services and consumer goods, and his claims 'that all phenomena of value are the same in nature and origin, and that the magnitude of value is always governed according to the same principles'. To mention another example, von Mises (1953: 144–45) is critical of 'most' proponents of the quantity theory of money (i.e., those satisfied with arguments like (4)) for treating the determination of the value of money differently from that of other goods; to von Mises, the value of all goods, money included, has the same source in individual valuation. The same pursuit is present in von Mises's consistent reluctance to let any 'objective' factors (productivity, above all) enter his subjectivist theory of interest: interest is to be explained as a manifestation of the same realm of subjective valuation by individuals as all other price phenomena (see Kirzner, 1979: 76–87).²⁶ Again, the same spirit governs Kirzner's (1973: 129) treatment of entrepreneurship: '. . . exactly the same competitive-entrepreneurial market process is at work whether it manifests itself through prices adjusting toward general (or partial) equilibrium patterns or through the adjustment of commodity opportunities made available, techniques of production, or the organization of industry'.

It is also illustrative to take a closer look at von Mises's view of the pricing process. I quote a lengthy passage:

The pricing process is a social process . . . [in which] all people are instrumental in bringing about the result, viz., the price structure of the market, the allocation of the factors of production to the various lines of want-satisfaction, and the determination of the share of each individual. These three events are not three different matters. They are only different aspects of one indivisible phenomenon which our analytical scrutiny separates into three parts. In the market process they are accomplished *uno actu* (von Mises, 1949: 335).

²⁶ The idea of progress in science as growth of explanatory unification is compactly expressed by Hayek (1952: 31), who maintained that 'every important advance in economic theory during the last hundred years was a further step in the consistent application of subjectivism'.

Two stages of explanatory redescription seem to be taking place in this passage. First, three phenomena are identified with (redescribed as) aspects of the same thing: price structure, allocation of production resources and distribution of the final products are all aspects of an *X*. Secondly, this *X* is identified with (redescribed as) a consequence of individual actions in the market process. Explanation goes hand in hand with ontological unification. It is noteworthy that causation seems to enter the picture only at the second stage of the explanation.

c: A final remark is needed in order to block a possible misunderstanding. While it is obvious that much of economics seeks unification, it is not equally obvious that what is being sought is always ontological unification. That is why it is important to make a distinction between logical and ontological unification. Logical unification is brought about when more and more statements within a discipline become derivable from the same set of axioms, or when the same set of statements becomes derivable from a smaller set of axioms. It seems to me that a major part of work in general equilibrium analysis is motivated by some ideal of logical unification. While it is clear that logical unification is highly valued in Austrian economics (just think of von Mises's claim of being able to derive the fundamentals of economic theory from the 'axiom' of human action), my point is that it is primarily ontological unification that is constitutive of the Austrian way of explaining economic phenomena. Unification based on inferential capabilities is different from unification based on representational capabilities, though they may go hand in hand.

4 Explanation and prediction

a: One of the most fundamental criticisms levelled against the view that we could explain (and predict) phenomena by deducing their descriptions from a conjunction of statements containing empirical generalizations is the thesis that such generalizations are not universally strictly true. Empirical generalizations cannot have an explanatory role in deductive arguments, because, strictly taken, they do not hold in all circumstances and at all times. Every generalization comes with a certain degree of instability.

This point is implied also in Sellars's insistence that it is theories which explain phenomena directly. In addition, by so doing, theories 'explain empirical laws by explaining why observable things obey, *to the extent they do*, these empirical laws' (Sellars, 1963: 121 – emphasis added). Thus, we may conclude, theories explain two things. First, they explain why phenomena behave in certain ways, characterized by empirical generalizations. Secondly, they explain why those generalizations do not hold without exception. This second point is expressed by Sellars (1963: 123) in his

statement that ‘micro-theories explain why inductive generalizations pertaining to a given domain and any refinement of them within the conceptual framework of the observation language are at best approximations to the truth.’ As should be clear by now, the view articulated in this paper implies that scientific theories perform these two explanatory tasks by stating what the phenomena under consideration are.

In the following argument, I will show that perception of the instability of empirical regularities (and empirical generalizations as descriptions thereof) has an important role in the formulation of the Austrian approach, and that Austrian scepticism about the predictive capabilities of economic theories is rooted, partly at least, in that perception.

b: For this purpose, I will use the twin concepts of a closed and an open system. The distinction is best understood by considering two conditions of closure (Bhaskar, 1978: 73–76; Sayer, 1984: 112–14):

- 1) The extrinsic condition: the object or system is either actually isolated from external influences, or these influences remain constant.
- 2) The intrinsic condition: the internal structure of the system or object is either nonexistent or constant.

Only on these conditions could we have strictly true empirical generalizations with no deviations. If either one or both of these conditions are not satisfied, we have an open system. In this case, the stability of any empirical regularities related to the behaviour of the system becomes threatened by external and/or internal influences which are not mentioned in the generalization (their presumed constancy or absence may be implied in the closure or *ceteris paribus* clauses connected to the generalization). Thus, the degree of the stability of empirical regularities can be regarded as indicative of the degree of closure.

c: The absence of empirically constant relationships or stable regularities in society has been forcefully underlined by several Austrian economists (who share this view with many other economists and social scientists). Thus, for example, arguments like (4) above would not be able to provide us with uniformly successful explanations and predictions, because ‘[t]he relationship between the quantity of money and its purchasing power is not constant’ (von Mises, 1981: 117). If (4) turned out to be a completely successful prediction, this would be little more than an accident. As I said in Section III.2i, the proportionality theorem involved in (4) is undermined by the instability of the microstructure of the economic system, including the expectations and valuations of individuals. We may reformulate this point by saying that the intrinsic condition of closure does not hold when effects are brought about as a consequence of an increase in the money supply. For example, in countries with rapid inflation in the recent past, individuals expect it to

continue, and reduce their real money demand. For this reason, ‘the decrease in the value of the money has occurred faster than the increase in its quantity’ (von Mises, 1953: 227).

The lack of constancy and the consequent inability to attain accurate predictions have been attributed to the high degree of complexity among phenomena studied by economics:²⁷

. . . here individual events regularly depend on so many concrete circumstances that we shall never be in a position to ascertain them all; that consequently not only must the ideal of prediction and control remain largely beyond our reach but also the hope remains illusory that we can discover by observation regular connections between the individual events (Hayek, 1964: 343).

Complex phenomena, or phenomena in open systems, are intersections of several causes and conditions, only part of which fall within the purview of one scientific discipline. No doubt neither of the two conditions of closure are met by the subject matter of economics. The extrinsic condition is violated by changes in such factors as legal, political and weather conditions, for example. The intrinsic condition is not satisfied, for instance, because of creative innovation, learning and free will on the part of economic agents – factors stressed by Austrian economists.

d: I am now ready to submit a simple idea of how economic theory might perform the two explanatory tasks mentioned above in Section III.4a. First, the theory redescribes phenomena as manifestations of a system of ‘deeper’ entities, and by doing so accounts for the fact that those phenomena obey certain empirical regularities (they do so because they are what they are). Secondly, the theory redescribes the phenomena as members in a set of manifestations of an *open* system of more fundamental entities and thus explains why they obey the regularities only approximately (again, they do so because they are what they are).

This is all there is to Mengerian *Verständnis* of an economic phenomenon: accomplishing the two explanatory tasks amounts to understanding ‘the reason for its being as it is’. At the same time, however, an economic theory need not have predictive power with respect to particular phenomena. What we have is ‘a description merely of the general character of the order we shall find under specifiable conditions but can never translate into a prediction of particular manifestations’ (Hayek, 1964: 345). Our explanatory ambitions

²⁷ ‘The minimum number of elements of which an instance of the pattern must consist in order to exhibit all the characteristic attributes of the class of patterns in question appears to provide a quite unambiguous criterion’ of the degree of complexity (Hayek, 1964: 335). For a discussion of the relationships between ‘open system’, ‘complexity’ and ‘absence of constants’ – which is maintained to be one of synonymy by the author – see Grunberg (1978).

are not undermined by our inability to derive from our theory plus a finite set of initial conditions all or even most of the spatiotemporal and other accidental attributes of particular phenomena.²⁸

5 *Additional remarks*

a: In the foregoing, I have suggested a way of reconstructing one aspect of Austrian explanation – the idea of grounding economic explanations on beliefs in the way the world is. Not all aspects of Austrian explanation have been covered. To give some idea of how a complete account could be pursued, I will make brief remarks on two more aspects, those related to inferring and answering, the basic components of explanation according to the two other orientations mentioned in Section I.2. above.

b: Many Austrians, perhaps most notably von Mises, have emphasized that economics is a deductive science. Thus, it should be clear that deductive inference has an important role in Austrian explanation. How is this role to be characterized in relation to the explanatory structure outlined earlier in the present section? I suggest that one role of deduction is a matter internal to the redescriptive part of identification statements. Beginning with statements concerning individual action, Austrian economists seek deductively to display the structure of the process by which individual actions produce the unintended consequences with which social entities then become identified. Let it be noted, however, that it is not at all clear that each step in the process can be deductively presented. Another role for deductive inference depends on the acceptance of aggregative arguments like (4) – themselves deductive in structure – as part of Austrian explanations. The Austrian addition to such arguments would be the provision of individualistic redescriptions of the constituent macrocategories. These redescriptions would tell us what is really going on under the aggregative descriptions and inferences which are based on them.

c: I suggest there are at least two senses in which Austrian explanations are dependent on the pragmatic context in which explanations are given. First, explanations constructed by means of specifications of (A) and (C) are often provided as answers to questioners who do not share Austrian beliefs in the ultimate nature of social entities. Such ‘deep explanations’ are offered for

²⁸ All this is compatible with Michael Scriven’s criticism of the covering-law model and the related structural identity thesis. As Scriven (1962: 186) writes, ‘a prediction has to say when something will happen, or what will (sometime) happen, a causal explanation only what made it happen’. This can be put in terms of a logical difference: ‘explanations can be supported by assertions about qualitative necessary conditions whereas even a conditional prediction requires quantitative sufficient conditions’ (1962: 185).

questioners whose background beliefs are such that they tend to be content with (what Austrians would regard as) 'surface explanations' like (4). On the other hand, when Austrian background beliefs in the truth of (A) and (C) are shared by both questioners and answerers, no need to go beyond arguments like (4) may arise in all routine situations of scientific practice, provided that (4) and other aggregative arguments are treated instrumentalistically.

The second kind of contextual dependence is related to the types of questions presented as requiring answers as explanations. Explanations based on specifications of (A) and (C) typically provide answers to questions concerning the existence and proximate behaviour of economic phenomena and institutions. On the other hand, for reasons given in Section III.4 above, questions about the precise quantitative behaviour of economic objects are not as easily answerable on the same basis.

IV Explanation and existence

a: I am now ready to make a few remarks on the relation of explanatory theorizing in Austrian economics to realism about the world and about theories. The two questions that occupy us briefly in this section concern, first, the nature of the existence of both the explaining and explained entities, and, secondly, the possible boundaries between science and common sense with respect to ontological matters. This means that we are going to reverse the angle regarding the relationship between explanation and the way the world is. We have talked about explanation as based upon beliefs in the way the world is. We will now – especially with the second question – talk about beliefs in the way the world is as based upon explanatory success.²⁹

b: As I said earlier, the question of ontological commitment is largely irrelevant to the inferential version of the covering-law model of explanation – though, typically, the reality of explananda is taken for granted. To a realist of our present variety, ontological commitment is crucial for explanation; and it is primarily the real existence of the objects of explanatory redescrptions which concerns the realist. Austrian economists seem to share this concern: 'Praxeology conveys exact and precise knowledge of real things.' (von Mises, 1949: 39). Austrians are also subjectivists: 'Society as we know it is, as it were, built up from the concepts and ideas held by the people . . .' (Hayek, 1952: 33), or, in other words, '[s]o far as human actions are concerned the things *are* what the acting people think they are' (1952: 27).³⁰ These subjective entities (individual beliefs, purposes,

²⁹ For a general discussion of these questions and of a variety of answers to them, see Mäki (1984). On the problem of the existence of explananda, see Mäki (1987).

³⁰ These two quotations from Hayek are open to different interpretations. It would not seem to be compatible with the reconstruction of Austrian explanation suggested here to adopt the

preferences etc.) are among the theoretical entities of the Austrian theory, and, 'although purposes cannot be seen or touched, they are nonetheless "there"' (Kirzner, 1976a: 44). This view is, as I propose to call it, a combination of ontic subjectivism and ontological objectivism or realism. It is ontic subjectivism in that many fundamental objects of economic theory are claimed to be subjective in nature; they are 'made of subjective stuff'. It is ontological objectivism or realism in the sense that those subjective entities are maintained to have an objective existence, they exist independently of economists' theories of them.

c: Thus, the explanantia of Austrian explanations are regarded as really existing. What about the existence of explananda? Some philosophers (e.g., Sellars) think that explanatory reductions of the kind discussed earlier are essentially replacements: theoretical redescrptions are taken to replace phenomenological descriptions. In explaining a phenomenon we explain it away, out of existence. In this view, identifications like (GT) and (GP) permit us to say, in effect, that gases, temperature and pressure do not really exist – only molecules (and possibly their properties) do. If gases can be said to exist, what is meant is that they exist only as collections of molecules.

At least some of the explananda of Austrian explanations seem to be of this kind (it is not clear to me whether this applies to all of them). Here we have a neat formulation of the idea at a general level: 'A collective whole is a particular aspect of the actions of various individuals and *as such* a real thing determining the course of events' (von Mises, 1949: 43 – emphasis added). Thus, we may conclude, identifications (A) and (C) should at least sometimes be understood as replacements: social entities have real existence only as objects of their individualistic redescrptions.

d: Now to the second question. Scientific realism holds that scientific theorizing is the most reliable way to find out what there is in the world. The same kind of reliability cannot be attributed to the procedures and conceptual resources of common sense. Science has, so to speak, ontological authority over other forms of human thinking. Furthermore, explanation and ontological commitment go together also in the following way: the better our theoretical explanations, the firmer our commitment to the existence of our postulated entities. The inferiority of common sense with respect to the natural sciences, at least, seems to be implied in Hayek's (1952: 23) statement that '[t]he views people hold about the external world is to him [the natural scientist] always a stage to be overcome.'

view that the domain of economics has a subjective (ideal, mental, conceptual) character all down the line. An important nonsubjective element is the fact that the final and many intermediate outcomes of invisible-hand processes are unintended by acting subjects. Making the two Hayek citations compatible with this point presupposes that 'to be built up' and 'so far as human actions are concerned' be interpreted suitably.

What then is the relationship between Austrian economic theory and common sense? Let me begin with Ullman-Margalit's (1978: 268–70) suggestion that an invisible-hand explanation of social phenomena is not the most 'natural' or 'plausible' account, because it is 'an explanation in terms of intentional design [which] will naturally suggest itself'. We might reformulate this by saying that an intentional-design explanation is a kind of common-sense account for social patterns and institutions. As it is one of the central pillars of scientific realism to maintain that common sense is not the most reliable source of understanding the way the world is, the replacement of intentional-design explanations by invisible-hand explanations – which have less initial plausibility – can be taken as a step supported by scientific realism.

e: I will next argue, however, that there is an important respect in which ontological authority is not denied common sense in Austrian economics. While physical theories postulate unobservable entities such as quarks and magnetic fields to explain observed phenomena, and scientists become convinced of the real existence of those entities because their theories have high explanatory power, this is not the case in Austrian economics. Unlike physical scientists, Austrian economists do not infer their belief in the existence of the fundamental constituents of their explanatory ontic furniture from the explanatory power of their theories. Like some other economists (e.g., Cairnes and Robbins), they claim to be convinced of the existence of human action and its elements in advance of any theoretical endeavours; indeed, this conviction is part of our common-sense knowledge of the human world. In this respect, economics is said to be in a better position than the natural sciences.

f: Thus, it turns out that, according to Austrian economists, scientific explanations of economic phenomena are not superior to common-sense accounts as a source of more correct beliefs about what exists as the basic constituents of the human world. In what respect, then, are they superior? Let me try to clarify the situation by formulating the would-be identification statements employed in the two explanations, scientific and common-sense:

- | | |
|---|------|
| <i>x</i> is a consequence of an invisible-hand process ensuing from individual actions. | (sc) |
| <i>x</i> is a result of intentional design by human individuals. | (cs) |

Explanations based on these identifications share the same ontic furniture of individuals and their properties, but they differ as to the nature of the causal relation between human action and economic phenomena. It is the conviction of Austrian economists – this time acquired through considerations of explanatory power – that the relation depicted in (sc) is often the correct one.

g: I said earlier that Austrian economists subscribe to a combination of ontic subjectivism and ontological objectivism. I wish now to have shown that their ontological objectivism is a combination of common-sense realism and scientific realism. That they subscribe to the first element in this combination, is, I think, due to their ontic subjectivism: common sense, unaided by scientific theorizing, seems to have access to the subjective realities deemed to be the fundamental constituents in the ontic furniture of Austrian economics. However, economic theory is required to represent the presumed fact that these constituents in fact are fundamental and that they have a causal relation to economic phenomena characterized by the notion of the invisible hand.

V Concluding remarks: explanation, essentialism, and justification

a: I will begin this final section with a summary of the foregoing. First, the purpose of the article has been to use a reconstruction of one school of economic thought as an example to give a rough idea of how economics based on realism and explanatory ambitions would look, as opposed to economics based on instrumentalism and predictive aims. Secondly, I outlined a version of scientific realism which, for instance, allows essences and mental objects the 'right' to existence among scientific objects. Thirdly, I demonstrated how this version can be used to illuminate and reconstruct the Austrian way of explaining economic phenomena and institutions. For this purpose I introduced the notions of reductive redescription, identification and ontological unification. I also pointed out how the emerging conception of explanation can be made consistent with a sceptical attitude towards predictive capabilities in economics, and also how inferential and pragmatic concerns might be incorporated into the conception. Fourthly, I showed the way in which common sense plays a crucial role in Austrian realism.

b: It is important to be clear about what I have *not* done in this paper. I have not shown (or even tried to do so) that Austrian explanations are correct, nor have I shown by means of what kind of criteria and considerations their correctness should be assessed. Thus, unlike most of the recent discussion of the methodology of Austrian economics, this paper is not about questions of justification or appraisal (as noted in I.d). What I find largely misguided in those discussions is that they have *started* with these questions. In my opinion, questions of justification are not the proper place to begin. Questions concerning the aims of theorizing are. Not until these latter questions have been settled can we begin to consider appropriate ways of appraising the success of theories in attaining those goals. If explanation, logically

irreducible to prediction, is the goal, and if, in addition, explanation takes place in open systems, this should have some bearing on the criteria of justification – the traditional predictivist criteria will not do any more (this follows from considerations in Section III.4 above).³¹

c: I will clarify my point (and proceed to introduce a new point) by employing Karl Popper's simplified notion of essentialism. It seems that Popper (1963: 103–105) characterizes essentialism as a view that commits itself to the following three doctrines:

- 1) Scientific theories 'describe the "essence" or "essential natures" of things' lying behind the appearances.
- 2) By so doing, theories provide ultimate explanations in the sense that such theories are 'neither in need nor susceptible of further explanation'.
- 3) The truth of such theories can be finally established 'beyond any reasonable doubt'.

d: It is obvious that some Austrian economists – most notably von Mises – accept all of these three doctrines. It should be equally obvious that my reconstructive project presupposes, at most, accepting doctrine 1), which is independent of the nonfallibilism of 3).³² Let it be added that I am unsympathetic to an epistemological doctrine of justification like 3), and though I seem to share this attitude with some contemporary Austrians, no sophisticated theory of justification has been developed by Austrians to replace 3). My suggestion is that such a methodological theory should be constructed on the basis of a well founded understanding of the nature of the aims of economic theorizing, that is, an understanding of the nature of what it is that any criteria of justification are to measure.³³

e: Let us now turn to doctrine 2), and we shall see an interesting problem emerge. That many Austrians accept 2) should be clear. Von Mises (1981: 28) says that a characteristic of science is 'not stopping until it reaches a point beyond which it cannot go', and Kirzner (1976a: 177) specifies that the

³¹ Thus, I would advise Mark Blaug first to answer his own question, 'how economists explain', and only thereafter tackle Austrian (and other) views of justification.

³² Note that I am not talking about *apriorism* now. Confusions abound here, both by Austrians and by those who are critical of Austrian *apriorism*. In fact, the nonfallibilism of 3) is not equivalent to *apriorism* as it is often thought in the spirit of logical positivism. They are independent, just as essentialism and *apriorism* are independent of each other. Thus, nothing definite is implied with respect to *apriorism* by what I say in this article.

³³ Thus, I would not recommend adopting fashionable methodologies of justification from popular philosophical literature and attempting to implant them in the Austrian approach (nor in any other approach in economics or elsewhere), without a thorough-going analysis of what the suggested standards of justification are meant to measure. There is some flavour of this, e.g., in Rizzo's (1982) otherwise insightful proposal.

intentions of human actors are, with respect to historical events, ‘final causes that can be accepted without further explanation’.

Now an interesting problem with this arises since it has been contended by many scientific realists that basing one’s explanations on such common sense objects as human intentions and beliefs is part of a superficial ‘folk psychology’; real understanding of human cognition and learning requires going ‘deeper’ into neurophysiological processes (see, e.g., Churchland 1979). This view may be related to another challenge, directly addressed to economics by Alexander Rosenberg (1981): the dependence of economics on an intentional language prohibits it from finding the ‘natural kinds’ (or, we might say, the essences) of the human world – intentional languages do not ‘carve the nature into its joints’.³⁴

Within economics, this dependence is at its maximum in Austrian economics which consistently attempts to construct its theories on intentional (and, in Rosenberg’s opinion, non natural-kind) notions like valuations, purposes, expectations, and actions. Thus, Rosenberg’s (and Churchland’s and others’) point can be translated into a challenge to Austrian economists. I formulate it as a situation of choice between three options regarding the legitimate role of common sense when trying to unveil the ultimate essences of economic phenomena. Each of the three options seems to be possible for an Austrian economist.

The first option is the acceptance of the common-sense view or folk psychology as the correct conception of the nature of human action and its elements. This is in accordance with the realist-essentialist orientation to explanation, and it is also consistent with doctrine 2). The second option is the adoption of consistently scientific realist principles all down the line, in that all common-sense descriptions – also those about human action – would be replaced by scientific (e.g., neurophysiological) redescrptions. In the process, the objects of common-sense descriptions would be identified with the objects of scientific redescrptions. This, too, would be in line with the essentialist orientation and with doctrine 2). The third option is to relativize the talk about ‘ultimate explanation’ strongly with respect to disciplinary boundaries, so that the reduction of facts about individual action to, e.g., neurophysiological processes would not become a concern to economists. This choice might involve the point that no matter what intentions, valuations and beliefs ultimately are, economic phenomena are certain

³⁴ Rosenberg offers this as a diagnostic explanation of why economics has not indicated predictive success equal to that found in many natural sciences. His recommendation for cure is to turn to sociobiology for help – sociobiology is maintained by him to have access to the natural kinds of social life. It is important to notice that we have to accept neither Rosenberg’s diagnosis nor his recommendation in order to take his challenge seriously. In fact, a plausible rival diagnosis can be built upon considerations of Section III.4 of the present article, concerned with the open systemic character of the objects of economics.

kinds of manifestations thereof, and this constitutes their essence. We may then ask whether this view would mean that there is a pragmatic limit, based on the disciplinary division of labour, to explaining economic phenomena in terms of beliefs in the way the world is. If there is such a pragmatic limit, this would imply that, among the orientations to explanation, the third option would connect the essentialist orientation to the pragmatic orientation. Explanation as reductive redescription would work only within a pragmatic context of questions, background presuppositions, social settings etc. Doctrine 2) should be rejected or pragmatically relativized.

VI References

- Aronson, J.** 1984: *A realist philosophy of science*. London and Basingstoke: Macmillan.
- Bhaskar, R.** 1978: *A realist theory of science*. Hassocks: Harvester.
- Blaug, M.** 1980: *The methodology of economics: or how economists explain*. Cambridge: Cambridge University Press.
- Boland, L.** 1982: *The foundations of economic method*. London: Allen & Unwin.
- Caldwell, B.** 1982: *Beyond positivism: economic methodology in the twentieth century*. London: Allen & Unwin.
- 1984: Praxeology and its critics: an appraisal. *History of Political Economy* 16, 363–79.
- 1986: Towards a broader conception of criticism. *History of Political Economy* 18, 675–81.
- Causey, R.** 1972: Uniform microreductions. *Synthese* 25, 176–218.
- 1977: *Unity of science*. Dordrecht: Reidel.
- Churchland, P.** 1979: *Scientific realism and the plasticity of mind*. Cambridge: Cambridge University Press.
- Dolan, E.**, editor 1976: *The foundations of modern Austrian economics*. Kansas City: Sheed & Ward.
- Enç, B.** 1976: Identity statements and microreduction. *Journal of Philosophy* 73, 285–306.
- Friedman, M.** 1974: Explanation and scientific understanding. *Journal of Philosophy* 71, 5–19.
- Grunberg, E.** 1978: 'Complexity' and 'open systems' in economic discourse. *Journal of Economic Issues* 12, 541–60.
- Hausman, D.** 1981: *Capital, profits, and prices: an essay in the philosophy of economics*. New York: Columbia University Press.
- Hayek, F.** 1935: *Prices and production*, second edition. London: Routledge & Kegan Paul.
- 1948: *Individualism and economic order*. Chicago: University of Chicago Press.

- 1955: Degrees of explanation. *British Journal for the Philosophy of Science* 6, 209–25.
- 1964: The theory of complex phenomena. In Bunge, M., editor, *The critical approach to science and philosophy, in honor of Karl Popper*, Glencoe: Free Press, 332–49.
- 1967: *Studies in philosophy, politics and economics*. New York: Simon & Schuster.
- Hirsch, A.** 1986: Caldwell on praxeology and its critics: a reappraisal. *History of Political Economy* 18, 661–68.
- Hooker, C.A.** 1980: Explanation, generality and understanding. *Australasian Journal of Philosophy* 58, 284–90.
- 1981: Towards a general theory of reduction, Part II: identity in reduction. *Dialogue* 20, 201–36.
- Hutchison, T.** 1981: *The politics and philosophy of economics*. Oxford: Basil Blackwell.
- Kirzner, I.M.** 1973: *Competition and entrepreneurship*. Chicago: University of Chicago Press.
- 1976a: *The economic point of view*. Kansas City: Sheed & Ward.
- 1976b: On the method of Austrian economics. In Dolan, E., editor, *The foundations of modern Austrian economics*, Kansas City: Sheed and Ward, 40–51.
- 1979: *Perception, opportunity, and profit*. Chicago: University of Chicago Press.
- Kitcher, P.** 1981: Explanatory unification. *Philosophy of Science* 48, 507–31.
- Koppl, R.** 1988: Clearing up marginalism. Mimeograph.
- Lachmann, L.** 1977: *Capital, expectations, and the market process*. Kansas City: Sheed Andrew & McMeel.
- Langlois, R.N.** 1986: Rationality, institutions, and explanation. In Langlois, R.N., editor, *Economics as a process*, Cambridge: Cambridge University Press, 225–55.
- Lawson, T.** 1989: Realism and instrumentalism in the development of econometrics. *Oxford Economic Papers* 41, 236–58.
- 1990: Realism, closed systems and Friedman. *Research in the History of Economic Thought and Methodology* 10, forthcoming.
- Mäki, U.** 1984: Wissenschaftliche Realismus – Kontroversen und Konvergenzen. In Manninen, J. and Sandkühler, H. J., editors, *Realismus und Dialektik*, Cologne: Pahl-Rugenstein, 52–59.
- 1987: Explanation as redescription. In Holz, H.H. and Manninen, J., editors, *Vom Werden des Wissens*, Cologne: Pahl-Rugenstein, 109–14.
- 1988a: On the problem of realism in economics. *Fundamenta Scientiae* 9, 353–73.
- 1988b: How to combine rhetoric and realism in the methodology of economics. *Economics and Philosophy* 4, 89–109.

- 1989: On the problem of realism in economics. *Ricerche Economiche* 43, 176–98.
- 1990a: Mengerian economics in realist perspective. *History of Political Economy* 22, forthcoming.
- 1990b: Friedman and realism. *Research in the History of Economic Thought and Methodology* 10, forthcoming.
- 1990c: Practical syllogism, entrepreneurship, and the invisible hand. In Lavoie, D., editor, *Economics and hermeneutics*, London: Routledge, forthcoming.
- Marr, W. and Raj, B.**, editors 1983: *How economists explain: a reader in methodology*. Lanham: University Press of America.
- Mayer, H.** 1932: Der Erkenntniswert der funktionellen Preistheorien. In *Die Wirtschaftstheorie der Gegenwart*, Volume 2, Vienna, 147–239.
- Menger, C.** 1883: *Untersuchungen über die Methode der Socialwissenschaften und der politische oekonomie insbesondere*. Leipzig.
- 1892: On the origin of money. *Economic Journal* 2, 238–55.
- 1963: *Problems of economics and sociology*. Urbana: University of Illinois Press. (First published in 1883.)
- 1976: *Principles of economics*. New York and London: New York University Press. (First published in 1871.)
- Moss, L. S.** 1976: The monetary economics of Ludwig von Mises. In Moss, L. S., editor, *The economics of Ludwig von Mises*, Kansas City: Sheed & Ward, 13–49.
- Nozick, R.** 1977: On Austrian methodology. *Synthese* 36, 353–92.
- O'Driscoll, G. Jr. and Rizzo, M.** 1985: *The economics of time and ignorance*. Oxford: Basil Blackwell.
- Pitt, J.** 1981: *Pictures, images, and conceptual change*. Dordrecht: Reidel.
- Reekie, W.D.** 1984: *Markets, entrepreneurs and liberty*. Brighton: Wheatsheaf Books.
- Rizzo, M.** 1982: Mises and Lakatos: a reformulation of Austrian methodology. In Kirzner, I. M., editor, *Method, process, and Austrian economics*, Lexington: Lexington Books, 53–72.
- Rosenberg, A.** 1981: *Sociobiology and the preemption of social science*. Oxford: Basil Blackwell.
- Rothbard, M.** 1951: Praxeology: reply to Mr. Schuller. *American Economic Review* 41, 943–44.
- 1979: *Individualism and the philosophy of the social sciences*. San Francisco: Cato Institute.
- Rotwein, E.** 1986: Flirting with *apriorism*: Caldwell on Mises. *History of Political Economy* 18, 669–73.
- Sayer, A.** 1984: *Method in social science: a realist approach*. London: Hutchinson.
- Scriven, M.** 1962: Explanations, predictions, and laws. *Minnesota Studies in the Philosophy of Science* 3, 170–230.

- Sellars, W.** 1963: *Science, perception, and reality*. London: Routledge & Kegan Paul.
- 1968: *Philosophical perspectives*. Springfield: Thomas.
- Spadaro, L.**, editor 1978: *New directions in Austrian economics*. Kansas City: Sheed Andrews & McMeel.
- Spector, M.** 1978: *Concepts of reduction in physical science*. Philadelphia: Temple University Press.
- Ullman-Margalit, E.** 1978: Invisible-hand explanations. *Synthese* 39, 263–91.
- Von Mises, L.** 1949: *Human action: a treatise on economics*. New Haven: Yale University Press.
- 1953: *The theory of money and credit*. London: Jonathan Cape. (First published in 1924.)
- 1978: *The ultimate foundation of economic science*. Kansas City: Sheed Andrews & McMeel. (First published in 1962.)
- 1981: *Epistemological problems of economics*. New York and London: New York University Press. (First published in 1933.)
- White, L.** 1977: *Methodology of the Austrian school*. New York: Center for Libertarian Studies.