

## ON THE PROBLEM OF REALISM IN ECONOMICS

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It seems that no economist can avoid embracing certain opinions about those properties of economic theories that have to do with how theories relate (or are thought to relate) to the world. Economists are at odds as to whether given theories have such properties and whether, as a general principle, such a situation is desirable. The relation of theories to the world is a perennial issue which has given rise to explicit methodological controversies in economics and continues to do so. Thus, economists themselves explicitly construe it as a problem in need of a solution. Unfortunately, terminological and conceptual confusions abound on the battlefield. Economists often formulate the issue as that of the "realism", or even as that of the "reality" of assumptions that are chosen as fundamental to their theories. This terminological usage is often highly misleading and, together with underlying conceptual obscurities, productive of stagnation in the discussion. The purpose of this essay is to approach the issue by providing conceptual clarification and terminological suggestions and in this way to take a first step towards a reconstruction of the premises and settings of the traditional controversy.

In earlier works (e.g., Mäki 1986b, 1988a), I began to analyze and apply the notion of realism with a view to eliminating the ambiguity surrounding it. In this paper I will pursue the project further by introducing a further working distinction between "realism" and "realistness". The primary aim is to provide some conceptual tools for specifying the problems of realism and realistness as I conceive it, and to outline some of the possible

Received September 1988.

solutions to them. I will begin with specifications of some (but not all) of the relevant meanings of "realism", especially those concerned with ontological and semantic matters. I will then show why "realism" (designating a collection of ontological and semantic doctrines) and "realistness" (designating a collection of attributes predicable of representations) should be kept distinct. I will then provide some illustrations which show how the issue of realistness can sometimes be reconceptualized as the issue of realism. The illustrations are drawn from the field of the metatheory of the theory of the firm; the positions of Fritz Machlup, Milton Friedman, Israel Kirzner and Herbert Simon will be briefly discussed in this context. Finally, some epistemological questions relating to belief, acceptance, and pluralism will be raised.

2. *Some Realisms*

The senses of the term "realism" to be introduced in what follows are typically "philosophical" in that they are suggested specifications of some of the uses of the term that are current in philosophers' discourse on ontological and semantic questions. This implies that I do not take as my point of departure those senses of "realism" that are constituent of economists' everyday usage of the term <sup>(1)</sup>.

The meaning of "realism" is sometimes restricted to its purely ontological sense; then it is understood as the statement, "X exists", or "X is real", or "There are Xs". X may designate, generally, the world; or less generally, particular entities, universals, etc.; or it may designate observable events, physical entities, mental powers, etc.; or, more particularly, genes, effective demand, cities, etc.; or, at the most particular level, the genes of Raisa Gorbachev, the GNP of Finland last year, Venice, etc.

Let us say the above statements and others similar to them exemplify *ontological realism*. The X or Xs that are said to be real are looked upon "from the point of view of reality". If the Xs are objects postulated in theories, then statements concerning their existence are concurrently statements about the semantic properties of those theories; they say that those theories or their individual components refer to something that exists independently of them. If we claim that there are genes, effective demands, and cities, this amounts to saying that genetic theories, Keynesian economic theory, and some urban theories factually refer to elements in their extensions. To say

(1) While I think the list of realisms to follow covers many of the species that are relevant in regard to the traditional issues within economics, the list is far from comprehensive; it omits some of the meanings of the term that are related, for example, to the theory of perception and to questions of scientific progress. For a more comprehensive account, see Mäki 1989.

so is to subscribe to what may be called *referential realism* with respect to those theories or their individual components.

Reference to specific real things "picks them out" from among all the constituents of the world, but does not yet characterize those things. This is accomplished by representations. Theories, statements, and terms may represent entities in the real world in that they tell us what those entities are like, how they behave, etc. To claim that theories, sentences, and terms have this semantic property is to advance the thesis of what might be called *representation realism*. Furthermore, linguistic representations consisting of statements may be claimed to be true or false partly by virtue of what their referents are like, i.e., by virtue of the way the world is. In other words, truth and falsity are among the possible semantic properties of theories and statements. Let us call this thesis *veristic realism*.

The above version of realism can be connected to other specifications. Consider, for example, the relation between science and common sense. Are the (often observable) objects of linguistic representations typical of commonsense frameworks (such as red balloons and aggressive bus drivers) real? What about the (often unobservable) objects of scientific theories (such as quarks and Freudian ids)? Are commonsense representations true, or can they be? What about scientific representations? Let us say that the *minimal* version of *commonsense realism* amounts to realism about commonsense objects and representations. The *radical* version adds to this non-realism about scientific objects and representations. The *minimal* variety of *scientific realism* consists of realism about scientific objects and representations. The *radical* version includes, in addition, non-realism about commonsense. These definitions imply that the minimal versions of commonsense realism and scientific realism are mutually compatible, whereas the radical versions are not. (See Mäki 1984).

Another additional specification is that of *descriptive* vs. *normative* attitudes on realism in the above senses. For instance, descriptive commonsense ontological realism about properties might say, for instance, that colours exist, while the statement that certain physical theories should be true (or false) about photons and electromagnetic fields exemplifies normative scientific veristic realism. Let us finally say that *methodological realism* is a subspecies of normative veristic realism which states that truth about the real world, its constituents and properties, should be pursued.

### 3. "Realism" and "Realisticness"

The categories of realism characterized above are not those of an economist who makes judgements about what is often called the "realism of assumptions" made in economic theories. But the economist, in the context

of the issue related to assumptions, also uses the term "realism". This is misleading. In order to avoid unnecessary confusion, I would like to suggest that we adopt, beside "realism", the term "realisticness", and that we should keep "realism" and "realisticness" separate. In the context of economics, the concept of realisticness and how it differs from "realism" can be outlined as follows.

"*Realisticness*" characterized economic theories and statements, or representations in general. Thus, we may say that "The assumptions of theory *T* are unrealistic". We should not, I submit, talk about the "realism" of assumptions and theories, but rather about their realisticness. There are several senses in which a representation can be realistic or unrealistic. Some of these, cultivated also by economists, can be briefly mentioned. A representation can be said to be realistic if it is about reality (i.e., if it refers factually) or about observables (i.e., if it refers observationally) or about essentials (i.e., refers essentially), or if it represents what it refers to, or if it is true of what it represents. These are some of the semantic senses of "realisticness". The term acquires more closely methodological and pragmatic levels of meaning if we say, e.g., that a representation is realistic if it has been tested and is well confirmed, or if it is plausible, or a useful approximation, or practically relevant, etc. There are other senses, too, such as being comprehensive or encompassing (i.e. covering a wide range of elements or details in a given situation). Respectively, "unrealisticness" means being not about reality or observables, being about inessentials, being false, disconfirmed in tests, idealizing, exaggerating, oversimplified, implausible, practically irrelevant, etc. Both realisticness and unrealisticness are properties of representations.

Technically, they can be treated as predicates attributable to representations. The predicate "is realistic" is given a disjunctive definition by stating, "is realistic" = $\lambda x$  "is about reality"  $\vee$  "is about observables"  $\vee$  "is true"  $\vee \dots \vee$  "is comprehensive" (where " $\vee$ " should be understood in the inclusive sense of "or"). Similarly with "is unrealistic".

Some of the senses of "realisticness" and "unrealisticness" are related hierarchically in that questions concerning some of them can be raised only provided questions of some others have been settled in certain ways. We cannot make claims about the truth or falsity of economic theories if we do not presuppose that those theories are realistic in being about the economy. Claims about the idealizing or exaggerating character of an economic theory are possible only if the theory is regarded as strictly false (about observables at least). If we have a theory of confirmation according to which relevant evidence confirms or disconfirms hypothetical beliefs in the truth of theories or statements, then claims about realisticness or unrealisticness (in the senses "well confirmed" and "poorly confirmed" or "disconfirmed") can be presented only provided truth and falsity are taken as possible semantic

characteristics of those representations. Here, (un)realisticness in one (methodological) sense is taken as an indicator of (un)realisticness in another (semantic) sense. Of course, we can also have a non-realist theory of confirmation according to which there is no connection between the evidential support for and the truth of a theory: in this case, what is confirmed or disconfirmed is belief in, say, the predictive, persuasive, or problem-solving power of a theory.

"Realism", in turn, characterizes the contents of metatheories of economics and the people who hold them. We may say, for instance, that "Philosopher of economics N.N. holds a realist metatheory of economics". Again, "realism", and derivatively, "non-realism" and "anti-realism", have several meanings, as we saw in the previous section. (Note that we do not say, "anti-realistic", nor "unrealist").

In some of their senses, "realisticness" and "realism" are connected. For instance, if we say, "The neoclassical theory of the firm is about real firms" (i.e. is *realistic* in this sense), we are *descriptive referential realists* about the theory; if we say, "Economic theory should be true" (i.e., should be *realistic* in this sense), we subscribe to *methodological realism* about economic theorizing. But it is important to see that there are other meanings of the terms that have no analytical link with each other. Thus, if we say, for example, "The assumption of rational expectations is well confirmed in the case of financial markets" (i.e., is realistic in one sense), or that "Neoclassical theory of the firm leaves out of consideration the role of management" (i.e., is unrealistic in this sense), or, "The assumption of the existence of perfect futures markets in the theory of general equilibrium is implausible" (i.e., is unrealistic in another sense), we do not, without additional premises, make points directly related to realism, non-realism, or anti-realism.

One final point has to be made about the interrelationships between the two sets of notions. Since (un)realisticness can be attributed to representations in general, nothing prevents us from talking about (realist, non-realist, or anti-realist) metatheories as being realistic or unrealistic. Thus, one may say, "A referential realist metatheory of the textbook version of Keynesian macroeconomics is unrealistic (in being false), if Keynesian aggregates do not exist in reality", or that "The rhetorical meta-theory is more realistic than its 'modernist' rivals in that the former gives a more comprehensive picture of economic reasoning, while the latter contains strong idealizations concerning economists' behaviour".

In the light of the above distinctions, it seems that two interrelated defects have plagued discussions on preferred kinds of economic theory. "Realism" and "realisticness" have not been kept separate; and the various sorts of realisticness (and, implicitly, of realism) have been treated

unanalyzed, often as if realisticness constituted a homogenous property (2). To mention just one consequence of this situation, one plausible position has been left unscrutinized; this is the view that an economic theory construed in accordance with the canons of methodological (and especially scientific) realism would have to be unrealistic in many ordinary senses of the word, while, at the same time, the theory would be characterized by less familiar kinds of realisticness.

It also seems that the so-called assumptions controversy in economics has been exclusively about the issue of realisticness of economic theory. Given the definitions provided above, there never was a controversy over the issue of realism, explicitly and consciously stated as such. This does not imply that the issue of realism has not also been debated, albeit implicitly. But this implicitness has had as an unfortunate consequence the fact that philosophical discussions of realism have never had an appreciable impact on the controversy within economics. An abyss between philosophers' realism and economists' realisticness has prevailed. In what follows, I will take some steps in trying to close this gap by showing how some issues of realisticness can be reconceptualized as issues of realism.

The list of realisms that look relevant for this purpose seems to encompass perhaps all other versions except ontological realism with respect to the world; at least economists or methodologists of economics have, if at all, only occasionally construed the existence of the world in general as an issue within the discipline. Other kinds of ontological realism (and related sorts of semantic realism) are no doubt relevant; economists do have explicitly differing views about the existence of *homo oeconomicus*, aggregate capital, or general equilibrium. Implicitly, too, they may disagree generally on the existence and adequate representation of universals and modalities. All other realisms seem also relevant. I will show this by analyzing and interpreting

(2) For an illuminating recent example of these flaws, see Ahonen (1986). Here we can find talk of the "realism" (instead of the realisticness) of economic theories (e.g., p. 254), and of the "realistic" (instead of the realist) mode of reasoning (p. 255 and *passim*). Furthermore, "scientific realism" is made to subscribe to "the social relevance" of research and the "resemblance" of its concepts to "commonsense concepts" (p. 257). As we have just learned, social or practical relevance is a form of realisticness that has no direct connection to realism, and proximity to commonsense concepts is a form of realisticness that is a characteristic requirement of commonsense realism, not of scientific realism. In the same vein, classical economics is said to subscribe to the "realism requirement" in that it judges that "only those theories which are based on empirically verifiable assumptions are valid" (this involves the additional mistake that mere verifiability is made a sufficient condition of "validity") and in that "Smith uses expressions which reduce the reasoning to a simple practical and concrete level" (p. 260) and espouses the *laissez-faire* doctrine as a "normatively relevant" principle (p. 262). The error here is that these are expressions of what should rather be called different "realisticness requirements", none of which directly implies or is implied by (scientific) realism. Again, it is claimed that for Smith, "the theory was no abstraction but the best possible simplification of reality" (p. 261), but we do not learn on what basis we might make the difference between these two forms of unrealisticness, and how simplification is related to Smith's alleged realism (in addition, contrary to the claim on the previous page, on p. 262 it is said that Smith's theory was a "generalized abstraction").

rival metatheories of theories of the business firm. The primary theory to be considered is the neoclassical theory of the firm. It might seem that this theory is generally accompanied by non-realist metatheories. While this appears to be partly true, the situation is in fact not quite that simple, the reason being that although all metatheories view the neoclassical theory as unrealistic in many ways, this is consistent with several kinds of realism. I will begin with the most non-realist metatheory and move on by relaxing various elements of non-realism.

#### 4. *Theories of the Firm and their Metatheories*

Traditional neoclassical microeconomics depicts business firms as rational and fully informed calculators and profit maximizers without an internal structure, connected to each other by the external ties of price signals under competitive conditions. Firms are assumed to have only one goal, that of maximum profits. But they do not try to attain this goal by means of strategic manoeuvres, but rather by reacting passively to external stimuli which consist of given changes in cost and demand conditions. Now it seems obvious that one can never observe a firm like this. It looks like a non-observable theoretical entity, which would seem to suggest that the relevant issue of realism here is one of scientific realism. But this is probably not the way an ordinary economist views the question. I suppose she or he takes it as read that the "assumptions" made are "unrealistic" about actual, observable business firms. We will next see what a few economists with methodological inclination have to say about the subject. Note that the brief account of the theory given above, although describing an approach closer to an introductory textbook version than an advanced version, gives a sketch of that particular theory which has been commented upon in metatheoretical terms by Machlup, Friedman, Kirzner, and Simon. In what follows I will discuss the classical methodological defences of the neoclassical orthodoxy provided by Machlup and Friedman, and two critical traditions, behaviouralism and Austrianism, represented by Simon and Kirzner. It will be seen that realism in its different forms can be found in places that may strike some as surprising.

None of these four writers has provided what might be regarded as a sophisticated and detailed metatheoretical account of theories of the firm; therefore, projecting their views on the basis of their explicit pronouncements requires a degree of interpretation. I should also warn the reader that no final and complete interpretations of their authentic views are attempted; each of these economists has provided an amalgam of metatheoretical views that is too rich and complicated (and, sometimes, internally inconsistent) for this to be possible. Instead, I will use ingredients in those amalgams to illustrate my metatheoretical categories.

#### 4.1. *Fritz Machlup*

The alleged non-observability of neoclassical business firms gives an empiricist and radical commonsense realist sufficient grounds for denying their real existence. This is the position taken by Fritz Machlup. He regards the firm of neoclassical microeconomics as a "heuristic fiction", a "mental construct", or an "imaginary puppet" which exists only in the economist's mind, not in economic reality. Hence, in Machlup's view, neoclassical theory is unrealistic in the sense of not being about real business firms. The term "firm" serves as an intervening variable that connects two data of observation. The first data consist of changes in situational factors (costs, incomes, prices, technology), while the second consist of changes in quantities and prices of the firm's products. (Machlup 1955, pp. 12-16; 1963, pp. 131-132; 1967, pp. 9-10).

According to Machlup, the purpose of neoclassical or marginalist theory is not to explain the behaviour of business firms, but rather to account for the behaviour of market entities or of the economic system as a whole (Machlup 1967, pp. 6-9). What we have here is a theory of competitive price which does not serve as a program for research on firms at all. For this other purpose we need other concepts of the firm, provided, for example, by behavioural, managerial, and organizational theories. In Machlup's metatheory, firms as postulated by these theories do exist in reality. They are no longer fictions. (Machlup 1963, p. 133; 1967, pp. 10, 15-16). This is one sense then in which these theories are viewed by Machlup as realistic. No doubt they are more realistic than neoclassical theory in other senses, too; for instance, in taking into consideration the internal organization and managerial functions within business firms, they are more comprehensive and less simplistic than neoclassical theory.

Machlup's position on these matters is far from simple or completely unambiguous (?), but on the basis of the conceptions presented above the following conclusions seem warranted. With respect to neoclassical firms, Machlup is an ontological non-realist: such entities do not exist in reality, they are nothing but fictions to him. It follows that, in regard to the neoclassical theoretical term "firm", he is a referential non-realist: that term is nothing but an intervening variable with no factual reference. Neoclassical theory has an empty extension. Machlup is also a representational non-realist and consequently a veristic non-realist about neoclassical theory: since there is nothing in reality, "picked out" by factual reference, that could be represented by the neoclassical theory, this theory is not a (true of false)

(?) For example, the nature and role of Machlup's requirement of the understandability of postulated behaviour (see, e.g., Machlup 1955, pp. 16-17), not to be ignored in a more comprehensive interpretation of his methodological views, poses additional challenges to the would-be interpreter.

representation of economic reality. All of these versions are forms of descriptive and scientific non-realism, but it is obvious that Machlup is also a normative non-realist about neoclassical theory: given the purpose of such a theory a non-realist interpretation should be adopted. The purpose of standard neoclassical theory is to answer questions concerning qualitative changes in market variables as responses to other such changes in competitive conditions with a large number of firms involved (Machlup 1967, pp. 30-31). For other purposes, such as for explaining the growth or size distribution of firms, other theories or models (possibly with a realist interpretation) are needed. It is these stated purposes that help define the conditions of application for each theory. Each model or theory serves only a limited number of purposes, or, we may say, their relevance is conditional upon pragmatic contexts. This observation gives rise to what Machlup calls the principle of "the relativity of the relevance of models" (Machlup 1952, pp. 27-28; see also pp. 9-10, 418-421).

Machlup is not, however, an ontological non-realist about business firms or the world in general. As he says, "[w]e know, of course, that there are firms in reality [...]" (Machlup 1963, p. 133). Moreover, it would seem that to him, to exist is to exist as an observable thing or event; he seems to be a radical commonsense realist about the world. Hence the formulation of "the fallacy of misplaced concreteness" as "mistaking a thought-object for an object of sense-perception, that is, for anything in the real, empirical world" (Machlup 1967, p. 26; emphasis added). There are observable business firms that can be described consistently within commonsense frameworks. These firms are referred to and represented by behavioural, organizational, and managerial theories. Viewed from the perspective of the question of realism-ness, we can say that those theories are regarded by Machlup as realistic at least in the sense of being about observables. This makes it possible for Machlup to be a realist about these firms and these theories.

#### 4.2. Milton Friedman

In his famous methodological essay, Friedman is, unlike Machlup, a realist about neoclassical business firms. This can be shown by beginning with a demonstration that Friedman is a veristic realist about neoclassical theory: he thinks that the assumptions of this theory have a truth value, namely that of false, and that being unrealistic in this sense is a good thing. As a descriptive point, he says that businessmen "do not actually and literally" behave as they are assumed to behave in neoclassical theory (Friedman 1953, p. 22). Furthermore, he says that the creation of the theory of monopolistic competition was originally motivated by "supposedly directly perceived discrepancies between the 'assumptions' [of the theory of perfect competition] and the

'real world'" (ibid., p. 31). From a normative viewpoint, Friedman (ibid., p. 14) states that "[t]o be important, therefore, a hypothesis must be descriptively false in its assumptions", and that "[f]or important and significant hypotheses will be found to have 'assumptions' that are wildly inaccurate descriptive representations of reality [...]". Thus, for Friedman, the basic statements of economic theory are unrealistic in having falsity as one of their (desired) semantic properties. This means that he is a veristic realist. This in turn implies (as the last quotation shows directly) that he is also a representational realist about neoclassical theory. Finally, the entities that the theory represents exist in reality, i.e., Friedman is a referential and ontological realist about business firms as objects of neoclassical theory. In sum, Friedman thinks that neoclassical theory refers to real business firms (i.e., is realistic), and gives a false representation of them (i.e., is unrealistic).

Plain falsity is not, of course, the only kind of unrealisticness defended by Friedman. Another sense in which the concept of unrealisticness is used by Friedman, is that of being non-comprehensive. This is the case when he ridicules the critics of neoclassical theory by outlining "a completely 'realistic' theory of the wheat market" that would have to mention the colour of the traders' and farmers' eyes and hair, the physical and chemical characteristics of the soil on which the wheat was grown, etc. etc. (Friedman 1953, p. 32). Of course, any theory has to be unrealistic in leaving out such details. However, unrealisticness in this sense does not, as such, contribute anything of interest to the issue of realism <sup>(4)</sup>.

Although Friedman is an ontological, referential, representational, and veristic realist, I still think that it is mostly correct to characterize him as an instrumentalist. But his is not an instrumentalism for which "theories are not true or false, but only instruments" (Caldwell 1980, p. 368; see Caldwell 1988b for correction). Neoclassical theory, or its fundamental constituents, is, in Friedman's mind, false about the real world, and this is nothing to complain. Truth in economic theory - as opposed to the veracity of economic predictions - is not something to be sought. This last principle is methodological non-realism, or, as Bruce Caldwell (1980) aptly puts it, methodological instrumentalism. Friedman's essay is partly a plea for the use of a false theory for instrumental purposes. The whole point of the peculiar Friedmanian variety of economic instrumentalism is that it is a mixture of ontological and semantic realism, on the one hand, and methodological instrumentalism, on the other. There is more realism in Friedman's metatheory of economics than in Machlup's; the latter is instrumentalist also in ontological and semantic matters.

<sup>(4)</sup> Still another form of realisticness that Friedman may have had in mind is plausibility. Abraham Hirsch and Neil de Marchi (e.g., 1986) base much of their interpretation of Friedman on this notion, which, again, has no direct link with forms of realism.

The key to understanding the difference between Machlup and Friedman is, I think, to be found in their implicit views concerning the relation between reference and representation. It seems to me that Machlup can be interpreted as subordinating reference to representation, in the sense that only those theories that represent adequately can be taken as referential with respect to real things. Friedman would seem to place reference in a position independent of representation: statements may refer factually without being correct representations. The term, "neoclassical firm", used on several occasions above, is illuminating here. For Machlup, a neoclassical firm is a firm as *characterized (represented)* by neoclassical theory; and because this representation is factually incorrect, there are no neoclassical firms, hence no reference takes place. For Friedman, however, a neoclassical firm is a firm as *an object of* neoclassical theory; a firm like this exists, and can be represented falsely but usefully.

Like Machlup, Friedman is willing to divide phenomena and problems between the purviews of different models or theories; Friedman, however, is less permissive as to the variety of legitimate theories. Only models of perfect competition and monopoly are allowed in the toolbox of an economist. The important point is that "there is no inconsistency in regarding the same firm as if it were a perfect competitor for one problem, and a monopolist for another" (Friedman 1953, p. 36). Friedman's example is that when "the problem is to determine the effect on retail prices of cigarettes of an increase, expected to be permanent, in the federal cigarette tax", we should apply the model of perfect competition, and if we are interested in how firms react "to price control in World War II", we should treat them as monopolists (*ibid.*, pp. 36-37). Although Friedman is not uncertain whether business firms as objects of theoretical description exist, he adopts here an attitude of ontological indifference with respect to whether particular firms really are perfect competitors or monopolists. He is not, however, indifferent as to whether those firms could be represented as being something else; this third option is excluded by Friedman in a rather dogmatic fashion.

Friedman's position on these and related issues is extremely ambiguous as I have tried to argue elsewhere (see Mäki 1986a). There is a possible interpretation that casts Friedman as a realist about essences in the economy and about theories of those essences. Support for this interpretation is provided by the following statement: "A fundamental hypothesis of science is that appearances are deceptive and that there is a way of looking at or interpreting or organizing the evidence that will reveal superficially disconnected and diverse phenomena to be manifestations of a more fundamental and relatively simple structure". (Friedman 1953, p. 33). Starting from this principle, Friedman could - though he does not - argue that the neoclassical theory of the firm is a "descriptively false" representation of the appearances of real business firms (*i.e.*, is unrealistic in this sense), but that it is also

a true representation of the essence of "the fundamental structure" of firms (*i.e.*, is realistic in this other sense). (See Mäki 1986a, pp. 136-137). Israel Kirzner and the Austrian approach in general adopt this view in regard to Austrian economic theory.

#### 4.3. Israel Kirzner

Austrian economists think that neoclassical theory is unrealistic in many ways. The theory, Kirzner (1973, p. 4) claims, "has constructed a mental picture of the market that has virtually left out a number of elements that are of critical importance to a full understanding of its operation". The focus of attention in this theory (the equilibrium values of price and quantity variables) is misguided. The central factor characterizing business firms, that of entrepreneurship, has been ignored in neoclassical theory. Real entrepreneurs are not passive reactors to changes in market conditions, rather they are active agents who bring about those changes. They are not fully informed, but rather ignorant and able to learn. A real business firm is not a neoclassical firm, that is, a mere rational calculator and constrained optimizer in a "Robbinsian" world of given ends and given means, but "a combination of entrepreneur and resource owner" (*ibid.*, p. 27), forced to make non-calculative choices and modifications of both means and ends of supposedly profitable action. (See Kirzner 1985, pp. 1-14, 18-19, 46-50). Thus, for Austrians, neoclassical theory is unrealistic at least in the senses of being non-comprehensive, non-referential, and untrue with respect to essential aspects of business firms. This implies that some forms of descriptive referential and veristic realism about neoclassical theory are unrealistic metatheories in that they are false.

An "Austrian firm" (*i.e.*, a firm characterized in the Austrian way) is blessed with what Kirzner calls "entrepreneurial alertness", that is, "alertness toward the discovery of as yet unperceived opportunities [for gainful action] and their exploitation" (Kirzner 1979, p. 109). An Austrian firm does not take ends and means as given, but is constantly prepared to make revisions in either. I have tried to show elsewhere that entrepreneurial alertness as conceptualized by Kirzner may be interpreted as a causal human power that inheres in market agents in general and business firms in particular (see Mäki 1988b). Entrepreneurial action then is a manifestation of this power, it is an exercise in the power of alertness. This constitutes the core or essence of entrepreneurial business action.

In general, most Austrians are methodological realists about economic theorizing, and they think their own theory deserves a descriptive realist interpretation. Furthermore, their realism is concerned with theorizing about the essences of economic reality, and it seems to be a peculiar mixture of the

minimal versions of commonsense realism and scientific realism. More precisely, the view of many Austrians seems to be interpretable as commonsense realism about many facts concerning individual action, such as its purposefulness, and as scientific realism about the workings of the invisible hand in "guiding" the market process (see Mäki 1986b). The former part of this suggestion does not always receive unambiguous support from Austrian writing. For instance, Kirzner (1976) says both that human purposes as the basic fact referred to in economic theory are "unobservables" (p. 46) and "although purposes cannot be seen or touched, they are nonetheless there" (p. 44), and also that "[t]he purposefulness of human action is something we arrive at by introspection" (p. 42). Now introspection is ordinarily regarded as a form of observation, whether scientifically legitimate or not, though naturally different from visual or tactile perception. The first two quotations (especially the first) lend support to a scientific realist interpretation of purposefulness, while the last one supports my commonsense realist interpretation. In any case, the notion of purposefulness is regarded by Austrians as indispensable in economic explanation, since it is "not merely a useful tool to obtain results but an essential element of economic reality that cannot be omitted" (Kirzner 1976, p. 47). Hence, for instance, the difficulty Austrians find in sharing the standard neoclassical tendency to represent business firms by production functions.

Essentialist realism is expressed in theorizing about business firms in ways that differentiate Austrians from Machlup and Friedman. Austrian firms are believed by Austrian economists to be real in the sense that they constitute the real essence of actual business firms. Although richer in content than neoclassical firms, Austrian firms are idealized and simplified in many ways; for instance, details of the internal organization of firms are left out (i.e., the theory is unrealistic in some senses). The reasons for this are somewhat similar to those that we found in Machlup. The primary focus of Austrian theory is not on firms as such, but on the process of overall coordination by the market. At the level of business behaviour, Austrians find it sufficient to concentrate on the simple but essential entrepreneurial processes of discovery and learning that ultimately are thought of as driving the market process which is taken to be responsible for economy-wide coordinative tendencies. Consequently, Austrian firms cannot be identical with actual, observable business firms (i.e., the theory is unrealistic in a further sense). But this is not regarded as endangering their real existence. Austrian firms are there, though unobserved as such, and they manifest themselves in a variety of observable configurations that we encounter in the actual business world. This makes referential and representational realism about the Austrian theory possible. Finally, belief in the truth of the Austrian theory of firms implies veristic realism. Austrians think, in other words, that their theory is realistic in the sense of being a true representation of the essence of business firms.

Friedman touched on this line of reasoning with his essentialist statement, but he never followed the line this far. He could have argued, tentatively at least, that the neoclassical perfect competitor constitutes the essence of business firms, hence the theory is and should be true. In fact he compared neoclassical perfect competitors to empirical firms and had to admit that the two do not correspond to each other, i.e., that the theory is false, but he also had to argue that there is nothing wrong with this, because he liked the theory.

#### 4.4. Herbert Simon

Whereas declaring Austrians to be advocates of realism may sound startling to some, there should be no element of surprise in Herbert Simon's case. He is one of those economists who are widely recognized as champions of "realism" within (and, sometimes, without) the discipline.

Unlike Friedman, Simon is generally interested in how decisions are actually made within business firms. He is in agreement with Friedman that neoclassical assumptions are unrealistic statements about these actualities. However, unlike Friedman, Simon is not satisfied with the situation; implying a commitment to methodological realism he prefers true propositions about how firms behave. Simon (1962, p. 15) evokes what he calls the "new realism" in his approach to the firm's decision-making. I will now try to give an account of what his "new realism" amounts to in terms of our vocabulary. It will be seen that several meanings of both "realism" and "realisticness" are involved, usually mixed together in unreflected ways.

It is well known that Simon argues for the replacement of the "armchair" approach typical of neoclassical (and, somebody might add, Austrian) economics by the behavioural approach with an emphasis on studying business firms by empirical means (Simon 1986). The neoclassical fully informed, maximizing firm should give way to the searching, information processing and satisficing firm. As to the notion of rationality in the study of decision-making, he advocates switching attention from what he calls perfect substantive rationality or results of choice to bounded procedural rationality or the process of choice (see Simon 1976 and 1978).

Simon opens Volume 2 of his *Models of Bounded Rationality* (1982, p. 1) with the statement that in the neoclassical theory of the firm, "there is little or no room in the theory for the familiar institutional characteristics of real firms; for example, for the facts that one of their principal inputs is labor, a 'commodity' that is contracted for on quite a different basis from other commodities, and that decisions are reached within a hierarchy of authority relations among the employees". That is, Simon claims that neoclassical theory is unrealistic in that it omits some features that are familiar to us in



real business firms. This can, I suppose, be interpreted as implying that Simon is a commonsense realist about business firms: they exist and have characteristics that are familiar to us from observation or everyday experience. However, to say that there is "no room" for these characteristics in the neoclassical theory is not yet to say anything of interest in regard to veristic realism; the theory may still contain true statements about those features that find a place in it. The only thing that Simon appears to deliver here is the idea that neoclassical theory is unrealistic in the sense of being non-comprehensive.

Simon (1962, p. 5) welcomes the influence of management studies on economic theory because this has increased the comprehensiveness of considerations within the theory of the firm. For instance, attention has been paid to the acquiring and processing of information by firms - instead of information being assumed as given -, as well as to many other decision variables besides the prices and quantities of standard commodities as in neoclassical theory. The same kind of point is made in the following: "In a substantive theory of rationality there is no place for a variable like focus of attention. But in a procedural theory, it may be very important to know under what circumstances certain aspects of reality will be heeded and others ignored" (Simon 1987, p. 31). What is preferred in both cases is a more realistic theory in the sense of being more comprehensive.

Comprehensiveness is often accompanied by other forms of realism, also assessed as desirable by Simon. "One element of realism [i.e., realismness] we may wish to introduce is that, while  $V(s)$  [the pay-off function] may be known in advance, the mapping of  $A$  [the set of behavior alternatives] on subsets of  $S$  [the set of possible future set of affairs] may not. In the extreme case, at the outset each element,  $a$  [in  $A$ ], may be mapped on the whole set,  $S$ . We may then introduce into the decision-making process information-gathering steps that produce a more precise mapping of the various elements of  $A$  on nonidentical subsets of  $S$ . If the information-gathering process is not costless, then one element in the decision will be the determination of how far the mapping is to be refined". (1955, p. 106). The element of "realism" here is twofold. First, it is one of increasing realismness in the sense of decreasing the degree of idealization in assumptions about the epistemic capacities of decision-makers; second, it consists of increasing comprehensiveness as one more feature within the decision-making process, namely information-gathering, is taken into explicit theoretical consideration.

Simon often prefers to formulate his assessments of economic theories in evidential terms, i.e., in terms of available empirical evidence against or in favour of or neutral with respect to theories under consideration. In other words, he often implicitly uses the concept of realismness in the sense "confirmed by evidence", and that of unrealismness as "contradicted by

evidence". Nothing about any variety of realism is implied by these usages alone. Often, however, veristic realism seems to be implied in Simon's view of the role of evidence. For instance, in criticising the neoclassical presumption of decision-makers with well defined pay-off functions relating to the nature, ordering, and probabilities of outcomes, and with the skill and will to calculate and reach the highest attainable point on their preference scales, Simon (1955, p. 104) says that "there is a complete lack of evidence that, in actual human choice situations of any complexity, these computations can be, or are in fact, performed".

In 1962, having been honoured with an invitation to lecture before the American Economic Association, Simon was careful not to announce his theoretical views as superior to those of the neoclassicals: "As empirical scientists, we can only hope [...] that we will have the facts to test competing theories; it would be extravagant to claim that the time is now". (Simon 1962, p. 8). However, Simon reports on various empirical studies that show divergencies between evidence and neoclassical theory - and also between theory and reality, as revealed by evidence. For instance, commonsense veristic realism seems to be suggested by reference to "major discrepancies between the [neoclassical] theory of the firm and the decision-making process as revealed by interviews [...]" (Ibid., p. 10). The claim of the unrealismness of neoclassical theory in the sense of having been disconfirmed by empirical observation is also supported by evidence acquired from laboratory experiments and computer simulations. Another example of alleged unrealismness in this sense is brought out by the claim that the assumption of U-shaped cost curves still found in neoclassical textbooks does not hold, because "empirical studies very often show cost curves to be J-shaped, without a recognizable minimum, rather than U-shaped" (Simon 1987, p. 34).

The way Simon comments his favourite theory of satisficing behaviour summarizes the two senses of realismness most emphasized by him. The importance of realismness in the sense of richness or comprehensiveness of economic theory is evidenced by the statement that "[m]odels of satisficing behavior are richer than models of maximizing behavior, because they treat not only of equilibrium but of the method of reaching it as well" (Simon 1959, p. 263). The other form of realismness held to be important by Simon is based on empirical confirmation: "There is some empirical evidence that business goals are, in fact, stated in satisficing terms". (Ibid., p. 264).

Sometimes Simon is brave enough to declare that neoclassical theory is "false", and in these cases veristic realism is explicitly presupposed. Such is the case when Simon (1963, p. 230) says that the two neoclassical assumptions, "Businessmen desire to maximize profits", and "Businessmen can and do make the calculations that identify the profit-maximizing course of action", are unrealistic in being "false" and that they should be replaced by propositions that are realistic in being, not only tested by observations, but



also "true". However, Simon admits that scientific theories often employ idealizing statements and that "unreality [i.e., unrealisticness] of premises is not a virtue in scientific theory; it is a necessary evil". To regulate them, he suggests, as against some of Friedman's more radical allegations, the "principle of continuity of approximation" which asserts: "If the conditions of the real world approximate sufficiently well the assumptions of an ideal type, the derivations from these assumptions will be approximately correct". The point of the principle is to provide us with theories of which the approximation "to reality" is not "beyond the limits of our tolerance". (Ibid., pp. 230-231). Thus, theories should be realistic in that they are sufficiently good and tolerable approximations to reality. The notion of realisticness here is a pragmatic notion involving ontological and semantic realism.

The idea of approximation to reality is central to Simon's case. He concedes that "in empirical science we aspire only to approximate truths; we are under no illusion that we can find a single formula, or even a moderately complex one, that captures the whole truth and nothing else" (Simon 1979, p. 510). The concept of approximation is, of course, here left in a state of considerable obscurity. One way of understanding what Simon may have in mind is to suggest that "approximate truth" or less than "the whole truth" is akin to non-comprehensive representation, i.e., that approximately true representations leave some elements of their objects out of consideration. It is not quite clear to me, whether this suggestion accords with the following statement: "There can no longer be any doubt that the micro assumptions of the [neoclassical] theory - the assumptions of perfect rationality - are contrary to fact. It is not a question of approximation; they do not even remotely describe the processes that human beings use for making decisions in complex situations". (Ibid., p. 510). To interpret this statement, some terminological conventions have to be made: let "is contrary to fact" mean "is false"; let "describes" mean "describes truly"; and let "describes remotely" mean "is an approximately true description". Given these and other possible conventions, it seems obvious that in Simon's opinion, the reason why neoclassical assumptions are not approximately true representations, is not that they leave out some elements of actual decision-making processes, but rather that the representation they provide is false about those elements that are taken into account. Note, however, that the claim seems not to be completely consistent with the statement given in the next passage of the same article: "[N]eoclassical theories have been replaced by a superior alternative [namely, the behavioral theory] that provides us with a much closer approximation to what is actually going on". (Ibid., p. 510). The same point is made in the allegation that the behavioural theory of the firm is "demonstrably so much truer than had been the [neoclassical theory]" (Simon 1982, p. 401) and that "the assumptions of the behavioural theories are almost certainly closer to reality than those of the [neoclassical theory]".

(Simon 1979, p. 509). These passages imply veristic realism and make the claim that both the neoclassical and the behavioural theory are approximations to reality but that one of them is closer than the other.

It is important to see that realisticness as Simon's goal is defined observationally and that whenever he subscribes to realism, the relevant version is that of commonsense realism. This is brought out, for instance, in one of his early papers where he says that in his search for alternatives to neoclassical views, he calls on our "common experience as a source of the hypotheses needed for the theory about the nature of man and his environment" (Simon 1955, p. 100) and that he suggests introducing modifications to the neoclassical view of decision-making "that appear (on the basis of casual empiricism) to correspond to observed behavior processes in humans [...]" (ibid., p. 104). That realisticness, also in the sense related to truth, is an observational affair and that it may come in degrees is manifest in Simon's statement that his approach to rational behavior offers descriptions that are "in closer agreement with the facts of behavior as observed in laboratory and field" (Simon 1956, p. 138).

There is an affinity between Simon and Machlup in that they both tie the need for realisticness to pragmatic considerations, namely the questions and problems posed for research. I already mentioned the conditions Machlup imposed on the applicability of the perfect competition model, and the need he saw for other models when those conditions do not hold. Simon also says that the maximizing model of economic decision-making can be used in certain situations, namely in those characterized by simplicity and changelessness (or at most slow change). However, as situations grow in complexity and rapidity of change (such as in the case of labour relations, imperfect competition, uncertainty and long-run dynamics), a more comprehensive and detailed picture of decision-making is required. (See, e.g., Simon 1959, p. 279). Simon even predicts that economic theory will necessarily become more realistic under the pressure of new questions and problem areas: "[...] economics is now focusing on new research questions whose answers require explicit attention to procedural rationality. As economics becomes more and more involved in the study of uncertainty, more and more concerned with the complex actuality of business decision-making, the shift in program will become inevitable. Wider and wider areas of economics will replace the over-simplified assumptions of the situationally constrained omniscient decision-maker with a realistic (and psychological) characterization of the limits of Man's rationality, and the consequences of those limits for his economic behavior." (Simon 1976, pp. 147-148).

In conclusion, it can be said that Herbert Simon's "new realism" amounts to varieties of commonsense realism with special emphasis on the realisticness of economic theories, most often in the dual sense of being both comprehensive and empirically confirmed, and sometimes also in the sense of being true.

### 5. *Epistemological Issues*

I will now raise some epistemological questions that relate to some of the positions discussed above in regard to the issue of realism in economics. I will begin by making a distinction between acceptance and belief. A theory is *accepted* if it is adopted, held, used, applied, etc. A theory is *believed* if it is regarded as being a true account of its objects. It is instructive in this context to consider what Bas van Fraassen (1980, p. 8) takes as "the correct statement of scientific realism": "Science aims to give us, in its theories, a literally true story of what the world is like; and *acceptance of a scientific theory involves the belief that it is true*". (Italization partly deleted). Here, scientific realism is defined as a doctrine which binds acceptance and belief intimately together. In my view, this is not (even part of) "the correct statement" of what scientific realism amounts to; it is far too strong to be acceptable as a common characteristic shared by all versions of scientific realism about all acceptable scientific theories. In any case, van Fraassen's proposal invites us to pay closer attention to the relation between acceptance and belief in some metatheories of economics.

Let us take Friedman's view first. I would like to formulate it as the statement that economic theories should be accepted as good predictors (but not believed to be true) and rejected as bad predictors (but not believed to be false). According to this conception, nothing follows from acceptance of a theory about its truth and about the existence of its objects. Beliefs about these questions (i.e., the truth value of a theory and the existence of its objects) are formed on grounds independent of accepting or rejecting a scientific theory. This is possible, provided that the objects of economic theory are regarded as commonsense objects, i.e., objects that are accessible to us just by means of our everyday experience and commonsense frameworks. It would, indeed, seem natural to think of business firms as such ordinary objects. We appear to have information about the existence and properties of business firms independently of what any particular economic theory says about them. It is this information that permits Friedman and others to make the judgement, from a commonsense realist point of view, that the assumptions of neoclassical theory are unrealistic in being false about real firms. Neoclassical theory is not to be believed. But it is to be accepted because of its instrumental virtues.

Likewise, Machlup separates acceptance from belief. Nothing follows about truth and existence from acceptance. But no theory-independent assessment of truth and existence is possible either, since the theory has no referents at all, hence none about which we could have information received from other sources. Non-existent entities, of course, are inaccessible by any means. Neoclassical or marginalist theory, in Machlup's view, is not to be believed. It is rather to be accepted as a convenient vehicle for connecting

sets of observational data together. On the other hand, I would guess that Machlup's view could be interpreted so as to imply that managerial, behavioural, and organizational theories of the firm are to be accepted (for some purposes) and (possibly) believed, but again on independent grounds. Acceptance does not imply belief nor vice versa.

I am not aware of any well-formulated position on the issue under discussion among Austrian economists. In my attempt at a realist and essentialist reconstruction of the Austrian approach (Mäki 1986b) I suggest that acceptance of an economic theory be based on explanatory power and that the explanatory power of a theory be analyzed in terms of its capacity to bring about ontological unification among apparently independent phenomena<sup>(2)</sup>. An idea typical of many versions of scientific realism is to tie explanatory power and belief in existence and truth together: accepting a theory as a good (or perfect) explainer - possibly in the sense analyzed in terms of ontological unification - entails believing that the theory is true and its referents are real. Here, however, the ways of Austrian economics and scientific realism partly diverge. Austrians are close to Friedman in that they are commonsense realists about many objects of their theories. They think they (and the rest of us) have independent (e.g., introspective) access to some of the fundamental realities of economic life, such as the purposefulness of human action, subjective valuation, expectations, etc. Their existence can be established without recourse to any explanatory power an economic theory might have. The difference between Friedman and the Austrians is that the latter believe their theories are true representations of these real objects. (Some of the Austrian economists believe, furthermore, that the truth of their basic statements is accompanied by certitude). On the other hand, in regard to the question of the reality of the invisible-hand mechanism, Austrian economists seem to be closer to those scientific realists who link explanatory power and belief in existence and truth with each other. The existence and functioning of this mechanism as described by Austrian theories can, I suppose, be established only by recourse to the explanatory power of those theories; there is no independent experiential access to the existence and workings of the invisible hand.

Although my own intuitions are strongly realist, and Machlup is the least realist of the economists considered, I think it would be wise to follow him on two points, suitably specified. These are the ideas, first, that acceptance and belief do not always have to go together, and second, that different theories or models may be accepted on different grounds. There may be economic theories that are best suited for the purposes of providing heuristic frame-

(2) Note that the essentialist component in Friedman's inconsistent metatheoretical rhetoric referred to earlier can be read as an expression of this idea. Friedman, however, primarily advocates predictive power as the criterion of acceptance.

works for creative modelling, and they might be accepted as fruitful frame-works but not believed. There may be other theories that should be accepted as good systematizers of empirical data, as good predictors and retrodictors, but neither these should perhaps be always believed. A methodological realist, however, insists on pursuing economic theories that can be both accepted and believed, that is, believed to provide a true and explanatory account of the nature of (aspects of) the economy, and accepted on this basis.

The above point brings me to Bruce Caldwell's and Lawrence Bolland's case for pluralism in the methodology of economics (see Caldwell 1988a and Bolland 1982). I am now prepared to argue that, in the field of epistemology, pluralism and realism about economic theorizing are at least partly compatible with each other, in at least two ways. First, both can accept that there are different standards of appraisal for theories with different purposes. The only restriction a realist has to place on this principle is the requirement that economics as an intellectual discipline should pursue, among other things, theories of the economy that could be accepted as true explainers. This is related to the minor requirement that economics should also attempt to explain the fact that some theories whilst not to be believed work well as heuristic frameworks or as predictive instruments. Second, in conformity with methodological pluralism, the standards of appraising economic theories do not have to be accepted by realism as fixed; they can be regarded as conjectural and evolving through competition and learning. This means that nobody may pretend to hold the final, infallible set of criteria of acceptance. Several candidates for the role of a good criterion or set of criteria have to be taken seriously. Only little by little can we hope learn which criteria serve best our purposes, including the major goal of attaining true, explanatory economic theories. Against radically relativistic pluralism, this implies rejection of the idea that any criterion and any theory is as good as any other <sup>(6)</sup>.

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<sup>(6)</sup> Earlier versions of this paper have been presented at the conference "Quels Fondements Epistemologiques pour la Connaissance Economique?" in Mons, Belgium, December 10-20, 1987, and at the Fifteenth Annual Meeting of the History of Economics Society in Toronto, Canada, June 18-21, 1988. I wish to thank the two audiences for lively discussions.

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#### Summary

JEL 036

### ON THE PROBLEM OF REALISM IN ECONOMICS

This paper attempts to provide tools for a reconceptualization of the traditional assumptions controversy within economics. It is suggested that we should make a distinction between realism and realismness. While realism is a philosophical doctrine (or divides into many such doctrines), realismness is a property (or many such properties) of representations, including economic theories and their assumptions. Varieties of realism and realismness are distinguished and their interrelationships are discussed both on a general level and as applied to metatheories of theories of the firm (such as those of Machlup, Friedman, Kirzner and Simon). To give an example of the results of these analyses, it is stated that in his defense of unrealistic assumptions in economic theory Friedman turns out to be an ontological, referential, representational, and veristic common sense realist, but not a methodological realist. In addition, the notions of acceptance and belief are introduced and related to the issues of realism, realismness, and methodological pluralism in economics.

#### Riassunto

JEL 036

### IL PROBLEMA DEL REALISMO IN ECONOMIA

Questo articolo si propone di fornire alcuni strumenti utili per un ripensamento della ben nota "controversia sulle ipotesi" in economia. Si suggerisce di tracciare una distinzione fra due concetti: realismo e "realisticità". Mentre il realismo è una dottrina filosofica (o un insieme di dottrine fra loro distinte), la "realisticità" è una proprietà (o una congerie di proprietà) delle rappresentazioni, fra cui vanno incluse le teorie economiche e le relative ipotesi. Dopo aver individuato vari tipi di realismo e di "realisticità", se ne discutono le interrelazioni sia in termini generali, sia in relazione ad alcune metateorie delle teorie dell'impresa (in particolare, quelle di Machlup, Friedman, Kirzner e Simon). Per illustrare i risultati di queste analisi, si sostiene che Friedman, nella sua difesa dell'irrealismo delle ipotesi nella teoria economica, risulta essere un realista ontologico, referenziale, rappresentazionale e veristico (nell'accettazione del senso comune), ma non metodologico. Infine, dopo aver introdotto i concetti di accoglienza e credenza, se ne discutono le relazioni con i problemi del realismo, della "realisticità" e del pluralismo metodologico in economia.

### DECISION THEORY AND THE DEDUCTIVE METHOD

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#### 1. *Utility Theory and the Empirical Vicissitudes of the Theory of Consumer Choice* (\*)

The nomological machinery of the standard theory of consumer choice is spectacularly spare and simple. It consists of utility theory and two weak generalizations concerning distinctively economic choices of goods and services. (Indeed, the revealed preference approach (Houthakker, 1950) reduces utility theory to mere consistency of choice). Utility theory states merely that preferences are complete and transitive and that agents choose that feasible or available option that they most prefer. To say that preferences of agent  $A$  are complete is to say that, given any two options,  $x$  and  $y$ , either  $A$  strictly prefers  $x$  to  $y$ , or  $A$  strictly prefers  $y$  to  $x$ , or that  $A$  is indifferent between  $x$  and  $y$ . Given completeness and transitivity, options can be "weakly ordered" — that is, all options can be ranked from least to most preferred, with, of course, many ties among options among which the agent is indifferent. Since options can be thus weakly ordered, numbers can be assigned to them, and one may thus define an agent's utility function. A utility function — an assignment of numbers to options according to the agent's degree of preference — is far from unique. Any "monotone" or order-preserving transformation of a given utility function will do. Given the existence of a utility function, one can restate the generalization, "Agents choose that feasible option that they most prefer", as "Agents maximize utility". But speaking in this way can be misleading. One is *not* com-

Received July 1988.

(\*) I would like to thank a most affable audience at Bowling Green University and, particularly, Christopher Morris, for helpful criticisms.