

6 Knowledge in neoclassical economic theory

the economist's advice to policy-makers must often appear crude and be misleading ... he gives the impression that investment policy is a matter only of millions spent per year, no matter on what. Efficiency is for him a matter of best mixes, not of best shapes. He seems to treat knowledge as a stuff, obtainable in measurable quantities for a known expenditure, and guaranteed to produce effects knowable in advance; he believes that we can know in advance precisely what it is, in all essentials, that we are going to find out. Better a contradiction in terms than acknowledge a chink, let alone a gaping rent, in the armour of rationality.

George Shackle [1972, pp. 114–15]

Whatever assumptions about knowledge we may attribute to it, general equilibrium does not seem to stand up well to a critical inquiry. In modern Austrian economics, by contrast, we find the problem of knowledge to be a matter of fundamental concern.

Ludwig Lachmann [1976, p. 55]

Neoclassical economic theory is often criticized for neglecting an essential element of knowledge in models of economic decision-making. The most common critiques would have us reject all neoclassical models because they are claimed to be based upon 'perfect knowledge' and the like. Often it is argued that neoclassical explanations are incomplete without a formal treatment of uncertainty and information search. The distinguishing feature of such critiques is the presumption that assumptions regarding imperfections in knowledge can be recognized in the neoclassical world without, at the same time, completely undermining other desirable methodological properties of this framework, such as internally stable equilibria, consistency with 'rational' decision-making and in general an 'explicitness' regarding explanation. Other more radical critics find such a proposal for piecemeal reform untenable. Many neo-Keynesian thinkers, among others [e.g. Clower 1965; Leijonhufvud 1968; Kornai 1971], argue that any systematic programme to incorporate imperfect and incomplete

knowledge into economic theory must sacrifice the traditional neoclassical concepts of (general or long-run) equilibrium. George Shackle's [1972] lengthy critique is even more uncompromising. He argues that such a programme must imply the sacrifice of all the methodologically desirable properties listed above.

Shackle's critique is perhaps the most interesting (and dangerous) of the above critiques and it is therefore of interest that the Austrian economist, Ludwig Lachmann [1976], has argued that Shackle's critique constitutes a successful and decisive challenge to neoclassical economics. Lachmann sees Shackle's results as even grounds for rehabilitating Austrian views which give a more fundamental role to knowledge and changes in knowledge, notably the Austrian theories of Hayek and Ludwig Mises.

In this chapter I will focus primarily on the arguments of Lachmann and Shackle and in particular on Lachmann's overriding view that, since the theories of Shackle and the Austrians give a more strategic role to knowledge and its limitations, they possess a clear-cut advantage over neoclassical economics in explaining economic phenomena. While one can agree with both authors that no economic theory can be methodologically complete without a careful specification of the knowledge considerations lying behind all decision-making, their arguments are insufficient for either the rejection of neoclassical economics or the resurrection of Austrian economics. Rather, what Lachmann's essay reveals is that neither the neoclassical nor the Lachmann–Shackle viewpoint under discussion is explanatorily complete with respect to knowledge. Specifically, neither provides a satisfactory solution to what might be called 'the problem of knowledge dynamics' – the problem of defining an explicit and non-trivial role for changes in knowledge to play in the explanation of the transition between short-run (temporary) equilibria and long-run (general) equilibria.

Before I begin discussing Lachmann's and Shackle's viewpoints I need to explain why these critics seem to have an excessive concern for the requirements of 'rationality' rather than the more mundane notion of maximization that I discussed in Chapter 1. Once this distinction is clarified, I will examine the failures of the neoclassical and Lachmann–Shackle viewpoints to provide a satisfactory solution to the problem of knowledge dynamics. In doing so, I will have to discuss two other important distinctions. One is the methodological distinction between exogenous and endogenous knowledge in decision-making. The other is the distinction between epistemology and methodology which will play a major role in this chapter. Using these distinctions it will be argued here that a central shortcoming of both the neoclassical and the Lachmann–Shackle viewpoints resides in their failure to permit the epistemological (as distin-

guished from methodological) features of a decision-making environment to play a major role in determining the decision-maker's response to knowledge 'shocks'. At the end of the chapter I will consider a possible solution to the problem of knowledge dynamics which sees theories of knowledge ('epistemologies') as an autonomous foundation for any explanation of an individual's methods or decisions which are based on historical observations or expectations.

MAXIMIZATION AS 'RATIONALITY'

It is common to find economists using the term 'maximizing' interchangeably with 'rational'. As Samuelson noted many years ago [1947/65, p. 98], what most philosophers might call 'rationality' is a much stronger concept than what is required for decision-making. For Samuelson, 'consistency' was sufficient – the Axiom of Revealed Preference is merely an expression of consistency. While in many cases one could substitute 'consistent' for 'rational', it would be misleading when the stronger notion is intended. The stronger notion of rational is often a confusion between the mechanics of giving an argument in favour of some proposition and the psychology of the person stating the argument. The psychology version is not what economists usually mean by 'rational' even though they sometimes refer to a failure of an argument as evidence of the 'irrationality' of the decision-maker. The accusation of 'irrationality' is but a left-over artifact of the eighteenth century rationalism which Voltaire parodies in *Candide*. The eighteenth century rationalists would have us believe that if one were rational one would never make a mistake and thus whenever we make a mistake (e.g. state a false argument) then we must be irrational [see further, Agassi 1963].

One does not have to take such a strong position to understand what economists mean by a rational argument. All that is intended is that whenever one states an argument – that is, specifies a set of explicit assumptions – the argument will be rational if and only if it is logically valid. Logical validity does not require that the argument be true but only that the assumptions are logically sufficient, that is, that the conclusions reached are necessarily true whenever the assumptions are *all* true. But why the concern for 'rational' arguments? One reason for the concern is the *universality* and *uniqueness* provided by rational arguments. The promise of 'rationality' is that once the assumptions are explicitly stated, *anyone* can see that the conclusions reached are true whenever the assumptions are true. That is, if the argument is rational, everyone will reach the *same* conclusions if they start with the *same* assumptions. It is this universality of rational arguments that forms the basis of our

understanding behaviour or phenomena. If the behaviour or phenomena can be ‘rationalized’ in the form of a rational argument for which the behaviour or phenomena are logical conclusions, then anyone can understand the behaviour or phenomena if one accepts the truth of the assumptions.

In the nineteenth century this notion of universality was captured in the notion of maximization since both notions involve similar mechanics. If we can specify an appropriate objective function for a decision-maker who is a maximizer then we can understand the choice made. This is because, if the objective function (e.g. a utility function) is properly shaped so that there is a unique optimum, then everyone using this function while facing the same constraints will make the same choices. Thus, again, it is the universality and uniqueness that form the basis of our understanding. Every neoclassical theory is offered as an intentionally rational argument. The explicit assumptions include those which specify the shape of the objective function, the nature of the constraints and, of course, the assumption of maximization.

The criticisms discussed in this chapter focus on how the decision-maker *knows* his or her objective function or the constraints. The question asked by this type of criticism, which presumes that rationality is always the stronger notion, is whether there is also a rational way to acquire this essential knowledge. Many people apparently still think that one can inductively acquire knowledge by means of an inductive logic – a logic which uses singular observations as assumptions and reaches general, universally true conclusions. Trying to show how one acquires true knowledge in this way always involves what is called the ‘problem of induction’. Unfortunately, this is not a solvable problem since there is no inductive logic that will meet the requirements of universality and uniqueness in every case as implied by the notion of the ‘rationality’ of an argument.

Whether one thinks the ‘problem of induction’ is solvable or not, the questions raised by Lachmann and Shackle do not require induction or rationality in the stronger sense. Maximizing decision-making does require knowledge of the objective function and of the constraints (e.g. prices) and if we are to explain the choices made we must somehow deal with the decision-maker’s knowledge.¹

THE METHODOLOGICAL PROBLEM OF KNOWLEDGE

As Lachmann notes, identifying precisely what assumptions concerning knowledge distinguish neoclassical theory ‘is anything but easy’ [1976, p. 55]. Nevertheless, it is still possible to identify the basic methodological flavour of the neoclassical view of knowledge and this may be conveyed by the proposition that, no matter how knowledge is characterized, knowledge

in short-run models is a fixed and exogenous parameter. The assumption of exogeneity guarantees that knowledge considerations can determine short-run choices, but not vice versa. The assumption of fixity guarantees that any variation in economic choices can be fully explained by variations in objective factors (i.e. factors other than knowledge).

The assumption of fixity has often been defended on the basis of either of two propositions:

- (a) That there exists unlimited ‘perfect knowledge’ – that is, if knowledge (of past, present and future) is perfect, then it follows trivially that it cannot change, or
- (b) That the time period being considered by the theory is too short to permit any knowledge change whatsoever, the limiting case being explanation at a point in time (‘statics’).

Knowledge, in the sense of (b), is thus analogous to capital in the short run. But on either grounds, the assumption of fixity leads directly to Lachmann’s (and Shackle’s) major criticism of the theory. In a world of actual uncertainty, knowledge cannot be stable but must inevitably be volatile; thus short-run equilibria are extremely temporary. Of course, no explanation of a short-run equilibrium *per se* is sufficient for the determination of the eventual long-run equilibrium. Since a long-run equilibrium is merely a special short-run equilibrium, the attainment of a long-run equilibrium presumes the existence of the one state of knowledge appropriate for that special short-run equilibrium.

The methodological problem which neoclassical economics presumes to be solved is: How does knowledge change to that which is necessary for the long-run equilibrium state, that is, to the one state of knowledge which is appropriate for the special short-run equilibrium which holds in the long run? A complete explanation of long-run equilibrium must provide an explanation of knowledge dynamics [see Arrow 1959b; Gordon and Hynes 1970]. But, if the acquisition of the knowledge appropriate for long-run equilibrium is explained, knowledge ceases to be exogenous.² In the long run, knowledge is an endogenous variable (like prices or capital) hence knowledge does not play a decisive role – at least not in the sense of the role played by individuals’ tastes and the current state of technology. This means that, for the purposes of determining or calculating the long-run equilibrium, (endogenous) knowledge is irrelevant.

Lachmann’s and Shackle’s criticisms of the above view may be seen to be more than just a plea for ‘realism of assumptions’. First, if Lachmann’s criticism of neoclassical theory is simply that it does not take knowledge into account in any explicit form even though we clearly know that states

of knowledge do determine the properties of short-run economic choices, then it follows trivially that the neoclassical explanation must be incomplete and its predictions arbitrary (in the sense that neoclassical results must vary indeterminately with an unspecified state of knowledge). This would be an unfair representation of neoclassical economics and therefore an unfair criticism. As suggested above, a better way to characterize the neoclassical tradition is as one where, in the long run, knowledge is explanatorily irrelevant and in the short run it is specified explicitly as fixed and exogenous. We may then judge this specification against other alternatives, specifically against those of Hayek, Mises and Shackle.

Shackle's critique [1972] may be seen as an attempt to show that the assumption of fixed and exogenous knowledge is unsatisfactory primarily because it means relinquishing the explanation of economic processes over time ('economic dynamics'). Shackle reaches this conclusion in two ways. His first argument, and the one he stresses, introduces an additional proposition:

- (c) That perfect knowledge is possible *only* at a single point in time [1972, p. 165].

It then follows directly that, in so far as neoclassical theory depends upon the assumption of 'perfect knowledge' to explain the 'fixity' of knowledge, neoclassical theory can only be rationalized for a point in time and not over time. It is thus only if unlimited perfect knowledge could exist over time that a neoclassical theory based on fixed knowledge could produce meaningful dynamic explanations. Would the incompatibility between neoclassical theory and dynamic explanation be removed if we settled for a view of knowledge as limited, incomplete or otherwise imperfect (i.e. 'expectational') and in turn introduced the view that this knowledge was fixed or rigid over an acceptable, yet small, duration? Shackle's second argument is that the answer to this question is 'No'. Since Shackle [1972, pp. 77, 180, 436] sees expectations as subject to moment-to-moment instability and thus as perfectly volatile, even a neoclassical theory which sacrifices the assumption of perfect knowledge is still limited to a point in time. If Shackle is suggesting that neoclassical economics faces only two alternatives, then it must choose to analyze either static situations or situations of perpetual change and instability, but not both.

One can easily agree with the general spirit of Shackle's criticism, since it is easy to see that, if one wants to explain the properties of a dynamic economy, it is methodologically much more interesting to do this within a framework where knowledge is variable. Moreover, there is little reason why knowledge needs to be fixed in neoclassical theory. Traditional arguments that deny the potential variability of knowledge in neoclassical

economics can be seen to be based on the unwarranted fusion of the methodological problems connected with the fixity of knowledge and the epistemological problems connected with the perfection of knowledge. These two types of problems are easily made indistinguishable whenever one insists that perfect knowledge must have an indispensable place in the neoclassical framework – for example, when it is presumed that, without it, (complete) rationality is impossible. A commitment to a perfect knowledge assumption on these confused grounds thus constrains neoclassical theory to use an assumption involving the fixity of knowledge. Yet this constraint only exists because of the presumption that perfect knowledge is a precondition for rationality – a view which has been criticized [e.g. Tisdell 1975]. In short, if we separate rationality from perfect knowledge, the way is made clear for the introduction of 'imperfect' and thus potentially-variable knowledge into neoclassical theory. A possible key to this separation is the rejection of the Marshallian long-run vs short-run dichotomy.

Shackle does not make these arguments. His critique is essentially in an earlier tradition of showing that any explanation which requires the assumption of perfect knowledge must be inconsistent with any theory which incorporates dynamically-variable knowledge. It should also be noted that while Shackle is especially wary of the epistemological problems which are entailed by the perfect knowledge assumption, he is notably lax on developing the epistemological rationale for his own viewpoint. This will be the major critical theme of the following sections.

I discuss Shackle's version of the Austrian arguments in some detail here because, according to Lachmann [1976, p. 57], Shackle's arguments represent a convenient modern expression of much of the Austrian viewpoint and stand as a major source of criticism of neoclassical theory. And the essence of this viewpoint is that knowledge is better specified as an exogenous, yet highly volatile, item in our economic explanations. Note that from Shackle's perspective the conflict between the neoclassical and Austrian viewpoints involves only the variability of knowledge over time; it does not involve its exogeneity. While Lachmann refers to the possible 'endogeneity' of knowledge in Shackle's theory [p. 56], it is important to recognize that this concept is interesting only when it is defined relative to a dynamic process such as learning dynamics. The appropriate relation between changes in knowledge and adjustments in economic choices is that of lagged endogeneity since learning takes time and must precede decision-making. On the other hand, a concept of 'static endogeneity', that is, the proposition that knowledge and economic choices are simultaneously determined, is not relevant here since this would leave Austrian theory, let alone neoclassical theory, undetermined and thus make both theories

equally incomplete or circular.

Lachmann is correct in arguing that the Austrian assumption of exogenously-variable knowledge is preferable to the short-run neoclassical assumption of exogenously-fixed knowledge. Moreover, the Austrian assumption provides a vital starting point for examining the question of how the stability of knowledge (viz. expectations) affects the stability of the aggregate economy. However, one might implicitly disagree with Lachmann over the calculation of the net benefits associated with this specificational improvement. No matter how satisfactory the methodological role one assigns to knowledge in economic models, the benefits of this will be nullified if one happens to pick, at the same time, an unsatisfactory characterization of the views of knowledge held by economic agents.

THE EPISTEMOLOGICAL PROBLEM OF KNOWLEDGE

So far nothing I have said would require a commitment to any particular views of knowledge which might be held by economic decision-makers. My concern has only been with the methodological role that knowledge, however defined, might play in the structure of economic explanations. In this section the central concern is explicitly with these alternative views and their implications for neoclassical and Austrian theory. In this light, it is interesting that nowhere in Lachmann's essay does he tell us exactly what constitutes 'knowledge'. Implicitly Lachmann must hold that there exists some 'accepted' theory of knowledge upon which all economic agents inevitably base their decisions, a theory which apparently is so well accepted that it need not be stated. The implied claims about the homogeneity of viewpoint shared by all economic decision-makers are indeed comforting. However, they do not sit well alongside the facts that, in spite of Lachmann's grouping of them, Mises is usually considered an Apriorist³ while both Hayek and Shackle based their views of knowledge on Inductivism⁴ (albeit of the sceptical kind). Lachmann is in fact prepared to play down Mises' Apriorism [p. 56] on the grounds that epistemological differences are of little consequence to the matters at hand. My point is simple. Such differences in views of knowledge are absolutely central to the matters at hand.⁵

We need not be troubled with the many questions of overriding philosophy of science implied here. We only need a few simple characterizations of theories of knowledge which 'ordinary' economic decision-makers might hold. The importance of these theories may be directly brought out by considering a problem posed frequently in Shackle's critique [1972, p. 180]. He asks, in what way do decision-makers respond to an (exogenous) change in 'the news' – the new information or

data which is accumulating daily? If this were a problem in price theory, and we were to ask for the impact of a price change on an individual's consumption, it would be evident that we could produce a satisfactory answer only if we had a satisfactory characterization of the individual's underlying tastes. The same point applies to the problem at hand. If we wish to determine the impact of a change in 'the news' on an individual's expectations and thus on the pattern of his or her decisions, we must satisfactorily specify the theory of knowledge through which the changed news is fed. Lachmann and Shackle would appear to assume that all individuals respond to the news through a common theory of knowledge. It is, however, easy to conceive of at least three different epistemological viewpoints on the same change in the news and thus three different decision-making responses.

Consider first individuals who follow Mises and thereby hold an Apriorist theory of knowledge. Since, by definition, their expectations are formed quite independently of the 'data' revealed by the news, their expectations and the pattern of their decisions can only be invariant to changes in the news. Consider next people who, like many of us in the past, hold a Positivist view of knowledge. These individuals will normally only look for new positive evidence to empirically support their guesses (viz. their inductive inferences). If a change in the news reveals predominantly 'verifying facts', then these individuals' expectations (which are being verified) will change little and thus the pattern of their decisions will change little. It is only in the extreme case where the changed news reveals predominantly 'refuting facts' that these decision-makers' expectations will be appreciably affected. Consider finally people who hold a Scepticist theory of knowledge.⁶ These are people who are always looking to the news for indications that they should change their expectations. Except in the case where the changing news consistently reveals only 'verifying facts' (which are irrelevant to the Sceptic), it is evident that these people rarely have uniform patterns of behaviour and the effect of new 'refuting facts' can often have a devastating impact on their expectations and decisions.

These alternative characterizations are of course most relevant in assessing Shackle's view that volatility and instability in the news imply volatility and instability of the aggregate economy in general. Clearly if all decision-makers were Apriorists or the news revealed only 'verifying facts', Shackle's argument simply could not hold. Perfect volatility in the news is consistent with perfect stability of decision-making in aggregate. In fact, it is only in the extreme case where most decision-makers are Scepticists and the news contains mostly 'refuting facts' that Shackle's instability argument may prove interesting. And emerging from this

extreme case are all the criticisms of the neoclassical presumptions of rationality, economic stability and the fixity of knowledge.

The question, of course, is whether Shackle's extreme case is a 'satisfactory' characterization of the epistemological environment faced by an aggregate of individuals. If it is not, in the sense that a weighted average of the theories of knowledge held by all individuals does not reveal them to be predominantly Scepticist and a weighted average of all new 'data' does not reveal a high proportion of 'refuting facts', then criticism of the stability and fixed-knowledge presumptions of neoclassical economics are beside the point. Even if the news is perfectly volatile and unstable, this is of limited interest whenever individuals show little responsiveness to changes in the news. Moreover, the methodological comparative advantage of specifying knowledge as a variable must be largely illusory under these circumstances. However, even if Shackle's extreme case was a 'satisfactory' one, there is no way in principle in which this could challenge the rationality assumption of neoclassical economics. Scepticism is an eminently rational viewpoint for a decision-maker to hold and it would be a mistake to confuse the very high elasticity of response to a change in the news with non-rational behaviour.

THE INTERDEPENDENCE OF METHODOLOGY AND EPISTEMOLOGY

Lachmann's efforts to stress the importance of knowledge in economic theory in general are commendable. Nevertheless, neither he, nor Shackle, nor any existing economic theory has gone far enough in stressing the epistemological role of knowledge in particular. None of the viewpoints considered here can be taken as both methodologically and epistemologically complete with respect to knowledge. This is primarily due to all parties taking the answer to the question 'What is knowledge?' for granted, and this presumption may in turn be explained by the common acceptance of a very particular view of the role of 'rationality' in all decision-making and in explaining all decision-making. This view is simply that the 'adequacy' of the assumptions about the role of knowledge in economic explanations is to be judged only by whether or not they can 'rationalize' *successful* decision-making. Shackle and the Austrians are correct in noting that a theory of *successful* rational action does require some judgement as to what constitutes adequate knowledge, although one may admit to a variety of different notions of 'success' and 'adequacy'. Where Mises 'examines the elements of a logic of successful action' [Lachmann 1976, p. 56], Shackle examines what kind of success (albeit limited) is possible when we constrain rational decision-making by the limitations of necessar

ily-imperfect knowledge.

This general concern with only successful rational action greatly limits the role of rationality in economic theories and methodology. It is well known that logic or rationality can only tell us when we can expect our rational conclusions (predictions or expectations) to be true. It cannot help us predict whether our conclusions are false. This means that true and successful conclusions are logically possible even when one's assumptions are 'unrealistic'. This is because it is possible for one to deduce true conclusions from false assumptions even when the deductions are logically valid.⁷ Thus successful actions do not prove that the decision-maker's assumptions were true. Moreover, if one follows Shackle by accepting the view that 'rational success is only possible with perfect knowledge', then one could never explain a decision-maker's successes as a necessary outcome of a rational argument. Not only because true assumptions are not necessary for successful actions, but because even if they were the decision-maker could never know for certain whether his or her assumptions were true – knowledge is always changing in response to the news. It is for this latter reason that Shackle would have us replace the rational successes of neoclassical economics (i.e. stable equilibria) with a second-best kind of success – his 'kaleido-statics' or constantly changing temporary equilibria. His concept of knowledge, he claims, is adequate for that limited purpose. On this last point he may be correct, but what would be the cost?

In this light, Shackle's critique seems to have lost sight of at least one important methodological virtue of modern neoclassical economics. That virtue is the requirement that we should be explicit concerning all our active assumptions. Any long-run equilibrium can be shown to follow logically from some specific set of exogenous givens (resources, technology, tastes, etc.). But if, as Shackle argues, one of the givens of neoclassical theory is the fixed and exogenous knowledge and it is not logically complete itself, then the explicitness of neoclassical theory turns out to be the source of its alleged downfall. Unfortunately, the insights gained through Shackle's focus on change and instability can never be a satisfactory compensation for the resultant loss of neoclassical explicitness.

CONCLUDING REMARKS ON THE LACHMANN–SHACKLE EPISTEMOLOGY

I have stressed a number of key points in the above sections. It is misleading to claim that neoclassical theory is wrong whenever it does not give an essential role to knowledge. To the contrary, as can be seen in Chapter 4, when examining the *long-run* equilibrium solution to any neoclassical

model, knowledge does not play a *decisive* role. Specifically, the solution can be obtained without reference to the knowledge of the decision-makers. Thus any argument for the relevance of knowledge presumes the absence of a long-run equilibrium. But the Marshallian tradition based on the long-run vs short-run dichotomy is misleading. In the short run the decision-maker's knowledge is necessarily fixed, but as Shackle also stresses, any knowledge which is fixed is also potentially unstable. It constantly needs updating. His conclusion regarding the inevitability of instability is based unfortunately on his inductivist epistemology which presumes that all knowledge necessarily 'rests on inductive inference' [1972, p. 407]. Such an epistemology by its peculiar nature is limited since it can only comment on the *successful* acquisition of the needed knowledge.

While Shackle's views can be criticized, there is much to learn from them. One can see that almost all relevant issues concerning the role of knowledge in modern economic theory can be reduced to two key questions:

- (1) What constitutes a 'satisfactory' explanation of any economic decision-making *process* if knowledge is taken to be an exogenous and/or fixed element in this explanation?
- (2) What is a 'satisfactory' characterization of the theory of knowledge⁸ held by any given decision-maker of our economic models?

The first question concerns the *methodological role* of knowledge and calls for judgements as to the explanatory adequacy of alternative specifications of a knowledge variable in economic models. These judgements are to be distinguished clearly from those on the second, which concern theories of what knowledge actually is (as seen by economic decision-makers) or the *epistemological role* of knowledge in economic models. The second question is irrelevant only for models where long-run equilibria are assumed to hold since such an assumption entails the (successful) acquisition of adequate knowledge (however characterized).

As Lachmann suggests, historically it is trivially true that Austrian theorists have answered the first question better than those classical and neoclassical theorists concerned only with long-run equilibrium solutions. However, like most writers on the role of knowledge, Lachmann appears to assume that the second question is of little importance or, at least, that there exists an answer to it which can be taken for granted in any case. Such a view would be acceptable only if (i) the first question could be answered independently of the second, or (ii) the assumed answer to the second was satisfactory on its own grounds. Fortunately, Lachmann argues neither point (i) nor point (ii). Moreover, both points are false. As I have argued

here, in any model where knowledge or time is supposed to be relevant, the two questions cannot be regarded as independent of one another since answers to the first must constrain answers to the second and vice versa.

Epistemology considerations should not be taken for granted. An inductivist epistemology will always be an inadequate foundation for discussions of knowledge dynamics. Logically, the complete success of induction requires an infinity of time.⁹ This requirement raises an important problem. For a short-run equilibrium to be also a long-run equilibrium, the appropriate knowledge must have been acquired. But if the attainment of a long-run equilibrium is to be presumed, successful inductive inference must entail a sufficient amount of time. Such sufficiency is at least problematic; and this problem is the keystone of Shackle's critique of neoclassical economics. He argues that in order to maintain the relevance of knowledge real time must matter. Specifically, the amount of time necessary for the attainment of the long-run equilibrium must be denied. But this critique works only for an inductivist epistemology. One could just as easily argue for the irrelevance of (successful) inductive inference in decision-making, even in the short run. Thus without an argument for the necessity of inductive inference, Shackle's inductivist epistemology will necessarily be an inadequate explanation of both short-run knowledge and the role of knowledge or knowledge change.

In summary, it is only by attributing a questionable theory of knowledge (viz. Inductivism) to the economic decision-makers of neoclassical economics that Lachmann and Shackle can successfully reach their critical conclusions. Once the importance of real time and the resulting interdependence between the methodological and epistemological roles of knowledge are recognized, in conjunction with alternative views of the epistemological role in particular, the supposed comparative advantage of Austrian theory over neoclassical economics disappears.

In so far as neither neoclassical nor Austrian theory provides a 'satisfactory' characterization of such epistemological foundations, both theories share a common defect. A most important part of this failure is the common assumption that the objective of any economic theory is to explain only rationally-successful action, which then constrains all epistemological theories to explain universal (rational) success or universal (non-rational) lack of success. While Lachmann wishes to establish a clear-cut comparative advantage for Shackle's Austrian economic theory over neoclassical theory, there would seem to be little point in elevating the former simply on the grounds that it is less optimistic about rational success or that it suggests an extreme characterization of an epistemological environment which leads to this conclusion. Any proof of

the ultimate superiority of Shackle's foundations must be clearly demonstrated for any and all epistemological specifications and it is indeed fortunate that such global proofs are themselves largely precluded by their own scepticism.

NOTES

- 1 The remainder of this chapter is adapted from Boland and Newman [1979] which I co-authored with my friend and former student Geoffrey Newman. I thank the editors of the *Australian Economic Papers* for giving me permission to do so.
- 2 I have discussed the role of exogeneity in Boland [1989, Chapter 6]. Elsewhere [in Boland 1982a, Chapters 2 and 6], I explained that in long-run models, where appropriate knowledge is simply assumed to exist, any question about the time needed to acquire that knowledge is beyond consideration.
- 3 Apriorism is usually of the form that knowledge is based on introspection and in particular all knowledge is founded first on *a priori* assumptions such that observations always are secondary.
- 4 Recall that Inductivism is a methodological doctrine that limits all claims to knowledge to inductive proofs. I have explained this doctrine more fully in note 5 of Chapter 1.
- 5 It is thus ironic that Lachmann defends the view that expectations may be divergent among economic decision-makers [1976, p. 58] without admitting that epistemologies that decision-makers endorse could also be divergent by the same arguments.
- 6 Scepticism is the rationalist view of knowledge that says that all attempts to prove knowledge to be true will lead to an infinite regress. Thus, according to Scepticism, all knowledge that is claimed to be true will always be questionable.
- 7 Philosophers call this the 'fallacy of denying the antecedent' [see further Bear and Orr 1967; Boland 1982a, Chapter 9].
- 8 For example, is it Apriorism, Positivism, Inductivism, etc.?
- 9 One might say that this is the only way to 'solve' the problem of induction – of course, if by 'infinity' we mean an impossibly long period of time, then the problem is not solved [see further, Boland 1982a, Chapters 2 and 6].

7 A naive theory of technology and change

Sometimes it may be natural to think of 'technology' as a separate *input* element, an extra variable in the production function... Suppose we have a change that could be described, roughly, as an increase in the productivity of labor. This could mean that there has been a change in certain conditions upon which the productive effect of a certain specified standard input of labor depends. But it could also mean that the units of labor have changed their quality in a way which is not reflected in the kind of measure we use for labor input. The same could be true for the input of capital... Changes in the kind of capital used would be a time-requiring process. A change in technology would permit a larger potential of capital accumulation.

Trygve Haavelmo [1960, pp. 147–8]

There is one aspect of knowledge that has always been explicitly recognized in Marshallian economics, namely technical knowledge. However, the knowledge recognized in Marshallian economics is about production technology. While technology is thereby not a neglected element in neoclassical models, it can be argued that changes in technology have been ignored. Recall that Marshall defines the long run as the period during which knowledge is fixed [1920/49, pp. 291 and 315]. Since long-run prices are determined mostly by production costs, I think Marshall is saying that *technical* knowledge is fixed. In this regard, consideration of the problem of knowledge dynamics discussed in Chapter 6 might lead us to question the adequacy of neoclassical models to deal with questions involving changing technology and particularly their adequacy when it comes to questions of economic history.

In Marshall's day, technical knowledge was variable only over very long periods such as between generations. Of course, historians are more concerned with the big picture which involves inter-generational comparisons. To the extent that history does involve inter-generational comparisons historians must deal with changes in technology. But while

knowledge can be acquired by anyone, technology is usually embodied in machinery. Without the capital or machinery which embodies the current technology, one cannot benefit from the current state of knowledge. So it would seem that to study economic history one ought to examine neoclassical capital theory. But unfortunately, neoclassical capital theory is more concerned with adjustments of capital within the long-run period where technology is fixed. When a firm changes from one industry to another in the long run, it changes the quality or type of capital from what was appropriate in one industry to that which is appropriate in the next. The choice of industry is based on a given menu of technologies in Marshall's long run.

When, as a new PhD, I first considered the matter of technology and change I had an idea which I naively thought would be rather easy to work out. That idea was that since a firm (i.e. a business enterprise) is fundamentally a social institution, it would be possible to apply the standard theory of social change to the analysis of the technology of a firm with respect to changes in an economy. That was a nice idea, but it would have failed for the lack of a standard theory of social change that could be applied. This forced me to deal with social change as I dealt with technology. It is my view now that this can be done by viewing them both as interrelated aspects of social learning. This chapter presents my early attempts to demonstrate just this view.¹ In the last section of this chapter I will briefly outline my conclusions regarding the simple theory of social institutions developed between the lines, so to speak. In the next chapter I will further develop this simple theory to deal with more general questions of institutions in economic history.

The evidence of learning by an economic institution, such as a firm, is any accumulation of (new) technology and any improvements in efficiency. This suggests a view of social learning whereby there are two ways a social institution can learn: (1) through *changes* in the institution, and (2) through institutional *reforms*. And, while an *institution* might not learn through a revolution, a *society* can learn by overturning some institutions. By institutional changes in the case of a firm I mean the acquisition of new or different machinery or personnel. By institutional reforms I mean improvements in the methods of using existing machinery and personnel. In each case the learning process takes time. The major learning process, the accumulation of technology, is limited both by the *discovery* of new ideas and by the *implementation* of them. One can stoically accept the lack of discovery, but the lack of implementation of a known improvement can be very frustrating. There is necessarily a disparity between the growth of knowledge and the growth of technology, that is, between availability and implementation. This disparity exists because *all* economic technology can

be seen to be embodied in capital and the accumulation of capital takes time. This would seem to mean that there can be no significant change in our productive capabilities (i.e. our economic technology) until we have changed our capital stock (physical or human). It also would seem that changes in capital cannot be explained by changes in technology and that changes in output of an economy can only be explained by changes in capital (physical or human).

NON-AUTONOMY OF TECHNOLOGY

I now present my argument for why I think economic technology does not exist by itself but must be manifested in the capital used by a firm or industry. It is common knowledge that we have on many occasions known how to do something but it was not until much later that we acquired the technical capability to do it. In other words, knowledge is not the same thing as technology. For example, technology may depend on knowledge but knowledge need not depend on technology [see Agassi 1966]. What is it that stands between our knowing how and our acquiring the ability? When after acquiring knowledge are we able? This would seem to be a fundamental question for the historian of economic technology. Today in this age of specialization I think the answer is that we are able to accomplish a technically difficult feat, or to produce a new product, only *after* we have accumulated the specialized capital in terms of either sophisticated machinery or technical personnel. By itself, all the research and development of a firm adds little to the economic technology of that firm. The fruits of the research or development become part of the firm's technology only when the firm invests in (or acquires) the *necessary* machinery and personnel that are specifically designed or trained to do the new job. In other words, all technology exists only by being built into the economic institutions, that is, by embodying it in the capital either through specialized design or through specialized training.²

To say we cannot obtain new technology without a change in capital (mechanical or human) is to say that technology is not autonomous. Since technology may not be autonomous, we need not expect the growth of technology to appear to be continuous. Technology necessarily grows in discrete jumps because before a new technological capability appears, institutional changes are required, that is, new specialized machinery must be designed and constructed, and/or (new or old) personnel must be trained. In either case, the process of introducing a new technology takes time; the greater the change, the longer the time. We should not, of course, rule out improvements in productive capabilities that arise through improving efficiency. These improvements also take time but they would not account

for the substantial changes in productive capabilities. Parenthetically, I should point out that this latter kind of improvement, or institutional reform, is assumed automatically in neoclassical economic theory. Not quickly seeking and finding the most efficient means of producing a *given* quantity of output would be considered irrational. The neoclassical problem has always been to find the most ‘efficient’ level of output of all those that are technologically possible.³ And institutional changes, such as increasing productive possibilities, is considered an outside question for neoclassical capital theory – but not for the reasons I have laid out here. In neoclassical capital theory it is merely a matter of having *more* of the *same* type or quality of capital rather than choosing a different type or quality of capital. In terms of Chapter 5, neoclassical capital theory is concerned with the achievement of an intermediate-run equilibrium.

CAPITAL AS EMBODIED TECHNOLOGY

A further extension of the idea of embodied technology is that future (as well as current) advances in technology are limited by the *quality* as well as the growth of capital. For example, the exploration of space which made new research and development possible was itself limited by the development of technical capabilities. In other words, not only is the growth of technology limited by the changes in capital, but so is the growth of knowledge limited. This idea was employed by Arrow in his famous [1962] capital theory article about the economic implications of learning by doing.

I have said that changes in capital cannot be explained by changes in technology. Stated another way, if we ask, ‘Why has the capital stock of a large firm, an industry, or an economy changed?’ we *cannot* answer ‘Because there was a *prior* change in the technology of that firm, industry, or economy, respectively.’⁴ It might be asked, if we exclude changes in technology as bases for explaining changes in capital, what does it leave? Of course, neoclassical theory offers another explanation. The direct reason why capital would be changed is that the entrepreneur or manager of a firm seeks to increase profits. The assumption of profit maximization leads to another question. Why should changing capital be more profitable? The answer to this question can be that the output which only the new capital can produce may now be more desirable. Increased desirability might be indicated by contracts, by market research, or by rising market prices. In any case, these would be the *reasons* for profitability and ultimately the reasons for changing capital, that is, for institutional changes.

CAPITAL AND CHANGE

Recognizing capital as embodied technology leads to a consideration of whether changes in output of an economy can be explained *only* by changes in capital. I am speaking here of the *ex post* realization of a change in output which would clearly be the case when there is a substantial inter-generational change in the type of output – such as might occur when the automobile industry changes from gasoline engines to electric motors. We already know about the substantial retooling necessary to bring out a new model of the present type of automobile output.⁵ To advance the argument for a capital-based explanation of secular changes in output, we should ask: Are there any other bases for the accomplishment of a change in output? Clearly, we could say that desirability of a different output should affect its being produced. Unfortunately, desirability would not be an adequate explanation because desirability is neither necessary nor sufficient even when it may appear that we have the theoretical capability. Clearly, desirability is not sufficient when we do not have even the theoretical capabilities of a different output. To see that it may not be sufficient we need only observe one occasion where it is not, although we have the ‘know-how’. As long as one is willing to recognize real time, it is easy to find such examples. The usual problem is not how to produce a desirable good but how to mass-produce it. The American space shuttle programme is replete with examples of goods that are produced as one-only items that would be useful if mass-produced. Today, the most important is the fuel cell that can produce electrical energy with virtually no pollution and a very low cost of operation. The fact that such items can be produced (albeit at an extremely high cost) only makes it frustrating that the means of mass-producing them has not been found. Sometimes it takes decades before such one-only items in the space programme see their way to the mass consumer market. This is a problem of implementation rather than knowledge.

TOWARDS A THEORY OF SOCIAL CHANGE

To many anti-neoclassical economists my naive arguments in this chapter would not seem to be very amazing since much of it goes against the neoclassical theory of the textbooks. Technology is always assumed to be ‘given’ in Marshallian models. The questions of capital theory are always in terms of the *quantity* of homogeneous capital, and technology is always something independent and exogenous. The role of capital in the growth of technology and the development of new and different goods is central to both economic theory and economic history.

On the basis of what I have said here it could be argued that capital theory should be the foundation for all future improvements in economic theory and perhaps even economic history. This is simply because the growth of technology today is probably the most important aspect of the modern economic decisions of economic institutions such as firms. As many already agree, technology can no longer be considered exogenous; it must be endogenous, that is, any theory of the firm, as an economic institution, must also explain the growth of technology.

Most neoclassical theorists are unlikely to heed the call for a rethinking of neoclassical capital theory. It is all too easy to retreat to the view that capital is merely a commodity like any other and thus it is subject to Marshall's Principle of Substitution (i.e. to the neoclassical maximization hypothesis) and thus explainable as discussed in Chapters 2 and 3. So what can be learned from this elementary exercise in dealing with Marshall's secular or inter-generational run? What I have said so far can be generalized into a simple theory of social institutions. This simple theory says that society's institutions are, like the firm's capital, embodiments of society's social technology. Social institutions are social capital. The evidence of learning in society is the changing of social institutions through simple change, more elaborate reforms, or even through revolution. Although a revolution in the case of a firm means going out of business, it need not mean that for the case of the society as a whole. Since technology can always be viewed as merely accepted solutions, it follows that social institutions are merely accepted solutions to standard social problems. Without *new* problems there need not be any social change. Even though the problems solved by the current institutions are no longer interesting, we may still have solutions for them.

This chapter constitutes the results of my early study of institutions and technological change. In retrospect, it does seem rather naive. Nevertheless, it suggests some interesting ideas concerning an analogy between the neoclassical theory of capital and a more general theory of institutional change. And the awkwardness of my naive early views did prompt me to learn more about social change and social institutions in general. In the next chapter I present the results of my later explorations into a more substantial view of the role of institutions in neoclassical economic theory.

NOTES

- 1 The remainder of this chapter is based on a paper I delivered to the Society for the History of Technology meetings in 1967 [see Boland 1971].
- 2 One could easily see supporting evidence in the high degree of specialization prevailing in today's economy.
- 3 This is considered a low-level criterion of efficiency and requires only that the firm find its optimum point *on* its production function – that is, it is not wasting inputs.
- 4 Except in the case where to produce the new capital the technology of the production of capital itself may have changed.
- 5 Until recently, every time there was an energy crisis, automotive executives would point out that it takes at least four years to introduce a new model. Executives of the Chrysler Corporation are now claiming that the lead time can be reduced to less than two years.

8 Knowledge and institutions in economic theory

Though economic analysis and general reasoning are of wide application, yet every age and every country has its own problems; and every change in social conditions is likely to require a new development of economic doctrines.

Alfred Marshall [1920/49, pp. 30–1]

The failure of economists to appreciate the transitory character of the assumed constraints and to understand the source and direction of these changing constraints is a fundamental handicap to further development of economic theory.

Douglass North [1978, p. 963]

For more than six decades, neoclassical economics has been criticized for neglecting the social institutions that form the framework in which the neoclassical economy functions. In North America the criticisms have come from those economists who huddle under the banner of ‘institutional economics’ and focus on the problem of explaining institutional change. This chapter discusses the role of institutions in neoclassical economics. Whether there is a problem with how neoclassical economics explains the evolution of institutions is a question open to debate. Proponents of neoclassical economics argue that since one can explain any institutional setting and its evolution as merely the consequences of the logic of choice (i.e. of optimization facing given constraints), our understanding of institutions is merely another example of neoclassical analysis (e.g. James Buchanan, Gordon Tullock and Douglass North).

The primary concern of some opponents of the neoclassical economics has been to show that the pro-neoclassical view is simply false. In particular, they have seen that advocates of the neoclassical view presume that neoclassical choice theory can easily be made dynamic. Some opponents go so far as to argue explicitly that this presumption is completely unfounded [Shackle 1972; Hicks 1976]. The question of

dynamics is even sometimes alleged to be the ‘fatal flaw’ of neoclassical theory [Robinson 1974].

So much has been made of this criticism over the last two decades that those institutionalists among the anti-neoclassical group have turned their attention from a study of the nature of institutions to the study of the evolutionary aspects of any economy. So far, the institutionalists’ critical programme of study – called ‘evolutionary economics’ – has failed to persuade neoclassical economists to drop their ‘paradigm’. To the contrary, many neoclassical theorists believe that the evolution of an economy’s institutional setting can be explained *within* the neoclassical paradigm [e.g. Buchanan and Tullock 1962]. However, it would be misleading to suggest that this is only a methodological dispute over the ability to ‘explain within’. Underlying this question is a more fundamental theoretical issue concerning the nature and role of institutions in neoclassical theory.

Here I will argue that the essence of the methodological dispute lies not in the depths of sterile philosophy, but in the apparently contradictory roles played by institutions in economic theory. On one hand (viz. in neoclassical theory), institutions are tacit or given static *constraints* which ultimately define various equilibrium positions. On the other hand (viz. in economic policy analysis), institutions are explicitly dynamic or active *instruments* used either to facilitate or to prevent change. Both aspects of institutions are explicitly recognized in Lance Davis and Douglass North [1971]. Following Buchanan and Tullock, Davis and North distinguish between the *institutional environment*, which includes the ‘legal ground rules’ that constrain on-going political and economic business, and the *institutional arrangement*, which provides a workable mechanism either for operating *within* the ground rules or for changing them. It will be shown that any appearance of contradiction here can easily be overcome with an explicit recognition of the relationship between institutions and knowledge.

I will argue here that since the neoclassical conception of an institution (i.e. a short-run constraint) is inherently static, all attempts to promote and defend the pro-neoclassical view will necessarily result in methodological failures. Moreover, if neoclassical economics is ever going to be able to explain the evolution of institutions then a broader view of institutions will have to be developed. I think such a broader view is possible within neoclassical economics. But, unless the dynamic nature of institutions is properly explained, no explanation (neoclassical or institutional) of evolutionary economics can ever succeed.

I will begin by presenting the neoclassical view of institutions, namely, the one where institutions are merely some of the constraints facing the optimizer. Specific attention will again be given to the Marshallian method of dealing with the dynamics of constraints. Next, I will summarize from

Chapter 7 my criticism of the adequacy of any neoclassical programme for dealing with questions of dynamics. Then I will present a theory of the nature and role of institutions designed to overcome the inadequacy of the neoclassical approach to institutional dynamics.¹ It will be based on an explicit recognition of the relevant epistemological questions involved as well as the instrumental aspects of institutions. Finally, I will explain the essential relationships among time, knowledge and institutions.

THE NEOCLASSICAL VIEW OF INSTITUTIONS

Within neoclassical theory, all *endogenous* variables are explained as the logical consequences of self-interested rational choice, whereby one's choice may be limited by the similarly motivated rational choices of others through any activity in the market. This form of rational choice involves maximization (or minimization) of some objective function while facing some *given* constraints. The nature of the constraints facing any *individual's* choice may or may not be explained as a matter of his or her past or irreversible decisions or those of other individuals. Those constraints which are not considered a matter of choice cannot be *explained* within neoclassical theory. Operative constraints which limit individuals' choices (e.g. anything which is naturally given or beyond control, such as the availability of resources, technology, and so forth) are by definition the *exogenous* variables of neoclassical theory.² Also by definition, any fixed or exogenous variable can be seen to play a determining role (viz. in the determination of the values of the endogenous variables) *only if* changes in that variable necessarily result in changes in the endogenous variables.³

Neoclassical theory, of course, recognizes many exogenous variables, including institutional or socially determined constraints such as legal limits and property rights. The constraints facing any *individual's* choice include some 'endogenous givens' which are determined in concert with the rational choices of other individuals; for example, the givens of consumer theory include market-determined prices. In this sense, some of *any individual's constraints* are explained as the consequences of (the equilibrium or concert of) *all individuals' choices*. Moreover, any constraint the establishment of which requires the (implicit) participation of many individuals is in some sense an institution. For this reason, some economists might consider a system of all market-determined prices to be an institution whose function is to provide the decision-maker with a 'summary of information about the production possibilities, resource availabilities and preferences of all other decision-makers' [see Koopmans 1957, p. 53]. However, the view that a price system is a social institution is true (if at all) *only* in long-run equilibrium, the attainment of which may

take an unrealistic amount of time. More important, it would be very misleading to focus on prices as the *only* institutional constraint. The tendency to do so persists because many neoclassical economists rely on the *normative* view that price *should* be the only institutional constraint. As a matter of positive economics, dealing with real-time phenomena – which must exist in the short run – there are other institutions which constrain individual choices (see Coase's theorem). Whether or not the existing institutions can be explained away by assuming there are no incentives to change them, because they are optimum, is the moot point discussed in this chapter. Given any neoclassical model of the economy, if there are many exogenous variables involved in the explanation of one or more endogenous variables, then formally there are many possible causal explanations for observed changes in the endogenous variables. The explanations formally differ only to the extent to which changes in different exogenous variables are recognized as the causes.

In these terms one can identify many types of neoclassical explanations which are distinguishable in terms of the method used in each to deal with the multiplicity of 'causes'. At one extreme, we find the approach which follows Walras and William Stanley Jevons in being concerned only with the logical and mathematical adequacy of the neoclassical model.⁴ At the other extreme is Marshall's approach, which is the foundation for virtually all neoclassical theories of institutions.

When there are many possible causes, (causal) explanation becomes a very difficult methodological problem. And as I discussed in Chapters 2 and 3, solving this problem was the central purpose of Marshall's *Principles of Economics*. His solution was based on an explicit recognition of 'the element of Time' and its relationship with what he called the Principle of Continuity. As I explained before, the latter presumes that anything that can be varied in the given amount of time must yield to the Principle of Substitution, that is, can be explained as a matter of optimizing choice. His solution is built on two assumptions. First, he assumes away changes in all variables which are impossible to control (such as weather) or for which there is not enough time to change them (such as cultural traditions). Such variables cannot be explained with his Principle of Substitution hence they are unexplained givens or exogenous variables. Note again, such 'exogeneity' may depend on the amount of time under consideration. The second assumption is that it is possible to rank-order the changeability of variables such that those that can be changed more quickly are explained before those that are more rigid. Specifically, Marshall's method of duration-ordered periods depends on an assumption about dynamics, namely, about the rate at which the given variables could be expected to change. The rigidity of capital stock relative to the variability

of labour is, of course, the hypothetical and only basis for the distinction between the long and short periods.

Although many variables are to be objects of choice in Marshall's long period, that period is not without some givens. He specifically noted that 'there are very gradual ... movements of long-run equilibrium prices caused by the gradual growth of knowledge, of population and of [available] capital, and the changing conditions of demand and supply' as well as changing social conditions 'from one generation to another' [Marshall 1920/49, p. 315]. There is nothing in Marshall's *method* which prevents any neoclassical economist from attempting to explain inter-generational changes in such variables as long-run prices or the long-run distribution of resources.⁵ But, if the changes in the long-run variables are to be explained as the results of changes in institutions (as elements of the 'social conditions'), the question is begged as to whether changes in the institutions are themselves the result of additional applications of Marshall's Principle of Substitution, that is, have the existing institutions been chosen in the way that other endogenous variables are chosen (as objects of optimization)? In other words, by including social conditions among the *endogenous* variables (i.e. among the objects of choice), neoclassical economists are merely modifying Marshall's concept of a long period without changing his neoclassical method. Whereas institutions (as 'social conditions') are among the exogenous givens in Marshall's long period, they are considered endogenous variables in the modified long-period analysis. In this manner, the modified long run forms the starting point for the neoclassical view of institutions.

In all neoclassical analyses of endogenous institutions, the prevailing institutional constraints are viewed as the outcomes of attempts to minimize costs or maximize benefits for those individuals or groups who are in a position to alter the institutions in the modified long run. Once the institutional arrangement (or environment) has been established, it becomes the set of ruling constraints on individual choices – at least in the short run. In terms of the logic of choice, institutions are like capital, which by definition is fixed in the short run and is the basis of the cost functions facing the decision-maker. In the modified long run, when equilibrium has been reached, the optimum institutional constraints as well as the optimum amount of capital must have been chosen. The ultimate modified long-run equilibrium values of all endogenous variables, including the institutional constraints, are logically determined (for any given set of behavioural assumptions) by the values of the *recognized* exogenous variables that cannot be considered the results of optimization (either because they are difficult to change or their changes are beyond control).⁶

As implied early in Marshall's book, every explanation requires the

recognition of something exogenous [1920/49, Book I, Chapter 3]. Since Marshall's long-run explanation (of prices) assumes that institutions (as 'social conditions') are exogenously given, any approach which makes them endogenous requires the recognition of something else as an exogenous variable. For example, the primary exogenous variable in Douglass North's neoclassical theory of institutional change is what he calls 'ideology'. In particular, the evolution of institutions is to be explained as the result of 'a fundamental change in ideological perspective' [1978, p. 974]. North adds that he sees 'no way to account for this transformation without the systematic study of the sociology of knowledge' [p. 974]. Although I can agree with this courageous statement, it would create methodological problems for the pro-neoclassical view, to which I now turn.

A CRITIQUE OF NEOCLASSICAL THEORIES OF INSTITUTIONAL CHANGE

Marshall cannot be blamed for the more recent tendency among neoclassical economists to take institutions for granted. In his theory of market prices, he did allow for the role of changing social conditions (including institutions) in the explanation of the history of an economy, that is, of the inter-generational changes of long-run prices and allocations. However, it must be recognized that to explain the dynamics of prices or allocations, one must explain *why* the social conditions have changed. This is because when changes in social conditions are considered exogenous (as in the Marshallian long run), they are thereby deemed unexplainable *within* the economic model. However, if the only reason the long-run endogenous variables (such as long-run prices) change is *because* social conditions changed, then the *changes* in the long-run endogenous variables remain unexplained.⁷ It would seem, then, that for an adequate explanation of long-run prices, the evolution of institutional constraints (on short-run optimization) must be explained. In other words, the recent concern for institutions among neoclassical economists is not merely idle curiosity (nor more neoclassical 'imperialism'). It is a fundamental methodological requirement for a complete explanation of the dynamics of long-run prices and allocations.

There are two methodological aspects of neoclassical theories of the evolution of institutions which deserve critical examination.⁸ First, as noted in Chapter 6, every neoclassical explanation presumes that (subject to constraints) individuals always get what they want, that is, all individual decision-makers are *successful*. As North observes, 'Neoclassical theory simply ignores the losers.' Although the presumption of successful decision-making may seem plausible in most neoclassical analyses, it

should be recognized that it implies that the individual decision-maker's knowledge is always correct (or otherwise, how the required true knowledge was acquired must be explained as well [see Hayek 1937/48]). In Chapter 1 and elsewhere I noted that, since there is no inductive logic, there is no way to guarantee that the knowledge which is essential for successful decision-making is always true. Moreover, an induction-based knowledge involves a very static (since it is timeless) concept of knowledge, one which begs the question as to why there should ever be a change in *long-run* variables. This methodological problem can be overcome by explicitly recognizing the role of the decision-maker's knowledge and by recognizing that changes are usually the result of systematic failures due to reliance on false knowledge, rather than of systematic successes based on necessarily true knowledge.

Second, if the ultimate basis for any explanation of the changes of the institutional constraints is *outside* the neoclassical explanation, then the pro-neoclassical view cannot be sustained. As noted before, to avoid circularity every explanation of any set of variables requires the recognition of one or more exogenous variables. It should be obvious, then, that without a change in at least one exogenous variable (e.g. in an ideological perspective in North's theory), the long-run neoclassical economy is static, since there is no reason for a change in the endogenous variables (such as institutional constraints) once the optimum values of the institutional 'constraints' have been successfully established. If, for example, the optimizing changes in the endogenous constraint variables are to be explained as the result of changes in the exogenous ideology variable, then by definition of 'exogenous' (not explained *within*), that change in ideology must be explained *outside* the neoclassical explanation of institutions – an exogenous ideology cannot be an object of optimizing choice. But even worse, if one wishes to make ideology an endogenous variable in a neoclassical model, then another new exogenous variable must be invented. Of course, having to invent a stream of new exogenous variables as the neoclassical programme progresses merely means that one is marching down the long road of the infinite regress.

These methodological considerations reveal, I think, the inherent poverty of every neoclassical programme for explaining the *evolution* of the organizational structure (institutions) of an economy as the dynamic consequences of constrained optimization. Specifically, these considerations call into question the adequacy of the decision-maker's knowledge by questioning the presumed success of the intended optimization. They also question the neoclassical view of the nature of institutions which, for methodological reasons, views them as *static constraints* facing the short-run optimizer.

A SIMPLE THEORY OF SOCIAL INSTITUTIONS

Although I can agree with the view of North and others that the evolution of institutions can be explained, I cannot agree that a neoclassical programme by itself is methodologically sufficient. An adequate explanation of dynamics must recognize all limitations on successful decision-making as well as the essential role of knowledge. More important, an adequate explanation of the evolution of institutions must be based on a theory which explicitly gives institutions a broader role than is allowed by seeing them as merely static constraints on the choices of any individual decision-maker. I will outline a theory of institutions which will form a basis for an adequate explanation of institutional dynamics. Although my theory will not necessitate giving up the fundamental assumption of rational decision-making, it will show that all neoclassical theories of institutional *change* are very special cases.

To begin, I would like to note that the critical issues of the adequacy of the knowledge available to a decision-maker and the methodological role of institutions are not independent. The reason is simple. One of the roles that institutions play is to create knowledge and information for the individual decision-maker. In particular, institutions provide social knowledge which may be needed for *interaction* with other individual decision-makers.⁹ Thus, the following theory of institutions emphasizes the primary role of social institutions, namely, to institutionalize social knowledge. However, for an adequate dynamic theory, I will avoid the presumption of successful decision-making; thus, in particular, I will not assume that the social knowledge is correct, even though it may be durable. But I go too fast. Let me proceed very deliberately by putting my theory in the form of explicit propositions.

Proposition 1. All sociological acts are based on expectations of expectations. Specifically, all interactive decision-making involves the actor's knowledge of the other individuals' knowledge.¹⁰

The significance of this proposition lies primarily in the conceivable alternatives, such as the actor's direct questioning of the other individuals.¹¹

Proposition 2. All social problems result from conflicts over expectations (or knowledge), which in turn result from the lack of acceptable limits on the range of expectations (at either source).

The significance of this proposition is dependent on the first and would mean little without it. Since most of our everyday experience involves previously *solved* social problems, it would be fairly difficult to give a pure description of any social problem apart from its assumed solution. Thus, I

turn directly to solved social problems.

It should be clear that, based on the second proposition, all solutions to social problems involve the limits on expectations. There are basically two different ways of limiting expectations: (1) narrowing the range of possible options (with prohibitions, taboos, and so forth), and (2) increasing the likelihood of particular possible options (with norms, standards, guides, conventions, and so forth). This brings me to my third, fourth and fifth propositions.

Proposition 3. All social institutions exist to solve social problems.

Proposition 4. All social institutions can be divided into two categories: *consensus institutions*, which exist as socially accepted solutions to specific problems (or to a set of problems), and *concrete institutions*, which exist to solve social problems resulting from relying on consensus institutions (e.g. common agreements) to solve problems.

Proposition 5. All concrete institutions are attempts to manifest the extent of a society's learning, that is, they are a society's social knowledge.

And, as a corollary of the fifth proposition, I note:

Proposition 5a. The sole job of a concrete institution is to represent a given particular consensus institution (or system of institutions).

There are many examples of concrete institutions; the American Constitution is the most obvious, and legal contracts are the most common. Consensus institutions are much less obvious, but one can identify all 'unwritten laws' and 'gentlemen's agreements' as common examples.¹²

Propositions 1, 2 and 3 form a static theory of institutions. That is, one can explain the existence of an institution by explaining the problem for which the institution was intended to be (or accepted as) a solution.¹³ Such problems include those discussed by North and others. One can also explain the continuance of the institutions by explaining the current problem for which the members of the society *think* the institution is a solution. In both cases the individual members may be mistaken, either in terms of the competence of the solution (as it may not do the job) or in terms of the realities of the problem (it may be a false problem or an impossible one to solve).

The addition of Propositions 4, 5 and 5a allows for a dynamic theory of institutions. More technically, these propositions form what has been called 'institutional individualism' [see Agassi 1974; Boland 1982a, Chapter 2]. If all institutions are considered to be *essentially* of the consensus type, it would lead to the view which Agassi called 'psychologistic individualism'.

If all institutions were viewed as *essentially* concrete, it would lead to the view called 'institutional holism' (sometimes called 'collectivism').¹⁴

The theory formed here views institutions as social conventions which can be influenced by individual members of the society but which also extend (in terms of time or space) beyond the individuals and thereby can influence the individuals either as constraints or as instruments of change. *How* the institutions can be influenced depends on the institutions designed to deal with that problem (such as election rules). This theory can best be understood in terms of a sequence of events or steps.

Step 1. A society faces a problem for which there is at least one conceivable solution.

Step 2. A consensus is formed around one particular solution, thereby establishing a consensus institution.

The establishment of the consensus may depend on a political process. In the modern urban world, a consensus is virtually impossible to achieve. One can easily see that the institutions of political parties and platforms are parts of a solution to the problem of forming a consensus. Specifically, a platform ties together a set of problems for each of which a consensus for a particular solution cannot be obtained. To construct a consensus, every party member agrees to support all planks in the platform, even though he or she may not be interested in every plank.

Step 3. It is recognized that the solution of Step 2 has inherent methodological difficulties because a consensus institution is limited in terms of space and time.

In particular, the solution of Step 2 will be limited to the members that form the consensus in terms of both their life-span and their number. For example, in this semester's seminar, everyone may know what to expect of one another in terms of operating rules, but next semester (or in any other seminar at the same time) there will be a new set of students who may not know what to expect. Thus, every semester a new consensus will have to be reached. The fact that there is no carry-over from one period (or place) to another is in effect another social problem for which some form of *durability* is the only solution.

Step 4. The society establishes a concrete institution to represent the consensus of Step 2; however, the durability or concreteness of the institution is merely another consensus institution.

Durability is the essential ingredient for a truly dynamic model, even if the durability is not exogenous.

Step 5. In the future, the succeeding consensus is formed partly as a result of the existing concrete institutions and partly as a result of the existing social problems, and so forth.

In other words, when Step 4 has been reached, the succeeding generations are taught how to solve *their* social problems by teaching them about the existing (concrete) institutions. Of course, the process involves to a great extent teaching them what their problems 'are'. Note that concreteness may present other social problems, which in turn are solved by a higher level of concrete institutions (e.g. an ombudsman). Some societies may wish to prevent any further changes. Others may design their institutions so that they can be easily altered in order to be able to adapt to changing circumstances. Whether a concrete institution actually possesses the intended durability is an important question of dynamics, but the form of concreteness is still only a consensus institution. In other words, concrete institutions continue to exist only because we allow them to exist. As individuals, we can choose to ignore them or persuade others to ignore them. There may be certain social or personal costs involved in such a stance, but it clearly is an option open to every member of a society.

Clearly, with this theory the question of social change becomes very delicate because of the seemingly indeterminate nature of the structural relationship between problems and solutions at both static and dynamic levels. The structural relationship at issue is an instance of 'circular causation'. Simultaneously, in the process of teaching (or socializing) new members of a society, the prior existence of an institutionalized solution is used as evidence of the importance of certain social problems, but the existence of the solution is in turn justified on the basis of the prior existence of the social problem. Such a symbiotic relationship may lead to a very static society if the 'elders' are skilled at socializing. It also raises certain difficulties with regard to the concept of a change in 'social conditions', including the existing institutions. My presentation of a hypothetical sequence which would lead to a concrete institution presumed the existence of a consensus institution. But, given the symbiotic relationship, can the consensus institution be changed *without* a change in the concrete institution?

This methodological problem for the explanation of social change is usually avoided, but not solved, in one of two ways. The first way to avoid 'circular causation' is to view all concrete institutions (such as the laws that constrain individual choices) as the *only real* institutions. Although this view has the advantage of being clear-cut and more appealing to common sense, it also has the methodological disadvantage of leading its proponents to view all matters of social change as matters of *only* power politics. But

more important, this view of institutions is inherently static. Once the institutions have been established, there can be no real institutional change, hence changes in other endogenous variables cannot be explained within the given institutional structure. This view's static nature, combined with its emphasis on power politics, leads its proponents to make political mistakes. For example, this view's proponents often oppose the establishment of an undesirable (concrete) institution because they fear the rigidity of its concreteness even though it can usually be shown that a concrete institution (such as a written rule) is easier to change than a consensus institution (an unwritten rule).¹⁵

The second way to avoid the problem of 'circular causation' is to say that consensus institutions (which underlie any concrete institutions) are the *only real* institutions. Moreover, there may be more than one way to represent a consensus institution; thus, changes in concrete institutions do not imply changes in consensus institutions or social conditions. This alternative has the advantage of avoiding collectivist dogma, but the disadvantage of viewing all social change entirely as a matter of persuasion (such as 'Madison Avenue' advertising techniques). Of course, with this view, changes in social conditions are very slow whenever communication is very controlled (e.g. 'one should not talk about such things'). But there is a more serious methodological problem. It is virtually impossible to know when a consensus institution has changed, and thus an operational explanation of social change becomes impossible. Any theory (such as Marshall's) which explains long-run changes in prices as the consequences of changes in social conditions (consensus institutions) is inherently untestable!

Neoclassical theories of institutional change can be seen to be variants of the theory represented by Propositions 1 through 5a. But being basically concerned with the individual decision-maker, every neoclassical theory would have to view real changes as those in consensus institutions; however, such changes may (have to) be brought about by changes in concrete institutions. It should be clear that most modern societies provide specific institutions which make orderly changes or the creation of other institutions possible. The legislative bodies of most Western democracies are an example. In fact, the changeability of any institution is a problem for which the rigidity of other institutions provides the solution. It should be noted that those institutions whose role is to provide information (such as norms, guidelines and legal limits) are effective only to the extent that they are stable. Thus, the changeability of such institutions compromises their knowledge role [see further, Newman 1976].

The critical issue with any neoclassical variant, as noted earlier, is whether a chosen concrete institution is, in fact, a successful representation

of a given consensus institution (e.g. whether it adequately represents the given ideology). Kenneth Arrow's (im)possibility theorem [1951/63] might easily be seen as an argument against the possibility of (complete) success in every social situation. Specifically, one cannot guarantee a successful social decision mechanism (a concrete institution) which will always represent the society's welfare function (a consensus institution).

Similarly, there is the critical issue of the adequacy of the solution over which the consensus is formed. Does the given ideology, for example, solve the social problems that exist? People may *think* the market system can solve all social problems, but that does not prove that it can. It is only a conjecture, the truth of which is neither proven nor provable. For example, Arrow [1974] has argued that one essential ingredient for social interaction (which includes doing business in the market as well as within the firm) is simple trust but the existence of a market for trust would be a virtual contradiction.

TIME, KNOWLEDGE AND SUCCESSFUL INSTITUTIONS

The neoclassical programme for explaining the evolution of an economy's institutions is quite compatible with my simple theory of the epistemological role of institutions. However, once one recognizes that neoclassical programmes (Marshallian or otherwise) presume *successful* decision-making and hence, for continuing success over time, that every individual must possess correct knowledge (which includes accurate representations of relevant consensus institutions), it becomes clear that a neoclassical theory is a special case of my version of institutionalism presented here. That is, in my theory, when the consensus institutions do succeed in accurately representing those solutions, then (and only then) are my theory and a neoclassical theory of institutional change completely compatible.

Neoclassical theories are incompatible with my theory whenever any individual's knowledge is not correct (i.e. not true). But, incompatibility is not the important issue here. As has been argued elsewhere [e.g. Hayek 1937/48; Hicks 1976], the existence of false knowledge is an essential ingredient in any dynamic theory of economic decision-making. If all knowledge were true (including knowledge about the future), then there would be no reason for (disequilibrium) change without changes in one or more exogenous givens. If one is going to explain change, the source of the change cannot be exogenous. Thus, it has been argued, dynamic theories must recognize false knowledge (and explain why it might be false). Furthermore, a theory of dynamic behaviour must specify the *systematic* way each individual responds to the discovery that his or her knowledge is false. Stochastic theories, their popularity notwithstanding, do not *explain*

response variations but only cover up the failure systematically to explain them accurately.¹⁶

In this chapter I have extended this dynamic issue of false knowledge to the question of institutions. I have argued that institutions provide essential knowledge to individual decision-makers. If that institutional knowledge is false, there is another reason for change. The only difference between institutional knowledge and knowledge in general is that the former (like capital) takes longer to change. In other words, institutional knowledge may be durable, and its durability may create problems. Even though an institution may successfully represent social knowledge that is true for one period of time, its durability may extend to a period for which it is false. Thus, since institutional knowledge is durable, it is likely to be false. Moreover, the existence of false institutional knowledge is a reason for change and, because change takes time, false knowledge is a continuing reason why the success assumption of neoclassical explanations is often unrealistic.

In this part I have discussed three widely recognized but allegedly neglected elements in neoclassical economics. To the extent that these elements are essential, proper consideration of them can surely improve neoclassical explanations. In the next three chapters I will discuss additional ways by which new elements might be included. Each of them represents a major departure from neoclassical methodology but it will remain an open question whether they represent impossible avenues for the possible repair of neoclassical theory. I will argue that Keynes clearly wished to recognize missing elements in Marshall's economics which would make long-run equilibrium explanations rather precarious. And as always one can find lurking about proponents of the alleged necessity to give neoclassical economics a transfusion of psychology to make it realistic. Into these murky waters I will venture the need to address the methodology of the individual decision-maker on the grounds which were introduced in Chapter 6. Each chapter involves a claim that there is one or more missing elements in every neoclassical explanation.

NOTES

- 1 This theory of institutions was developed in an undergraduate sociology class that I taught in 1968. It was subsequently reported in Boland [1979b] and is partially reprinted here by special permission of the copyright holder, the Association for Evolutionary Economics.
- 2 Exogeneity is, of course, defined as the purported intrinsic property of certain variables of a model *within which they cannot be explained* (i.e. they are not influenced by changes in endogenous or other exogenous variables of the model).

- 3 For a more detailed discussion of the methodological role of exogeneity and the requirements of determinant explanations, see Boland [1989, Chapter 6].
- 4 Consequently, in terms of the logic of solvability, it does not matter whether a formal constraint is socially given or is a parameter of nature (e.g. available resources).
- 5 To avoid circularity, it must be remembered that there still have to be some givens which do not endogenously change within or with the generation.
- 6 For the given values of the exogenous variables, if the current choices of values for the endogenous variables are such that there exist incentives for changes in any endogenous variables, then the (modified) long-run equilibrium has not been reached.
- 7 For more on the methodological question of explaining dynamics, see Boland [1982a, Chapter 6] and for a discussion of the technical requirements of explanation as distinguished from description, see Boland [1989, Chapter 6].
- 8 I say 'methodological aspects' to distinguish them from empirical aspects, such as the truth of the assumptions about the relative variability of the givens used to distinguish the short run from the long run.
- 9 The equilibrium price system is one instance of such a social institution; other institutions include the laws governing trade and advertising practices and tax laws. The extent to which the social knowledge provided (such as norms, guidelines and legal limits) is necessary is directly related to the power of the institution.
- 10 Such a situation was recognized by Plato in his dialogue 'Laches'. It is observed at the beginning that 'some laugh at the very notion of consulting others, and when they are asked will not say what they think. They guess at the wishes of the person who asks them, and answer according to his, and not according to their own, opinion.'
- 11 Clearly, it does not attempt to be relevant for the explanation of the observed behaviour of a hermit or anyone else who opts out of a society (although it would apply to a group that opts out). In other words, it does not attempt to apply to an asocial situation.
- 12 In correspondence, Ludwig Lachmann noted to me that he offered a similar theory of social institutions in his 1970 book. His illustration of the differences between consensus and concrete institutions is the difference between 'the market' and the stock exchange.
- 13 Of course, not all solutions are invented or designed – some may be 'discovered'.
- 14 Let me define these two different views of the *explanatory* relationship between institutions and individuals. Psychologistic individualism is the methodological requirement that says all explanations of institutions must recognize that only individuals can make decisions and that the only exogenous variables allowed are nature-given, including the psychological states of the decision-makers. Institutional holism would allow other exogenous variables such as the 'destiny of the nation', class interest, etc. In the extreme, institutional holism would deny a role for the individual in determining the social outcomes [e.g. Sraffa 1960].

It is commonly thought that if an explanation is not psychologistic-individualist then it is 'holist' (or 'collectivist'). This is a mistake. The distinctions to be drawn are between individualism and holism and between psychologism and institutionalism. This means that there are four distinct views. Economists since

Schumpeter use the term 'methodological individualism' to actually mean the stronger psychologistic individualism. It would be best to reserve the term 'institutional individualism' to indicate the form of individualism that allows exogenous variables beyond the limits of natural givens and psychological states of the individual.

- 15 Similarly, when in power, this view's proponents waste much time or many resources on superficial changes, that is, on those which change (concrete) appearances without altering the underlying consensus.
- 16 For a more elaborate discussion of the methodological problems with stochasticism in economic models, see Boland [1982a, Chapter 7; 1989, Chapters 1, 7 and 8].