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INDIVIDUALISM AND THE THEORY OF SHORT-RUN AGGREGATE ECONOMIC COORDINATION:  
A METHODOLOGICAL STUDY OF THE INSTITUTIONAL AND INFORMATIONAL FOUNDATIONS  
OF GENERAL EQUILIBRIUM THEORY

by

Geoffrey Newman

B.A., Simon Fraser University, 1970

M.A., Simon Fraser University, 1973

A THESIS SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

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of

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## ABSTRACT

This thesis examines the failure of both contemporary "classical" and "non-classical" (e.g., Keynesian) programmes to provide a non-arbitrary and logically complete explanation of observed short-run employment, price, and expectational behaviour. It is argued that, given the requirements which each programme has stipulated as necessary for successful short-run explanation, there exists no explanatory strategy which can meet the methodological criteria specified by both sides. In defending this argument, the principal contribution of this thesis is the provision of a meta-theoretical framework which can (a) illuminate all logically consistent and non-trivial explanatory options available to explain short-run behaviour; (b) demonstrate why all existing classical and non-classical strategies must fail; and (c) investigate the logical possibility of constructing a theory of short-run behaviour which, under a non-arbitrary modification of prevailing methodological criteria, can be construed as successful insofar as it combines the virtues of the two programmes without their defects.

The integrating idea in the proposed analysis is that all critical debates between classical and non-classical thinkers must be seen as debates over the fulfillment of the methodological standards of Individualism in explaining observed aggregate phenomena as aggregate coordinated ("general equilibrium") phenomena. Classical theorists contend that it is only if short-run observed outcomes can be explained as equilibria which manifest the "rational" decision making of all individuals that Individualism can be maintained and that any non-classical account of such phenomena which denies rationality (e.g., by substituting exogenous institutional determination) must be behaviourally arbitrary. Since these theorists equate the

existence of rationality only to the realization of equilibria with maximum gains from trade--as defined relative to given "tastes" and "technology"--the provision of any non-arbitrary short-run explanatory framework is seen to hinge ultimately on the success of either: (i) the classical demonstration that rational maximizing behaviour must transpire in the short-run; or (ii) the non-classical demonstration that short-run non-maximizing outcomes can in fact be consistent with "rational" coordination, as defined relative to a set of exogenous variables other than, or in addition to, tastes and technology.

It is argued that (i) is logically impossible--since it requires a guarantee of "sufficient" endogenous knowledge which can be procured only in the long-run--while attempts to underwrite (ii) only through the introduction of exogenous knowledge and/or institutional constraints cannot succeed in principle.

The conclusion, however, is that (ii) need not fail: the only successful way of rationalizing the existence of stable, short-run, non-maximizing outcomes in accord with Individualism is to deny the existence of exogenous institutional constraints, but to maintain limited knowledge, conjoined with a dynamic theory of institutional reform by individuals. It can then be argued that individual reform is "rational," relative to the constraints of changing institutions, given limited knowledge, even though static maxima can be realized only by accident and all institutional variables are endogenous.

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CHAPTER ONE

INTRODUCTION: TWO VIEWS ON EXPLAINING  
CLASSICAL DISEQUILIBRIA

Any cursory examination of the literature of economic theory over the past decade reveals that, for all the seemingly-diverse new research areas which have opened up, the highest analytical premium is still placed upon finding a solution to one fundamental theoretical problem. This is the problem of how to explain the existence and character of behavioural outcomes which observably differ from those implied by classical (Walrasian) general equilibrium theory. This dilemma emerges in much the same form whether one is concerned with explaining persistent unemployment (Solow 1980), the "price dynamics" which transpires outside of a competitive general equilibrium (Arrow (1959); Gordon and Hynes (1970); Rothschild (1973); and Fisher (1976b), or the short-run business cycle (Lucas (1976)). For that matter, it also emerges in the attempt to explain any other phenomena that manifest the presence of some social "distortion" or "rigidity" which limits the possibilities for individuals to exploit all available gains from trade, such as behaviour under wage and price inflexibilities, under market and incentive insufficiencies, under monopoly, and under sub-optimal "contracts" and regulatory constraints. Since all of these concerns have been a principal focus of both "doctrinal" and "policy" debates in economics, it is revealed, moreover, why the theoretical problem under examination has taken up strategic importance in any critical discussion of the foundations of Keynesianism and Monetarism (Clower (1965); Leijonhufvud (1968); Friedman (1970); Weintraub (1979); and Hahn (1980)), and in any consideration of the specific question of how government policy (and, in particular, monetary policy) can ever sustainably affect real output (Sargent and Wallace (1975); Fischer (1977);

Modigliani (1977); Phelps and Taylor (1977); Barro (1979); Taylor (1980); Weiss (1980); and Howitt (1981)).

From a methodological standpoint, it is evident that what unites all of the above research concerns is that they all require some basic decision as to how to interpret or rationalize seeming instances of classical disequilibria. More specifically, they all require either: (a) some admission that observed departures from classical equilibrium are in fact bona fide departures, which then necessitates the provision of a general and non-arbitrary explanation of the behaviour which transpires in a setting of "true" classical disequilibrium; or (b) some non-arbitrary rationalization for why all observed purported departures from situations of classical equilibrium can be only apparent departures, which is then sufficient to ensure that all such phenomena can be covered by some type of classical equilibrium explanation and which exempts the theorist from having to admit the existence of "true" disequilibria at all.

It is straightforward to identify the fulfillment of requirement (b) as being an ultimate desiderata of defenders of classical general equilibrium explanation—henceforth, denoted "the classical programme"—and the fulfillment of requirement (a) as constituting an ultimate objective of almost all critics of this programme, whether they be Keynesians, Neo-Keynesians, Post-Keynesians, Institutionalists, or Marxists—henceforth, denoted as "the non-classical programme." It is also straightforward to note that it is precisely the traditional failure of either programme to meet its relevant requirement successfully which has made past discussions of classical disequilibrium phenomena seem so opaque and, perhaps, even enigmatic in character.

1. The Failure of the Traditional "Classical" and "Non-Classical" Explanatory Programmes

Given the above perspective, I take it as axiomatic that the failure of traditional versions of the non-classical programme resided simply in their inability to provide any explanation of behaviour in classical disequilibrium which was other than arbitrary or ad hoc. Thus, Samuelson's (1947) "disequilibrium price dynamics" was little more than one possible "description" of the path of price behaviour which might transpire prior to the achievement of a competitive equilibrium; it simply did not offer a viable "explanation" for why any particular price dynamic path—out of an infinity possible—must come to prevail (see Arrow (1959); Gordon and Hynes (1970); and Barro (1972)). By the same token, neither Keynesians nor "second-best" theorists (following Lipsey and Lancaster (1957)) were really providing clear and convincing reasons for why agents would rationally endorse those types of institutional constraints (e.g., fixed, disequilibrium prices or wages) which were characteristically posited to rationalize observed non-classical outcomes, such as those associated with persistent, "involuntary" unemployment. Even if it were granted that a rationale for the sustainability of "false" prices or wages could be found, however, a further defect of these programmes was that they normally left quite unilluminated the question of which particular set of "false" prices or wages—out of an infinity possible—must come to prevail at a given point in time, so that they lacked the explanatory equipment to pin down non-arbitrarily even the level of involuntary unemployment.

Traditional proponents of the non-classical programme therefore largely committed themselves to the difficult position that observed departures from a situation of classical equilibrium were in fact "real" departures, without doing much else beyond arbitrarily assuming the "distorting" conditions necessary for the existence of classical disequilibria, and/or simply

describing—but not explaining—what might (but need not) transpire under such conditions. This was obviously not good enough to convince any ardent defender of classical general equilibrium theory.

On the other hand, I take it as axiomatic that the failure of traditional versions of the classical programme resided in no more than their inability to come up with the required, non-arbitrary proof of the impossibility of observing "true" classical disequilibria at any, and all points in time.

Thus, most of the important historical expositions of the "classical" position (and this includes Friedman (1970)) tended to stress the "long-run" character of classical results, which of course was tantamount to the admission that classical equilibrium explanation could be guaranteed to hold only in the "long run".

While such a view was normally put forth as part of a "progressive" methodological programme to ensure that the theorems of economic analysis met the appropriate canons of theoretical stringency (see Friedman (1953)) and, indeed, served as an important antidote to theoretical programmes which were (naively) prepared to take all sorts of "short-run" phenomena as permanent, rather than transitory, there can be little doubt that the position was an easy target for non-classical critics. In particular, since the traditional classical perspective did not rule out the possibility that "real" classical disequilibria could exist in the short-run, and since it had already committed itself to the view that it could be only a matter of accident (rather than a guarantee) that classical explanation could successfully cover short-run cases, it was straightforward for non-classical critics to conclude that the classical programme must be explanatorily incomplete and that any endorsement of this programme must constitute a commitment to methodological defeatism. This situation then left the door wide open for proponents of various non-classical programmes to rationalize all sorts of

arbitrary, short-run theorizing--on the grounds that something was better than nothing--and to perpetuate the view that any theorist who prides himself in theoretical "relevance" must attempt to illuminate short-run disequilibrium adjustment questions, no matter how poorly this might be done. Examples of these non-classical programmes have been discussed above.

Evidently, traditional proponents of the classical programme had made a strategic error in not explicitly demonstrating that classical theory could cover both short-run and long-run phenomena equally well, thereby ruling out the possibility of "true" classical disequilibria altogether. In saying this, I do not intend to suggest that defenders of the classical programme ever ultimately believed that their opponents could illuminate short-run behaviour non-arbitrarily (any more than they could)--so that the characteristic defence of a view which stated that the only non-arbitrary behavioural theory available was a "long-run" one was really a position of integrity.

What seems to be the case, however, is that, ultimate beliefs aside, traditional proponents of the classical programme were victimized by what might be termed an unanticipated "short-run panic"--one which had a significant doctrinal cost. Thus, when Cagan (1956) and Friedman (1957) actually tried to compete with various non-classical programmes by showing that they too could offer arbitrary descriptions of short-run disequilibrium adjustment processes--in particular, under a regime of "adaptive expectations," where adaptation was not fully complete (see also Friedman (1970))--they unwittingly provided their critics with the admission that short-run, disequilibrium adjustment questions were truly important ones, and that the classical programme could not in any way illuminate them successfully. When other defenders of the classical programme finally tried to repair this damage by simply invoking the proposition that "economies were in classical equilibrium all the time"--albeit rationalized on more substantive grounds than the early assumptions of "no

trading as false prices" and "costless and instantaneous adjustment" were-- the strategy still appeared far too crude and ad hoc, because this was the very proposition that defenders of Classicism needed to demonstrate non-arbitrarily (and not just assume) in the first place.

The net outcome of these sub-optimal strategies evidently was that all the strengths of the classical programme were eroded. Any defender of a non-classical viewpoint was now able to state, with a clear conscience, that his brand of theoretical arbitrariness in short-run explanation was no worse than that offered by classical theorists (e.g., under adaptive expectations) and that his ad hoc assumption--say, "that economies are hardly ever in classical equilibrium" was indeed no more ad hoc than any "classical" assumption to the opposite effect. I now examine how this controversy has changed in recent days.

## 2. The Avant-Garde "Classical" and "Non-Classical" Explanatory Programmes

In assessing the contemporary situation, it is appropriate to start from the recognition that the basic critical perspective put forth by proponents of non-classical programmes--that "true" classical disequilibria exist, and that the classical programme is logically incapable of illuminating such phenomena--has changed relatively little over time. Unfortunately, it is also probably fair to say that the traditionally-cited problems of explanatory arbitrariness in non-classical treatments have remained relatively invariant as well, although, if judged, say, by the most recent research in the Theory of Non-Walrasian ("quantity-constrained") Equilibrium (Drazen (1980); Hahn (1978); Muellbauer and Portes (1978); Fisher (1976a); Benassy (1975); Drèze (1975)). Leijonhufvud (1968); and Clower (1965)) and in the Theory of Temporary Competitive Equilibrium (Grandmont (1977b)), then there can be little doubt that arbitrariness now appears with much more mathematical elegance than it used to.

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It is perhaps not surprising that the basic spirit of non-classical programmes has not altered much from earlier times. After all, traditional debates left the classical programme in the "weak" position, so that revitalizing adjustments would seem to have to come from that quarter. This is in fact the case, although there can be equally few novelties in the type of revitalization programme avant-garde proponents of Classicism are proposing. As I have indicated above, there is really only one thing that proponents of classical programmes ultimately can do to reverse their less than distinguished historical record; namely, to demonstrate that a classical explanatory structure can fully account for all short-run phenomena without submitting to arbitrariness, and thereby to show that all purported short-run classical disequilibrium situations are apparent, not real. Historically-speaking, the only mystery here is why these demonstrations were not undertaken long ago.

Judging from the arguments of Lucas (1980), Barro (1979), and to some extent, Becker and Stigler (1977)--arguments which I will discuss in much more detail later--the essence of the avant-garde classical programme rests on two strategic moves:

- (a) to extend existing classical general equilibrium structure by positing the existence of technological constraints on individual action beyond those specified in an Arrow-Debreu world, the usual triad of these consisting of "transactions technology", an "adjustment technology", and an "information-generating cum search technology"; and
- (b) to guarantee the appropriate short-run "closure" of a classical equilibrium structure in accord with (a) by assuming at least one of the following: that all individual expectations are formed "rationally", that all markets are "efficient", or that a complete set of state-contingent contracts exists in the short-run and can be determined efficiently.

Given (a) and (b), the avant-garde defender of Classicism is then prepared to put forth the following argument to any proponent of non-classical analysis: that, any phenomena which the non-classicist cites as being an (observed) example of a "true" classical disequilibrium situation--whether this be



connected with the existence of unemployment, rigid wages, the short-run business cycle, or even externalities--can be explained as a "true" classical equilibrium situation, relative to the expanded constraint ("cost") set defined by (a), and the structural closure conditions defined by (b).

Implicit in this argument is another: that the only reason why non-classical critics have traditionally interpreted a variety of observed instances of short-run behaviour to be examples of "real" disequilibrium is because they mistakenly identified "classical" explanation with the formulation of an Arrow-Debreu world, where the additional technological constraints in (a) are not assumed to be binding. Thus, non-classical critics took seeming short-run failures for agents "to adjust" or "to transact" as a straight contradiction of classical postulates, without recognizing that agents were in fact being classically-rational in not adjusting/transacting, given the constraint of positive adjustment/transactions costs.

There are two important methodological implications that follow from this avant-garde classical argument which must not go unnoticed and, indeed, must receive careful critical attention. The first is that, if the attempt to explain all short-run phenomena as "classical" phenomena can be shown to be non-arbitrarily successful, then all attempts to construct non-classical explanatory frameworks to account for the short-run can be regarded as irrelevant. A second implication, and one which is at a more subtle level than the foregoing, is that, even if such a "classical" programme could not be seen to succeed without (some) arbitrary assumption, this programme could still be taken to offer the "preferred" explanation of short-run behaviour under the (weaker) demonstration that it manifested less arbitrariness than all competing non-classical programmes--programmes which Classicists have long regarded as being arbitrary, in principle and in all respects.

Can Classicists win the day with these arguments? The answer to this question evidently depends upon whether, and to what extent, the fulfillment of conditions (a) and (b) involves arbitrary assumptions. The strongest form of the avant-garde classical position requires the demonstration that neither (a) nor (b) involve any arbitrary assumptions at all. Any weakening of this position (i.e., allowing at least one arbitrary assumption in (a) or (b)) renders the proof of the proposition that "all short-run purported classical disequilibria are really classical equilibria" logically incomplete, but, as noted above, the stance is still arguable under the proof that "classical" arbitrariness in short-run explanation is better than all conceivable forms of "non-classical" arbitrariness. Noting for reference that, if (a) involves any arbitrary assumptions, then the avant-garde classical programme loses (at least some of) its explanatory equipment by which to systematically account for observed contradictions to the Arrow-Debreu results; and, if (b) involves any arbitrary assumptions, then the guarantee of short-run classical equilibria is lost (i.e., such equilibria can be explained only as "accidental" in the absence of the arbitrary assumption), I am now in a position to state the precise argument of this thesis.

### 3. The Argument of This Thesis

My proposal proceeds from a rather eclectic foundation. To begin, I agree with defenders of the avant-garde classical programme that (1) all extant efforts to provide a logically-complete and non-arbitrary theory of short-run, non-classical behaviour (including current efforts) have failed as a matter of principle. On the other hand, I agree with proponents of non-classical perspectives that (2) there are observable short-run situations which are not explainable by any classical equilibrium structure and it is mandatory to provide some independent explanation for such classical "disequilibrium" situations. The endorsement of (2), however, must immediately

imply the endorsement of the further proposition, (2'): that any proposed classical programme to explain all purported short-run departures from classical equilibrium as only "apparent" departures—such as avant-garde classical theorists would advocate—can never be (completely) successful as a matter of principle; its success must rest on the use of at least one arbitrary assumption. The conjunction of (1) and (2') therefore entails an initial critical viewpoint to the effect that neither existing classical nor existing non-classical programmes can avoid some type of explanatory arbitrariness.

Given the above, I now introduce the critical proposition (3): that, in any situation where both of the above positions require the use of at least one arbitrary assumption (as above), there exists no logical grounds for preferring avant-garde "classical" arbitrariness to avant-garde "non-classical" arbitrariness, or vice versa. This brings one directly to the central methodological dilemma. If (3) and (2') are accepted, and (1) is strengthened to (1'): that there exists no conceivable specification of a non-classical programme—now or in the future—which can successfully explain classical disequilibrium situations without the use of at least one arbitrary assumption, then the debate between these two camps must continue indefinitely in a setting where genuine progress in economic theory is impossible. Accordingly, progress in economic theory absolutely depends on the possibility of denying either (2')—which entails the non-arbitrary success of some short-run, classical programme—or (1')—which entails the non-arbitrary success of some short-run, non-classical programme.

The central thesis proposed is that (2') cannot be logically denied but (1') can be. In this way, it can be granted that (1) holds—that all existing efforts to provide a non-arbitrary, non-classical explanatory structure are failures (a proposition to which Classicists would agree)—without the

commitment to the view, (1'), that all conceivable specifications of non-classical structure must fail on grounds of arbitrariness.

The basic objective of this thesis is therefore to provide a general methodological analysis which can rationalize and explain all of the propositions listed above ((1), (1') and (2') being evidently the most important). In providing this, however, it will become apparent that the analysis is very consciously directed at two specific, and unfortunate, tendencies which have plagued virtually the entire debate between classical and non-classical thinkers. The first is the seeming failure of non-classical thinkers to even undertake a thoroughgoing methodological evaluation of the complete set of logical options which might be open to attack problems of non-classical explanation in principle, and the second is the seeming propensity of classical thinkers to interpret this absence of methodological self-consciousness on the part of non-classical thinkers as (somehow) a demonstration of the intrinsic failure of all non-classical theorizing. It is, I think, precisely these two tendencies which have led to the neglect of fundamental methodological characteristics of both programmes and, at the same time, allowed participants in the controversy to reach their "ultimate" stances all too quickly.

I do not cite the neglect of fundamental methodological characteristics arbitrarily. In fact, a viewpoint which never seems to be stated--but which is central to the perspective put forth here--is that non-classical explanations have proved to be inadequate thus far precisely because they have attempted to move into new explanatory terrain while keeping intact most of the methodological strategies of classical structure. Thus, it is the limitations of classical methodology which constitute the ultimate cause of the difficulties of non-classical explanation. From this perspective, it is rendered hardly more than a matter of definition that, if one initially

endorses all of the limitations of classical methodology as comprising the "ground rules" for any economic analysis, then the only acceptable, non-arbitrary, types of explanation must turn out to be classical in form, and that any attempt to successfully illuminate states which are inconsistent with this type of explanation must be forced to employ ad hoc assumptions. The problem is simply set up so that the explanatory "arbitrariness" of non-classical theory cannot avoid being the "dual" to the explanatory "incompleteness" of classical theory.

It is the problem of breaking out of the above methodological straight-jacket non-arbitrarily which constitutes the central logical problem addressed in this thesis. It is of course truistic to state that any solution to this dilemma requires that one remove at least some of the explanatory limitations of classical structure; the problem, however, is how to make such adjustments while maintaining methodological integrity. Certainly, it has been revealed historically that programmes to adjust or amend classical structure in "piecemeal" fashion have not done the job.

Some might be tempted by the idea that an exhaustive critical examination of current Walrasian and Non-Walrasian literatures must reveal how to proceed on this dilemma, so that if one was just exhaustive enough, it would be possible to provide a reasonably well-specified, non-arbitrary theory of short-run, non-classical behaviour. Unfortunately, I doubt that such a theory could be deduced simply from an analysis of current literatures. As I will amplify in more detail in Chapter Two, Section Five, this is not only because these literatures appear to be rather fragmented from a methodological standpoint, and not only because much of the theorizing in these literatures seems to already manifest the view that some ad hoc assumptions are needed in any successful model-building exercise, but also, more important, because virtually no theorist has attempted to spell out in detail the meta-theoretical

groundwork required for even the (preliminary) demonstration that a non-arbitrary and general theory of non-classical behaviour is logically possible. Thus, it is a matter of some irony that while there exists widespread critical discussion of the technical features of the many classical and non-classical models now extant, there exists virtually no formal literature which examines the methodological relationship between classical and non-classical explanatory structures as such. Accordingly, most of the avant-garde technical discussions of these models proceed in a methodological vacuum.

At the most general level, this thesis is a response to the above unsatisfactory state of affairs, and its primary output can be seen to be the provision of a meta-theoretical framework which can place into critical prospective a wide variety of avant-garde literatures with the objective of showing that the classical programme cannot logically succeed in its explanatory objective while the non-classical programme need not fail. The achievement of this output in turn may be seen to involve three distinct stages of analysis.

The first stage involves identifying the common methodological properties which lie behind all existing efforts (in many diverse areas) to explain non-classical behaviour. Insofar as the primary objective of such an undertaking is to show the limits on possible explanations of non-classical (and indirectly, classical) behaviour which can be generated, given existing theoretical apparatus--and to do this by way of a very small number of integrating propositions, or lines of theoretical argument--the analysis is in the same spirit as that of Samuelson (1947). (Samuelson was, of course, attempting to show only that classical theory could be explained in a completely integrated fashion--via the calculus of maximization.)

The second stage which may be identified in this undertaking involves the recognition that the explanatory "limits" defined in the first stage follow from a commitment to a particular "methodological structure", i.e., a finite set of explanatory options or strategies which are logically related to, and substitutes for, each other as potential solutions to the explanatory problem at hand. At this juncture, the central implication is more in the spirit of Arrow (1951): Given the "methodological structure" of contemporary economic theory, there exists no explanatory strategy which allows for a non-arbitrary and internally-consistent explanation of purportedly non-classical phenomena, whether such phenomena be construed as "true" classical disequilibria or as only "apparent" disequilibria.

Finally, a third stage which may be identified involves the question: Does there exist some adjustment in methodological structure (i.e., some adjustment in the "limits" of possible theoretical explanation) which will permit at least one conceivable explanatory option to come forth to explain "true" non-classical phenomena in a logically consistent and complete fashion?

In all of the above, I stress once again that I am not concerned with the precise, technical specification of any particular model of classical or non-classical behaviour. In the tradition of those analyses in the methodology of the social sciences offered by Popper (1945, 1957) and Agassi (1960), this thesis offers a critical analysis of methodological "options" or "strategies", options or strategies which in principle can, or cannot, lead to successful non-classical model-building.

I now turn to a consideration of more specific features of the problem at hand.

## CHAPTER TWO

A MORE SPECIFIC ORIENTATION TO THE PROBLEM: THE EXPLANATORY ROLE FOR INSTITUTIONS AND INFORMATION

Since the exposition of my argument has been carried on thus far at a relatively general and abstract level, it is appropriate at this point to provide a more concrete, and perhaps familiar, introduction to the problem-situation being addressed. With the understanding that all of the material presented here will receive a more extended and refined treatment in the chapters to follow, I begin by consolidating some basic definitions and interpretative ground-rules.

1. The Definition of "Classical" and "Non-Classical" Explanation

My usage of the term "classical"--whether employed to refer to a "programme", an "equilibrium", or a "state" or "outcome"--is, I believe, perfectly in accord with standard usage. Thus, the classical programme is defined as a programme to explain all observed economic behaviour as "classical equilibrium" behaviour, where classical equilibrium behaviour is defined as that form of (aggregate) coordinated economic behaviour which can be completely explained by reference to the given properties of individuals--usually defined by their "tastes" cum "rationality"--and certain given properties of nature--usually defined by "technology" and/or "endowments". By implication, a classical state (outcome) can be defined as any observed behavioural state which can be completely explained by reference to these posited "givens".

Correspondingly, a non-classical programme is taken to be any programme to explain observed economic behaviour by reference to a different set of posited givens than the "tastes" and "technology" specified by the classical programme. A non-classical state (outcome) in turn is defined as any observed



behavioural state which is not (completely) explainable by the given values of "tastes" and "technology". Any non-classical state is, by definition, a state of classical disequilibrium. As a general rule (though not necessarily), any non-classical programme will be a programme to explain observed classical disequilibria as non-classical equilibria; hence, to explain observed economic behaviour as a form of (aggregate) coordinated behaviour which is not derivable from the given values of "tastes" and "technology" but which is nonetheless derivable from the values of some other set of "givens".

## 2. Classical Explanation and Maximizing Gains From Trade

It is taken as axiomatic that a fundamental property of any successful classical equilibrium explanation of observed behaviour is that, given the stipulation that all individuals are "rational" and attempt to achieve maximum positions, any observed outcome can be construed as a state in which all individuals realize the maximum gains from trade (interaction), consistent with the posited given values for "tastes" and "technology". While a defender of this type of explanation will readily admit that what (the value of) the maximum gains from trade actually is at any particular moment depends upon what the values of "tastes" and "technology" relevant to that moment actually are, and, correspondingly, that differences in observed maximum gains from trade positions may be fully accounted for by reference to differences in the given values for tastes and technology, the important point is that the advocate of classical explanation never wishes to allow the existence of any observable situation in which gains from trade are not maximized as such. This is simply because "true" non-classical (or classical disequilibrium) states, by definition, cannot be illuminated by classical structure; classical theory can provide successful explanation (via "tastes" and "technology") if and only if gains from trade are presumed to be maximized.

The above observation then reveals the fundamental reason why proponents of any classical programme wish to see purported instances of classical disequilibria as "only" "apparent" departures from classical equilibrium: if such departures were in fact "real", classical theory could never cover these cases and, consequently, would be rendered explanatorily incomplete with respect to some observable phenomena. Correspondingly, the claim that classical theory is in fact explanatorily complete therefore must rest on the strategic demonstration that any and all observed behavioural situations can be explained as ones where gains from trade are in fact maximized, relative to given tastes and technology--and it is only this demonstration which can stop the long-standing objections of non-classical critics.

Given the above perspective, it becomes immediately apparent that there are two strategies which any defender of the classical programme might employ in order to demonstrate the explanatory completeness of classical structure. The first of these is to interpret his objective as simply being one of finding some specification of tastes and technology which can fit any purported instance of classical disequilibrium. Thus, when a proponent of a non-classical viewpoint cites some case of, say, "involuntary" unemployment, the classical advocate of this first strategy will claim that the unemployment cannot really be involuntary, since he can easily conceive of some specification of individual tastes--such as specifications which incorporate explicit characteristics of individuals' intertemporal preferences between leisure (work), and consumption, à la Lucas and Rapping (1968)--and/or technological constraints (perhaps including mobility costs and the existence of firm-specific human capital) which can underwrite the observed unemployment as consistent with the achievement of maximum gains for trade and, thus, "rational choice".

There are of course many other examples of this form which might be discussed, but the basic point is that prima facie the classical theorist can

always succeed in this strategy, since in principle there always exists some redefinition of (respecification of, extension of the domain of) "taste" and "technology" variables which can be "fitted" to a particular observed instance of (purported) classical disequilibrium. Unfortunately, the irrefutability of classical theory which is bought by this procedure directly reveals that the strategy is ad hoc and explanatorily degenerate, since it undermines the independence (reverses the appropriate causality) between exogenous and endogenous variables in classical explanatory structure. Under this approach, the claim that "whatever exists must be optimal"--because "whatever exists" can be construed as a consequence of some specification of tastes and technology--can therefore constitute little more than the assumption that classical equilibrium must always prevail. It is certainly not the demonstration that all observed outcomes must causally follow from given tastes and technology and, thus, cannot produce falsifiable (or testable) claims about the world.

While the confusion of the irrefutability of classical doctrine with its apparent explanatory power--the essential characteristic of the first strategy discussed here--has frequently plagued popular discussions of the merits of classical versus non-classical viewpoints, any serious discussion of these issues has invariably forced defenders of the classical programme to come up with another strategy. Evidently, this second strategy must involve the explicit demonstration of the truth of the theory that all (conceivable) factors which might potentially interfere with, or prohibit, the realization of maximum gains from trade cannot be present or operative in any observed situation being explained. If such a theory can be shown to be true by non-arbitrary means--and not just assumed to be true--then it follows that classical theory must be explanatory complete with respect to all observable phenomena, whether it be long-run or short-run in character, and there can be no further arguments.

### 3. The Explanatory Role for Institutional and Informational Variables

It is in the context of this second classical strategy, and the requirements for its success, that so much traditional and avant-garde literature has turned to a consideration of the "informational" and "institutional" characteristics in which observed economic action takes place. This is hardly surprising: "informational deficiencies" and "institutional rigidities" would seem to be the most obvious and, indeed, general classes of factors which could be cited to explain why all gains from trade were not exhausted in observed situations. After all, as Keynesians have long pointed out, it is difficult to guarantee that agents will reach the appropriate maxima if they do not know where these lie, or if mutually-advantageous trade is blocked by social distortions. Be this as it may, it is apparent that the only option for the classical proponent of the second strategy under discussion is to demonstrate non-arbitrarily that, in no conceivable instance, can either informational or institutional factors ever independently constrain the achievement of a maximum gains from trade position, as defined by the prevailing values of tastes and technology alone.

The logic of this argument is straightforward: if either informational or institutional variables were not structurally compatible with the achievement a (classical) maximum gains from trade position, and thus independently constrained the achievement of such a position, then any explanation of the observed outcome which followed from these conditions would have to make reference to the constraining informational or institutional factor as an exogenous variable in addition to tastes and technology. Hence, tastes and technology would not be sufficient to explain the observed outcome in question and any (successful) explanation of this outcome could not be "classical" in form.

It is this argument which directly explains why defenders of classical general equilibrium theory have always sought to ensure both that prices (including wages and interest rates)--the standard "social institutions" in this theory--can only be observed at their classical equilibrium values, and that agents logically possess "sufficient" knowledge to exploit all defined gains from trade associated with this type of equilibrium. Once again, under these conditions, neither informational nor institutional factors can have exogenous status in the explanation of the achievement of classical equilibrium; both factors are constrained to be structurally compatible with the determination of the maximum gains from trade position, as explained by given tastes and technology alone.

#### 4. The Long-Run, Short-Run Arguments

It is of course one thing to note that the above structural conditions must hold at a classical equilibrium position and another thing to prove that these conditions must prevail at any and all points of observation--and it is the latter which has posed the problem for classical theorists. No one will deny that the traditional assumption of the "long-run"--where both institutional variables (e.g., prices) and knowledge are presumably granted an infinity of time to adjust to consistency with given tastes and technology--constitutes a setting which is sufficient to guarantee that gains from trade will be maximized. After all, the "long-run", by definition, constitutes sufficient time for all agents both to procure "perfect knowledge" and to successfully reform (remove) all social distortions (Boland (1978)).

As stressed in the previous chapter, however, a commitment to a long-run argument here must leave the short-run cases as problematic. Thus, the required classical strategy must be to show that there exists a non-arbitrary rationale for why both the institutional and informational adjustments required for the achievement of classical equilibria must come to prevail in any and all short-

run settings as well. The methodological costs of not explicitly performing this short-run demonstration are obvious: all proponents of non-classical programmes will immediately conclude that classical explanatory structures are irretrievably incomplete with respect to the short-run and, therefore, unrealistic and not worthy of serious consideration.

It is in this context that it is appropriate to note, but not formally analyze at this time, the traditional classical propensity to deal with this dilemma simply by assuming that the informational and institutional conditions necessary for classical equilibrium to obtain in the short-run--a strategy which was formally as retrograde as the first classical strategy discussed above--and more recent avant-garde attempts to patch up the situation, through "rational expectations", "efficient markets", and the like. These specific efforts notwithstanding, the general point to acknowledge here is that what essentially divides classical and non-classical thinkers on the question of the short-run role for informational and institutional factors is that all classical thinkers are methodologically constrained to hold out for the existence of some non-arbitrary rationale for why institutions and knowledge must adjust to consistency with classical equilibrium in the short-run--if only such a rationale could be found--while non-classical thinkers (e.g., Keynesians) deny that such a non-arbitrary rationale can logically exist.

More precisely, advocates of non-classical explanatory programmes will accept the classical, long-run argument--that the required institutional/informational adjustment to classical equilibrium can be guaranteed to transpire if an infinite amount of time is granted; they simply see no way of providing a logically-viable theoretical argument to guarantee the achievement of the same types of adjustments in less than this amount of time. Accordingly, non-classical thinkers wish to turn the above argument-structure around: to argue that, just because there exists no non-arbitrary justification for the

successful achievement of "classical" adjustments in the short run, does not imply that there are no convincing (non-classical) explanations for why such adjustments do not take place in the short-run (and the particular way in which such adjustments do not take place). This is equivalent to the view that the theory stating that "short-run institutional and informational adjustments must always be sufficient for classical equilibrium to transpire" can be refuted but not verified.

The first part of this non-classical argument therefore entails the proposition that, if short-run classical equilibria do prevail, then it can be only a matter of accident (i.e., short-run classical equilibria can possess non-accidental explanatory status if and only if ad hoc assumptions are employed); the second part leads to the view that there are conceivably non-arbitrary reasons why classical outcomes do not come to prevail in the short-run, and why (explainable) non-classical outcomes do come to prevail.

Once again, this non-classical charge--that classical explanatory structure cannot illuminate short-run phenomena in a non-arbitrary fashion, and that the only interesting explanatory options for the short-run are therefore non-classical in form--coexists with its long-standing companion--the classical charge that there cannot exist any non-arbitrary, non-classical theory of the short-run either, so that the only interesting option is to find some justification for classical-type theorizing in the short-run, or abdicate responsibility for short-run explanation altogether. As I have emphasized in the above chapter, the essential characteristic of this debate is that neither position is seen to avoid explanatory arbitrariness in the eyes of the other, and neither side permits the other any options for removing their particular brand of arbitrariness. This is clearly why the debate between classical and non-classical thinkers has gone on for so long, and why a reconciliation between the two camps seems so impossible or, at

least, elusive.

The one inroad that has been established so far, however--and it should be stressed that it is an inroad--is that both camps offer views in which institutional and informational considerations, in particular, take up strategically-defined roles in the respective explanations. Thus, there is a reasonable degree of explicitness to work with in noting: (a) that the prototype classical explanation of how gains from trade are successfully maximized cannot assign an exogenous ("constraining") status to either informational or institutional variables (i.e., the only truly exogenous variables permitted are "tastes" and "technology"); and (b) that the prototype non-classical explanation of how gains from trade are not successfully maximized must (apparently) assign an exogenous status to at least one of these variables. Moreover, it is at least quite straightforward to see, on one hand, the non-classical critique (of classical explanatory programmes) as being defined by the claim that there exists no way of non-arbitrarily exercising the possibility that either institutional or informational factors can be independent constraints on interaction in the short-run, and, on the other, the classical critique (of non-classical explanatory programmes) as being defined by the claim that there exists no non-arbitrary, non-classical theory of short-run behaviour which can be generated from a setting in which either informational or institutional constraints are in fact independently binding. The next step is to establish to what extent these ideas are presented clearly in the current literature, if only to gain some perspective on the level at which the analysis must begin.

5. The Problem of Fragmentation and Logical Consistency in Avant-Garde Treatments of Institutional and Informational Variables

It goes without saying that, if present day economic theorists had access to a complete and successful theory of social institutions and a complete and



successful theory of knowledge, then the task of ensuring that all informational and institutional variables were placed into theories of general economic equilibrium in a logically consistent and complete fashion might be relatively straightforward. Unfortunately, this is not the prevailing situation. Interest in institutional and informational questions is relatively new on the scene, so that it is only to be expected that the relevant general theories of these items have not yet been produced, and that attempts to borrow wholesale the relevant ingredients from sociology and/or philosophy have not yet convinced anyone that these ingredients can fit very well with the logical structure of economic theories. Under these circumstances, it is also not surprising that research on institutional and informational questions is presently rendered highly decentralized and fragmented, and that the types of general propositions concerning the logical status of, and the logical relationship between, institutional and informational variables in alternative theories of general equilibrium (such as the type stated above) have yet to receive widespread consolidation. This last observation is stated with some regret, but it remains the obvious point that no interesting analyses of seeming short-run departures from classical behaviour--whether these in fact be "classical" (i.e., disequilibria are only "apparent") or "non-classical" (i.e., disequilibria are "real") in spirit--can be forthcoming until the basic logical relationships in these areas are straightened out.

5.1 In stating the foregoing, I am of course not suggesting there have been no attempts to raise all the theoretical questions associated with informational and institutional adjustment, and disequilibrium dynamics, in one package. Certainly, all of these topics have received at least broad mention in most discussions of, say, persistent unemployment (Solow (1980)), or the foundations of Monetarism (Friedman (1970); Hahn (1980)), or the

design of mechanisms for resource allocation (Hurwicz (1973)). What I am saying, however, is that these broad discussions are seldom sufficient to indicate how one might explicitly attack disequilibrium questions from a formal and perfectly-general point of view, and in the absence of these types of broad discussions, virtually all of the specific model-building research presently available fails to treat all of the topics under consideration systematically.

Thus, theorists who are predominantly interested in "institutional" questions--say, in the theory of property rights, transactions costs and externalities (Furubotn and Pejovich (1972, 1974)), the theory of public choice (Mueller (1976)), and the theory of the internal organization of the firm (Demsetz and Alchian (1972); Williamson (1975, 1976); Jensen and Meckling (1977))--tend to be lax on their informational cum expectational specification and to play down general equilibrium implications and "adjustment to equilibrium" questions altogether. By the same token, those theorists who are principally interested in the theory of information (Hirschliefer (1972); Spence (1976); Stiglitz (1976)), the theory of "efficient markets" and market signalling processes (Fama (1970); Spence (1973); Grossman and Stiglitz (1976, 1980)), and the theory of rational expectations (following from Muth (1961)) tend to conceal the institutional requirements and implications of their informational assumptions (although these analyses are usually quite clear on general equilibrium consequences). Similarly, those theorists who are most interested in advancing "pure" general equilibrium theory and, in particular, developing the logical cum mathematical structure of a theory of Non-Walrasian ("quantity-constrained") equilibria (see references above), and examining questions such as those connected with price adjustment without an auctioneer (Arrow (1959); Gordon

and Hynes (1970); Barro (1972); Rothschild (1973)), often employ sadly naive assumptions about the institutional setting under consideration, although the informational side of the specification normally fares better.

5.2 While it can be argued that there is some merit in using simplifying assumptions cum ceteris paribus clauses in one of the areas under discussion in order to rigorously demonstrate certain (partial) results in another, it is also apparent that such an approach can easily become methodologically precarious if the simplifying assumptions cannot be independently grounded in economic theory (i.e., they are truly ad hoc), or if they do not even stand as logically consistent with the partial analysis being undertaken (in which case they are not even satisfactory on an ad hoc basis). Unfortunately, the facts of the matter are that virtually every avant-garde analytical structure now extant is being held up by some ad hoc assumptions, and that problems of logical consistency are not absent. The apparent consequence of this state of affairs is not only that it becomes almost impossible to determine which variables are truly (as opposed to artificially) exogenous in these frameworks but also that it becomes difficult to establish the extent to which the wide variety of "non-traditional" results which have recently come forth owe more to the ad hoc assumptions being employed than to the systematic properties of a would-be general framework. More precisely, since relatively sophisticated avant-garde assumptions about some part of the structure are frequently mixed with "traditional" assumptions about the remaining facets, it is not easy to establish the one thing which is obviously central to the issues at hand; namely, whether any particular example of this research constitutes, on one hand, only a mere extension of (or a special case of) classical general equilibrium theory or, on the other, a genuine and fundamental departure from this tradition. This in turn makes it difficult to establish whether these theoretical formulations can ultimately

constitute logically consistent explanations of observed disequilibrium, or its absence.

To illustrate, it is not uncommon for some avant-garde non-classical scenarios to assume the existence of a private sector distortion (e.g., in prices, or via some monopoly/regulatory constraint/transactions costs impediment) but to still effectively cast the analysis in a setting where all agents have the sufficient ("perfect") knowledge to remove all such distortions. On the other hand, certain avant-garde classical scenarios may assume that agents have imperfect and incomplete information--thus, making classically-optimal institutional choices in general not possible--but still maintain that an institution of "markets" is always optimally provided, so that "correct" aggregate information can be successfully transferred to all individuals. If the characteristic of these particular scenarios is that they provide no guarantee that the posited institutional conditions fit with the posited informational conditions (see Newman (1976)), then still other analyses even fail to achieve theoretical consistency (or symmetry) on the institutional half of the explanation. Thus, it is also not uncharacteristic of many classical analyses to assume that certain institutions of coordination (e.g., prices) are endogenous, adjusting variables but yet to assign an exogenous role to other institutions of coordination (e.g., those associated with market structure and government policy) without making it clear why the latter institutions must be treated on a different footing than the former. Correspondingly, other non-classical analyses will posit that prices are exogenously fixed but still allow the institution of government policy to adjust instantaneously to the implied circumstances of unemployment, etc. (e.g., "traditional" Keynesian theory).

5.3 If the methodological costs of a decentralized, "piecemeal" approach to the general problems of institutions, information, and general equilibrium are that logical inconsistency and incompleteness must be tolerated, then prima facie this is not satisfactory. However, I believe that there is yet a further cost associated with such an approach—and one which is equally serious. This is that the consequent failure for avant-garde research to explicitly uncover the basic methodological features of the general problem-situation being addressed leads to a circumstance where important symmetries and links between the various (partial) literatures are not exploited.

To provide further illustration, it would be with substantial trepidation that many contemporary thinkers would link the recent "rational expectations" macroeconomics literature with either of the ongoing literatures on Non-Walrasian equilibrium (say, in its explicitly Keynesian form, as presented by Muellbauer and Portes (1978)) or, on the "micro-foundations of macroeconomics" (see Weintraub (1979)). Yet a mere glance at Hahn (1978) reveals that the problem of rationalizing the sufficiency of individual knowledge for the achievement of aggregate coordination is a central problem of both literatures, even if the former literature is somewhat more optimistic about the ease with which knowledge sufficiency can be procured than the latter (see Boland and Newman (1979); B. Friedman (1979)). It is important to understand that the reason this link might not be made is that the foundations of Non-Walrasian theories—primarily a Keynesian inspiration in the hands of Clower (1965) and Leijonhufvud (1968)—appear to be located in the failure both of markets and an auctioneering process, so that this view intuitively pairs with the denial of "efficient markets". What seldom gets mentioned in this connection is that the "institutional" assumptions implied by the efficiency of markets—in particular, as a vehicle for explaining how the "correct" set of aggregate information is signalled to all individuals—is a

theoretical substitute for the knowledge procurement mechanism assumed by rational expectations.

By the same token, it would be uncharacteristic of theorists to link the well-known arguments of Lucas (1973) with the recent work on the Non-Walrasian paradigm, or with more institutionally-minded analysis in public choice (e.g., Wagner (1976)). However, the basic problem situation which leads Lucas to see agents as responding to the history of (and anticipation of) government policy is of exactly the same methodological form as that which leads proponents of Non-Walrasian equilibria to see agents as responding to the history of (and anticipation of) quantity constraints, and public choice theorists to see bureaucratic decisions as reflecting a myriad of exogenous institutional constraints. Moreover, both of the presently-topical macro-economic problems of explaining business cycles (Lucas (1976)), and of demonstrating that money can affect real output under rational expectations and institutional distortions such as long term contracts (Fischer (1977); Phelps and Taylor (1977); Taylor (1980)), share this common methodological inspiration and are actually much closer in spirit to the Non-Walrasian literature than would be thought a priori.

As a final example, consider the literature on disequilibrium price adjustment (starting from Arrow (1959)) in juxtaposition with the theory of institutional reform proposed by Davis and North (1972), Goldberg (1974a), and others. As implied above, the apparent reason why few might be tempted to relate these two areas of inquiry is because the former deals with "price" institutions--which are familiar--while the latter deals with institutions such as laws, norms, and property rights--items which are traditionally held to be outside the scope of economic theory. It is evident, however, that both of these literatures must deal with broadly the same types of methodological questions, since all institutions must be, in degree, substitutes for one

another and, furthermore, because any general theory of institutional adjustment should hold quite independently of what the institutions are actually designated to be. Yet neither literature refers to the other and, while the institutional reform literature suggests that institutional adjustment questions can be handled within a conventional benefit/cost paradigm, the price adjustment literature in fact argues exactly the opposite: that a "dynamics of prices" can never be inferred from (be consistent with) conventional, equilibrium-based, formulations of benefit/cost analysis.

5.4 I take it as axiomatic that the variety of theoretical models which can be generated from a research setting in which logical incompleteness and inconsistency are permitted, and theoretical integration is absent, is unlimited. While such a prospect might be appealing to the non-dogmatist, the essential critical argument advanced here is that such a "piecemeal" and "unrestricted" approach to the development of current economic theory can succeed only in hiding—in a proliferation of seemingly-different analytical results—those methodological problems and groundrules which must legislate over, and be common to, all endeavours to explain alleged instances of short-run, non-classical behaviour by reference to institutional and informational variables.

Instead of stressing the seeming proliferation and diversity of analytical results which might potentially emerge, I therefore prefer to stress the simple fact that there is essentially only one critical theoretical problem under contemporary consideration. As emphasized from the outset, this is no more than the problem of providing a general and non-arbitrary account of the existence and sustainability of observed economic outcomes which appear to differ from the implications of classical (Walrasian) general equilibrium theory.

The (general) methodological problem which attaches to the posited theoretical problem concerns the identification of the best way to set up the theoretical problem, to attack it, and (potentially) to solve it, given (ultimate) constraints: (i) on the set of possible ways that the theoretical problem can be formulated; and (ii) on the set of conceivable (and relevant) explanations which can satisfy logical consistency and sufficiency, given the problem formulation.

In the context at hand, this general concern can be conveniently identified with one specific methodological problem: the problem of critically evaluating alternative strategies for placing considerations of both individual knowledge and institutional structure--and changes in these items--into theories of general economic equilibrium in a complete and mutually-consistent fashion. Accordingly, the specific methodological question under examination becomes: How is it possible to successfully place these joint informational and institutional attributes into a theory of observed aggregate behaviour in such a way that either "true" non-classical outcomes are systematically implied (the objective of the non-classical programme), or are systematically impossible (the objective of the classical programme)?

5.5 The basic thrust of the above arguments may be summarized straightforwardly as follows: almost all present-day theorizing in almost all areas of economic inquiry may be seen to manifest a concern with the fundamental and common methodological problem situation of how to place features of informational and institutional environments into logically consistent and complete theoretical structures so as to formally explain seeming departures from "classical" behaviour. It is the recognition of the importance of at least some aspects of this problem situation which distinguishes contemporary economic theorizing from its past heritage, which



largely took all informational and institutional questions for granted or, at least, was prepared to assume whatever was informationally and institutionally necessary to guarantee the achievement of classical equilibria. Nonetheless, this common methodological problem situation is seldom recognized explicitly, nor construed with adequate generality, by participants in today's theoretical debates (even though their research is in accord with it). Thus, the potential gains from theoretical unification implied by a self-conscious recognition of the commonness and generality of the problem situation being addressed are largely left unexploited--to the detriment of all the theoretical explanations under consideration.

#### 6. The Line of Attack

The above completes my introduction to the problem situation under discussion. There are a variety of possible ways in which one might proceed with the formal analysis of this problem, but it seems to me to be expositionally best to begin by analyzing the view that is most widely accepted by contemporary mainstream economists. This is the "classical critique" to the effect that all non-classical explanations of observed phenomena must fail on grounds of "behavioural arbitrariness"; the corresponding "non-classical critique" to the effect that all classical explanations must fail on the grounds of "explanatory incompleteness" will therefore be dealt with later. As will become evident, this ordering of subject matter permits the discussion to immediately proceed to the issue of why non-classical structures fail on grounds of arbitrariness--and the standard reason given is that these structures fail to explain observed (non-classical) outcomes as a logical consequence of "individual rationality" and, therefore, do not satisfy the basic postulates of Individualism.

This "classical" association of behavioural arbitrariness with the denial of individualist explanation can then be set forth as the basic initial proposition to critically examine, since, if it can be demonstrated that only

"classical" explanation can logically satisfy Individualism, then it follows by this argument that any non-classical explanation must be arbitrary. From the perspective of the success of any non-classical programme, a large premium is therefore placed upon being able to deny the above argument; hence, to demonstrate that there exists at least one non-classical explanatory form which satisfies the conditions of Individualism.

My purpose in emphasizing the basic properties of "individualist" explanations (and the conditions of their success) is that such a focus allows a fully integrated approach to the important questions of the analysis, such as: What are the essential characteristics of individualist conceptions of aggregate economic coordination (i.e., general equilibrium) as opposed to non-individualist ones? What role can social institutions logically play in individualist explanations of aggregate coordination? What is the role for institutional reform in such explanations? What role can individual knowledge (and expectations) logically play under Individualism? What is the required relation between knowledge considerations and institutional considerations in such a context?

Providing answers to these questions in a systematic fashion can then be seen to yield an exhaustive set of methodological (or meta-theoretical) options by which to consider all relevant questions concerning the explanation of classical disequilibria, or its absence and, in particular, by which to illuminate the general question: Are the conditions for successful individualist explanation broader than, or identical to, the condition for successful classical explanation.

It is this last question which then isolates the overriding question of the analysis—and one which has long stood as an enigma for economic theorists: Does there exist any way of specifying a role for social institutions and a role for individual knowledge (and, in particular, knowledge limitations) which

is logically consistent with Individualism (hence, can be accepted as behaviourally non-arbitrary) and which is also consistent with a successful non-classical explanation of the short-run? As stressed by Boland and Newman (1979) and B. Friedman (1979), it is the specification of the role of knowledge and, in particular, the specification of the role for knowledge in the short-run, which is seen to constitute the most difficult part of this interpretative problem.

## CHAPTER THREE

THE THEORY OF INDIVIDUALISM AND THE "CLASSICAL CRITIQUE" OF  
NON-CLASSICAL EXPLANATORY PROGRAMMES: AN INITIAL PERSPECTIVE

I have spent some time outlining a basic theoretical problem situation and a basic methodological problem situation confronting contemporary economic theory only as a way of providing some initial perspective from which to appraise the possible "ground rules" which might have to be satisfied in order to produce viable solutions to such problems. It goes without saying that an insufficiently general characterization of the methodological problem situation in particular not only must block an appreciation of what possible methodological solutions might look like but also must make it unclear what viable solutions to the corresponding theoretical problem might be available. Unfortunately, as I have suggested above, recent research cannot be entirely exempted from the charge that it has blocked methodological insights. Thus, the failure of this research to treat both institutional and informational considerations in a truly systematic fashion--an obvious precondition to any serious discussion of whether gains from trade can, or cannot, be regarded as maximized in explanation of observed phenomena--can hardly be seen as positive force in the development of a coherent set of methodological options for attacking disequilibrium questions.

However, this is not the only problem of the contemporary literature. A perhaps even more serious deficiency--and one which I turn to now-- is the apparent failure of avant-garde theorists to make it explicit that all the basic issues regarding classical and non-classical explanation must be examined in the context of the doctrine of Individualism and, in particular, in the context of the conditions for successful "individualist" explanation.

In this setting, the critical methodological question to examine now becomes: How is it possible to place both informational and institutional considerations into an individualist theory of observed aggregate outcomes

in a way which is complete and logically consistent? Moreover, as I will show, it is only in the context of the objective of preserving successful "individualist" explanation that the "classical critique" of non-classical explanation has any interest or force.

1. An Initial Perspective on Individualism and the "Classical Critique"

Prima facie, the demand that any explanation of observed aggregate behaviour be "individualist" in form may appear to be a relatively trivial requirement. After all, most of the avant-garde research discussed earlier--even if it be non-classical in character--appears to be roughly in accord with the spirit of Individualism; certainly, it does not remotely suggest a world in which the behaviour of individuals is determined completely by natural and/or institutional forces alone and which therefore leaves no room for individuals to attempt to shape aggregate outcomes in their own rational best interest (e.g., traditional Marxism and Institutionalism). Nonetheless, a moment's reflection must reveal that it is not accidental that, from Adam Smith to the present day, the success of "individualist" explanations of aggregate behaviour has been identified almost exclusively with the success of those explanations underwriting the existence of "classical" competitive general equilibria. By the same token, it is also not a matter of accident that ideas about the necessity of achieving aggregate coordination through "outside" controls (e.g., government policy) have frequently been seen to be contrary to the fundamental tenets of Individualism.

The reason for such viewpoints is evident: a classical general equilibrium constitutes a state in which individuals not only attempt to shape an aggregate coordinated state in their maximal best interest but also succeed in their endeavour on their own; a non-classical general equilibrium, on the other hand, must constitute a state where individuals do achieve some type of aggregate coordination but otherwise fail to achieve

that coordination which is consistent with the realization of their own maximal best interest. A fundamental question therefore becomes: Is it possible for individuals to fail at achieving their objective of maximizing gains from trade (relative to a classical general equilibrium) yet still independently represent their aims and tastes in a ("non-classical") aggregate coordinated state? An equally important related question is: Can the precise way in which individuals fail to achieve classical coordination (out of the infinity of possible ways that they might fail in this regard) be completely explained as a "rational choice" of the individuals, given their preferences and well-defined constraints?

Now, if neither of the above questions can be answered in the affirmative, then it is indeed true that only classical equilibria satisfy the canons of individualist explanation: the objective of rationalizing bona fide non-classical behaviour can only be construed as a programme to deny Individualism altogether. As I will show, this is the essence of the "classical critique".

Given the above perspective, the problem of maintaining the explanatory requirements of Individualism in a setting where classical outcomes (and the conditions necessary to guarantee these outcomes) do not obtain can be seen to be the historically-important intellectual problem that lurks behind all the economic theory following from Adam Smith. Granted, the problem has been smoothed over frequently by reference to "invisible hand" processes--but there can be little doubt that much of the important intellectual work in economics in this century has been concerned with explaining, in individualist terms, circumstances where the "invisible hand" observably fails to operate (at least quickly enough) and, therefore, with the conditions necessary to underwrite a "non-classical" (or "imperfect") Individualism. Here I refer to no more than the work of

Keynes (1936, 1937)--where institutional rigidities and limited knowledge are both strategic imperfections--and Hayek (1948)--where knowledge limitations are primary--and Arrow (1951)--where the inability to underwrite allocation through "markets" is decisive--although reference also might be made to the work of Samuelson (1947) and Arrow (1959), concerning conceivable specifications of a dynamic adjustment process which transpires prior to the realization of a classical general equilibrium.

It is important to stress, moreover, that the essential flavour of this intellectual problem has remained virtually unchanged right up to the present day. Even if it is not explicitly stated as such, this dilemma remains as the central intellectual problem of all the avant-garde research under discussion; recent research simply represents yet another attempt to resolve an age-old dilemma which has never been satisfactorily resolved.

## 2. A More Precise Characterization of the "Individualist Programme"

It will become crucial in what follows to distinguish Individualism, as a general programme to explain observed aggregate outcomes, from the specific "classical" and "non-classical" explanatory programmes outlined already. Before proceeding to a formal discussion of the "classical critique," it is therefore worthwhile to characterize the properties of individualist explanation a little more precisely, at least to the extent that one well-acknowledged idea can be fully explained. This idea is that the "classical programme" is a logically consistent (and, indeed, powerful) representation of a successful "individualist programme." The question of whether the "non-classical programme" also can be seen to be logically consistent with Individualism--the question of ultimate critical importance--will be dealt with in further and further depth after the expositional preliminaries are completed.

To initiate this discussion, it is appropriate to proceed from the perspective that the primary inspiration for any programme of Individualism has always resided in two very general proposals, both of which are concerned with the explanation of observed aggregate states as states of aggregate coordination (see Popper (1945), Hayek (1948); Agassi (1960, 1974) for general references; also Arrow (1951, 1959) and Buchanan and Tullock (1962)). The first of these consists of the stark denial of the idea that the achievement of aggregate social (economic) coordination inevitably must involve some type of supra-individual design or control, which imposes an order on the otherwise-chaotic interactions of individuals. The second, correspondingly, is the idea that aggregate "cohesion, not chaos" can be seen to follow from the "rational" interactions of self-interested individuals, without the existence of overriding forces.

Since these two ideas happen to be the ones which have dominated virtually all thinking on the logic of a "competitive" economy--from Smith, through Walras, to the most modern research in the mathematical theory of competitive general equilibrium (e.g., Arrow and Hahn (1971); Quirk and Saposnik (1968))--it is not surprising that classical, competitive economic theory has evolved as a prototype example of the power of individualist thought. More emphatically, this theory stands as probably the most significant attempt historically to show that Individualism can provide a superior account of the observed social order to any of those traditional, non-individualistic, alternatives which take this coordination to be a consequence either of the existence of supra-individual social entities (e.g., social classes, "controlling institutions"), or of physical cum material necessity, or of both. In the literature of economics, this latter tradition is perhaps best represented by the many forms of Marxism and Institutionalism--positions which,



understandably, have denied the possibility of any successful individualist account of the social order.

2. The "Individualist" Character of the Basic Propositions of Classical Competitive Theory

When a proponent of classical (Walrasian) general equilibrium theory claims that: (a) he can provide a complete explanation of any state of "competitive" economic coordination--as represented by competitive equilibrium "quantities"--and all social institutions necessary to bring about and sustain such a state--as represented by competitive equilibrium "relative prices"--only by referring to the properties of individuals--their "tastes" cum "rationality"--and certain (ultimate) limiting properties of nature--"technology" or "endowments"; and (b) he can interpret the achievement of such coordination as a "rational choice" of individuals, given the constraint of "scarcity", he illustrates most of the structural and methodological essentials of any individualistic viewpoint.

Thus, a fundamental structural feature of any "individualist" theory of aggregate economic coordination is that it attributes (at least some) explanatory autonomy to the properties of individuals and, consequently, defines a non-trivial role for these properties to play in determining the character of states of aggregate coordination. A central thrust of this viewpoint is therefore that any observed coherence in aggregate interaction could never be completely explained by reference only to the external constraints of nature and/or society at large. Accordingly, if Individualism argues that any account of aggregate economic coordination which does not give an independent explanatory role to the properties of individuals is "underdetermined", then its central task must be to demonstrate the way in which the properties of individuals can be employed to remove this underdetermination and, thus, "determine" states of

coordination.

It is not accidental that the above views are consistent with the traditional individualist predilection for explaining observed states of aggregate coordination as a consequence of individual "rational choice". Indeed, it is only under the presumption that the constraints of nature and/or society alone are not sufficient to explain observed coordination --a state of underdetermination--that there is room left in the explanation for individuals to possess any "free choice" at all. Such a circumstance must of course be logically guaranteed to exist as a precondition to the possibility of explaining aggregate coordination in terms of "free" choices which are also "rational" choices, say, in the sense that they imply coordination in everyone's mutual best interest. In short, if such underdetermination were not present, then individuals could be seen only as "puppets" of externally-imposed constraints, and it would be rendered only a matter of accident that any (explainable) state of aggregate coordination was consistent with the aims and interests of the individuals in the setting.

2.1.1 Given the emphasis on all-powerful natural and institutional forces in traditional non-individualistic theories of coordination, it is of course not surprising that the defender of Individualism attempts to buy an explanatory role for individual rational choice by denying the explanatory sufficiency of such supra-individual constraints. Nonetheless, this recognition still leaves unanswered the question of just what types of supra-individual constraint (if any) the individualist is really prepared to admit into his explanation. While it is indeed conventional for defenders of classical general equilibrium theory to emphasize that agents are rational with respect to constraints beyond those which individuals can be seen to impose on each other, given only their "tastes", it is

essential to understand that the individualist in principle is wary of permitting any natural or social constraints whatsoever to play an independent role in his explanation of aggregate coordination. Instead, he would like to be able to explain all such constraints as endogenous consequences of the achievement of aggregate coordination, rather than treating them as independent "givens".

It is at this stage in the argument that the individualist runs up against a methodological dilemma. In particular, since critics will claim that Individualism can be only a trivial theory of coordination if it does not incorporate some independent natural constraints--which define the general conditions of "scarcity" and positive opportunity cost--the individualist finds himself constrained to grant autonomous explanatory power to natural limitations, if only to carry on a dialogue with his adversaries. This is, of course, where the "technology" cum "endowments" half of classical explanation comes in. It is important to stress however that the individualist is prepared to admit natural constraints as explanatory only on the proviso: (i) that they be truly "ultimate"; hence, never be alterable as a matter of anyone's, or everyone's decision; and (ii) that they never be sufficiently constraining upon individual action so as to completely compromise the role assigned to the properties of individuals and, thus, rule out the possibility of "rational choice". As such, non-ultimate natural constraints are rendered as endogenous outcomes of the coordinated state, potentially explainable by the conjunction of the properties of individuals and the exogenous (i.e., "ultimate") natural constraints.

Will the individualist accept the same type of argument when it comes to the inclusion of ("ultimate") social constraints? The final step in the argument is the recognition that this is where he draws the line. Since

the individualist claims that, in principle, all social institutions can be endorsed, or altered, as a matter of individual choice--and none are constraining in an "ultimate" sense--he will also suggest that it is only simple methodological integrity which requires him to prohibit any aspect of "society" from being treated as an exogenous variable in his explanation of coordination. In fact, the individualist will contend that a successful explanation of any observed state of aggregate coordination simultaneously must be an explanation of the (complete) set of social constraints which just ensure the existence and sustainability of such a state, where both the coordination and the constraints are endogenously derivable from the rational choices of individuals. Thus, to those who claim that social institutions really do possess a "life of their own", the individualist will respond by stating that the autonomous constraining power of institutions is only apparent; that, since social institutions can never be more than a simple aggregate manifestation of "rational" micro-decisions, institutions can only possess a constraining power because individuals have rationally and voluntarily decided to give them this power in the interests of coordination.

This argument is, of course, not to be taken to suggest that the individualist prohibits all mention of social constraints in his explanation; he just prohibits references to autonomous (i.e., exogenous) social constraints. He is therefore prepared to tolerate mention of all sorts of non-autonomous social constraints, on the understanding that they are only a pedagogically-convenient "short hand" for the aggregation of the (already-established) rational choices of all individuals, as determined by the true exogenous variables of the explanation. For instance, a practitioner of classical general equilibrium theory very well may be able to model some parts of an aggregate coordination problem usefully by treating

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"prices" parametrically for some agents, but he would permissibly make the assumption only on the understanding that the prices in question were competitive equilibrium prices and, therefore, were not independent constraints in the problem-formulation. If pushed on this point, the practitioner could always show that the (assumed) prices were derivable from "tastes and technology" and, therefore, constituted the social institutions that everyone would rationally choose in order to realize a "best possible" coordinated state. On the other hand, if this theorist assumed parametric prices which were not so derivable, then these prices would indeed constitute autonomously-binding social constraints on individual interaction, and such a treatment would be contrary to the basic postulates of Individualism.

2.1.2 To summarize, any theory of aggregate economic coordination of an individualist form: (a) must assign some autonomous explanatory role to the properties of individuals; (b) must assign some autonomous explanatory role to natural constraints--to avoid the triviality of the setting where "scarcity" does not prevail--but can never permit this explanatory role to fully compromise that assigned to the properties of individuals; and (c) must prohibit the possibility of an autonomous explanatory role for any aspect of "society" (i.e., social constraints, social institutions). It follows that the denial of any one of these conditions constitutes a denial of individualist explanation as such.

An appreciation of the basic requirements of (successful) individualist explanation is doubtlessly important to the critical issues at hand since, as has been implied already and will be argued more explicitly below, classical general equilibrium theory constitutes perhaps the easiest and most straightforward way of meeting the requirements of Individualism--one in which the aggregate coordinated state and all

social institutions connected with this state are both completely explained by reference to the (exogenous) properties of individuals and the (exogenous) properties of nature. The question of ultimate importance is: Does there exist any form of explanation which can meet the requirements of Individualism when "tastes" and "technology" are insufficient to rationalize observed coordination. Since it follows by definition that any departure from a "classical" specification of the explanatory roles for the properties of nature, society, and individuals must involve forms of "non-classical" explanation, this question can be put alternatively as follows: Does there exist any "non-classical" form of explanation of aggregate coordination which is logically complete, and logically consistent with, the postulates of Individualism?

Now, if this question cannot be answered in the affirmative, then "individualist" explanation and "classical general equilibrium" explanation become synonymous, and the denial of one is the denial of the other. Under this view, it simply becomes impossible to provide a complete explanation of any coordinated economic behavior which transpires outside of a classical general equilibrium and to still maintain Individualism. This is both "the" logical problem of Individualism and the essence of the "classical critique," so that a very high premium therefore must be placed on demonstrating ~~that this skeptical conclusion need not hold;~~ that there are in fact "non-classical" explanatory forms which are consistent with Individualism. Furthermore, as I will show, such a demonstration constitutes the only methodologically-acceptable line of attack on the long-standing problem of explaining "classical disequilibria" in a way which is logically complete and logically consistent with individual rationality. The problem of providing a viable, non-arbitrary account of states of classical disequilibrium is indeed no more than the problem of

how to maintain the properties of "individualist" explanations in the circumstances where the properties of "classical" explanations must be relinquished.

I now turn to a more formal discussion of the "classical critique" --the view which denies the logical possibility of a non-arbitrary non-classical Individualism.

### 3. The Logic of the "Classical Critique"

Given the above preliminaries, I now define the "classical critique" formally as the view that there exists no conceivable methodological strategy that can ever succeed in producing a general theory of ("true") non-classical behaviour which is both non-arbitrary and in accord with the postulates of Individualism. As I will show more explicitly below, this view embodies the dual propositions that: (i) if non-classical explanations are developed in a manner which is consistent with Individualism, then these explanations must be arbitrary, and (ii) if non-classical explanations ever succeed in avoiding arbitrariness, then such explanations cannot be compatible with Individualism. These propositions then form the basis for the overriding critical viewpoint (already mentioned): that, given the "classical critique", the only possible specification of Individualism which can be non-arbitrary from an explanatory point of view is "classical" Individualism.

3.1 Since the above statement of the "classical critique" explicitly refers to "Individualism" --a reference which is seldom made--such a formulation may appear to be unfamiliar. Thus, the more standard expression of this critical perspective by advocates of the avant-garde classical programme (e.g. Barro (1979); Lucas (1980)) is in terms of the theorem that, either a classical equilibrium prevails, or the explanation of any action which transpires outside of such an equilibrium must be

"behaviourally arbitrary". If it is granted that what is meant by a "behaviourally arbitrary" explanation is an explanation which is not sufficient to constrain behaviour to a "determinate" outcome (or, possibly, a non-infinite set of outcomes), then a faithful translation of the above theorem would seem to be as follows: that the explanation of states other than those of classical equilibrium must be structurally "underdetermined", and that there exists in principle no additional exogenous variables which could ever systematically succeed in removing this underdetermination. Characterizing the "classical critique" in terms of this last claim--which may seem impossibly severe--then allows a direct consideration of the conditions under which this claim could ever really be defended. The (integrating) answer that I will provide in a moment is that such a claim can have force if and only if Individualism is required to hold.

3.2 To provide an illustration of the basic issues involved here, and one which makes use of analytical points developed above, suppose that some defender of non-classical theorizing put forth a proof that he could provide a fully-determinate explanation of some observed instance of ("true") non-classical behaviour by referring to one of possibly several exogenous variables other than (in addition to) "tastes" and "technology". For concreteness, presume that he cites the constraining characteristics of certain social institutions on individual interaction, where it is assumed explicitly that such social constraints are not explainable by reference to "tastes" and "technology" alone. Here a familiar identification might be with the (assumed) existence of some fixed, classical disequilibrium price or wage contracts (plus possibly a "rationing institution"). The contention of the non-classical theorist is that he can remove any potential behavioural arbitrariness (i.e. explanatory



underdetermination) in his account of observed non-classical outcomes simply by specifying the values of all his chosen exogenous variables, including, of course, the value for the independent institutional limitations which he regards as so strategic.

Would the advocate of the "classical critique" really deny that the non-classical thinker could procure a fully-determinate explanation of non-classical behaviour under the posited conditions? The answer is No. The classical theorist would simply point out to his adversary that he has achieved a (seemingly) non-arbitrary account of non-classical behaviour by allowing social limitations to possess exogenous status and that, by the canons of individualist explanation, it is not acceptable to permit this. Then, the classical theorist would go on to point out that, if the non-classical theorist was really to maintain Individualism in his explanation, then his account of observed non-classical behaviour could never be complete unless he provided a full-fledged, prior explanation for the existence of (value of) the exogenous social limitations which he has (hitherto) taken as "given".

The upshot of the classicist's argument, however, would be that the non-classical thinker would never be able to find "acceptable" exogenous variables to perform this task. In particular, since the defender of classical explanation will admit "tastes" and "technology" as the only "acceptable" (truly) exogenous variables by which the individualist can account for observed aggregate behaviour, he will contend that the only possible (successful) individualist account of observed social constraints (such as those that the non-classicist cites) is one where the social constraints are in fact not exogenous at all, but fully explainable by reference to the values of "tastes" and "technology" which determine a classical equilibrium. Accordingly, the defender of classical explanation

must conclude that the non-classical insistence of the possibility of the existence of social constraints which are incompatible with the achievement of classical equilibrium (i.e., where gains from trade really are not maximized) must be tantamount to the admission that such constraints could never be explained in individualist terms; that any success that the non-classical thinker might have in providing a complete (fully-determinate) explanation of such "distorting" social constraints could be achieved only by arbitrarily treating as exogenous still other variables (in addition to "tastes" and "technology") which are not "acceptable" givens under Individualism either.

Since the initial explanatory problem is just repeated at this second stage, it is easily seen that an infinite regress is implied here, and this is the formal basis for the "classical critique". In short, either the non-classical thinker must let the regress go on indefinitely--in the quest to show that his explanation can be successfully completed in individualist terms, thereby purging all "unacceptable" (artificial) exogenous variables--or he must stop it at some arbitrary point, thereby relinquishing Individualism precisely at that point. Neither option is satisfactory.

3.3 The structure of the above argument reveals, I think, the essential flavour of the "classical critique": first, as being ultimately an argument over the fulfilment of the explanatory standards of Individualism; and second, as an embodiment of the fundamental argument that only classical explanations can meet the explanatory standards of Individualism without being behaviourally-arbitrary (or, what is equivalent, without being "logically incomplete" or "structurally underdetermined"). This view in turn entails the dual critical propositions that any non-classical explanation of observed phenomena must either be: (a) behaviourally arbitrary, if it attempts to meet individualist explanatory standards; or (b) non-

individualist, if it ever succeeds in avoiding behavioural arbitrariness. As exposed above, these propositions are just two sides of the same coin. I should also emphasize that, if the arguments of the "classical critique" are in fact correct, then they must successfully deny the logical possibility of a non-arbitrary, non-classical Individualism.

3.4 There can be no doubt that the "classical critique" poses a severe problem for any defender of non-classical explanatory programmes. This is primarily because the critique does not allow the non-classical theorist to convince the classical thinker of the worth of his research simply by showing that he can come up with fully-determinate models of short-run, non-classical behaviour. Indeed, by the above argument, the classical theorist already accepts that a wide variety of non-classical models can be constructed, and that all of these can very well "appear" to be non-arbitrary, relative to explanatory standards which are less stringent than those of Individualism. What the classical theorist denies, a fortiori, is that any of these non-classical models can really be non-arbitrary if the standards of individualist explanation are maintained. The classical thinker's charge of "behavioural arbitrariness" in non-classical theorizing is therefore always relative to the standards of individualist explanation.

What all this implies, therefore, is that there is no option for the advocate of non-classical theorizing except to demonstrate that the "classical critique" is false--that he can produce non-classical explanations of observed phenomena which meet in all respects the standards of Individualism. If the non-classical thinker can fulfill the strategic requirement, then he can meet classical thinkers on their own terrain and classical thinkers will have no option but to accept his arguments. If he cannot do this, then it is probably fair to say that no reconciliation

between the respective defenders of classical and non-classical programmes will ever transpire.

In the following chapter, I consider a rather more sophisticated interpretation of the "classical critique", assessing this view explicitly in the light of questions of individual rationality and in the context of the logic of a "non-classical" critique of classical explanation. As I will show, an appreciation of both of these issues is absolutely required in order to penetrate the long-standing controversy between "Keynes and the Classics".

## CHAPTER FOUR

THE "CLASSICAL CRITIQUE," THE "NON-CLASSICAL CRITIQUE,"  
RATIONALITY, AND "KEYNES AND THE CLASSICS"

1. The "Classical Critique" and the Question of Rationality

My exposition of the logic of the "classical critique" in the previous chapter--through a consideration of the general requirements of individualist explanation--is clearly only one way of presenting this critical viewpoint. While I think that it is probably the best way to initially expose the methodological issues under consideration, an alternative, though not independent, route is through the consideration of the relationship between non-classical explanation and individual rationality. In this connection, it is often claimed that the problem of all non-classical explanations of observed phenomena--and the ultimate seat of their arbitrariness--is that they assume conditions or processes which are not consistent with "rational" individual decision-making. This charge evidently emerges every time a non-classical thinker wishes to assume fixed, classical disequilibrium prices in his analysis (or, at least, adjusting prices which are not at their classical equilibrium positions), or posits expectation-formation mechanisms which are not demonstrably in accord with rationality (e.g., adaptive expectations, before adaptation is complete), or suggests the possibility of a successful "neoclassical synthesis," a programme to append disequilibrium dynamic adjustment equations to the equations of a static, Walrasian equilibrium--to name but just a few of the areas of contemporary critical concern (see Friedman (1970); Barro (1979); and Lucas (1980)).

1.1 Rationality, Individualism, and Maximizing Gains from Trade

I start the discussion from the perspective that the above critical

charges are not surprising. Since explanations of observed aggregate phenomena via Individualism logically require that such phenomena be completely explainable as a consequence of the rational choices of individuals, subject to independent natural (but not social) constraints, it is only to be expected that an alleged failure of non-classical explanations to meet the requirements of Individualism (discussed above) can also be construed as a failure to non-classical explanations to offer complete explanations in accord with individual rational choice. In fact, these explanatory failures must be identical if, as classical thinkers invariably claim, rationality (over all individuals and all activities; henceforth, Global Rationality) can prevail only at the point where all individuals successfully exploit all available gains from trade, as calculated from the given values of "tastes" and "technology" alone (see, for example, Shiller (1978, p. 40) and McCallum (1979, p. 241)).

Since the above view, by definition, states that Global Rationality can prevail only in classical equilibrium, the essence of the "classical critique" can now be reformulated in terms of the following proposition: all non-classical explanations either are "arbitrary" ("underdetermined," "incomplete")--because they possess no non-arbitrary criterion which can be assigned to "maximizing" agents in order to allow them to rationally choose between, or rationally choose any of, the infinity of conceivable "second-best" positions where gains from trade are not maximized--or are non-individualist in character--since in order to underwrite the sustainability of any non-classical state, they require the imposition of "binding" constraints which (partially or completely) overrule the "determining" rôle for individual rationality, and which thereby render the explanatory role for rationality either incomplete or irrelevant.

Once again, it is important to stress that this version of the "classical critique" has force only if the proponent of non-classical explanation wishes to maintain individualist standards in his explanations. Thus, as Samuelson (1947) and others originally demonstrated, it is relatively straightforward to assume the existence of aggregate adjustment equations which pin down the path of disequilibrium "prices", or for that matter, "expectations," which prevail en route to a classical equilibrium, so long as the implied adjustment paths for these variables are taken to be predetermined and, thus, cannot be altered by individuals, in the light of their own self-interest. Here there is prima facie no problem with behavioural arbitrariness, since individuals are given no option as to whether or not to rationally accept the non-classical positions specified along the given adjustment paths. In short, there is no problem with arbitrariness in this instance because an essential postulate of Individualism--namely, that the tastes cum rationality of individuals enter into the determination (explanation) of any going state of the economy--is sacrificed.

On the other hand, if individuals were assumed to be able to choose between potential points on these adjustment paths on the basis of their own (conjectured) best interest (i.e., Individualism was maintained), then arbitrariness would immediately enter the problem again: individuals would have insufficient criteria to rationally pick any one of the infinity of available non-classical positions over others, and there could be no explanation for why any observed non-classical state was sustained, except by accident.

Some might be attracted to the idea of invoking the "state of irrationality" or a "satisficing criterion" as an explanatory variable at this point in the proceedings--but such a strategy would hardly improve the situation. It would just move the problem back to explaining why any

particular degree of irrationality or any particular satisficing criterion (out of the infinity conceivably possible) was "rationally" chosen over others, and the underdetermination of non-classical explanation under Individualism would still remain.

The above arguments illustrate just how powerful and uncompromising the "classical critique" of any form of non-classical Individualism really is. If one accepts the central methodological pivot of this critique--that Global Rationality, and Individualism in general, can prevail only at the point where gains from trade are maximized--then, no matter how sophisticated or naive is the specification of "tastes" and/or natural ("technological") constraints posited to determine the absolute size of this maximum (and which thus determine the precise character of the classical equilibrium under consideration), any bona fide observed failure to reach such a maximum can be explained only in terms which deny both Individualism and Global Rationality. Thus, by the conditions of the classical critique, the need to refer to "irrationalities" in explanations of behaviour (e.g., references to the existence of rationality which is "partial," but not "global"), or the need to deny individualist character in these explanations, constitute identical statements of the methodological problem which emerges in explaining any observed state which is not a classical equilibrium.

The reason for this result follows directly from earlier arguments: the admission that one can explain observed non-classical behaviour (in a context where free individual choice is possible) only by citing non-Globally Rational behaviour--of which there are conceivably an infinity of different types--must constitute an admission of underdetermination (or arbitrariness); in lieu of having (assumed) Global Rationality, given free choice, do the job of ruling out the infinity of irrational behaviours



(i.e., the classical solution), the only option is to remove this under-determination by exorcising the role for free choice and rationality in the explanation as such, and positing sufficient non-individualist behavioural constraints to "lock in" behaviour at a (determinate) non-classical position.

### 1.2 Some Methodological Generalizations

The above exposition hopefully reveals that the logical structure of the arguments comprising the "classical critique" are the same, no matter whether they are presented through the focus of Global Rationality (as here) or through the more general perspective of Individualism (as before). The virtue in presenting the critique through the avenue of rationality in particular is that it permits a number of important and general methodological points to stand out.

Perhaps the most basic methodological point to consolidate is one that has been already emphasized in all of the above analysis; namely, that the strength of the "classical critique" ultimately rests on the idea that Global Rationality can prevail only when gains from trade are maximized (as defined relative to given tastes and technology alone). It is this view--and this view alone--which produces the conclusion that the only "rational" (hence, non-arbitrary) equilibria are those of "classical" Individualism. An important implication therefore follows: that the only methodologically-acceptable route to a non-arbitrary, yet non-classical, Individualism is through the denial of this postulate; hence, through the demonstration of the logical possibility that Global Rationality can prevail even in states where gains from trade are not maximized for given tastes and technology. The consideration of the logical possibility that there exists a concept of "non-classical" Global Rationality (NCGR) which can hold when a "classical" concept of Global Rationality (CGR) does not

will prove to be an important reference idea, and I will come back to it later in the chapter.

A second, and equally important, methodological point to emphasize is the following: even granting that the only "acceptable" concept of Global Rationality is CGR, the extent to which any programme of classical Individualism explanation itself can be seen to be successful and complete must rest ultimately on the ability of this programme to provide a non-arbitrary guarantee that decision-making in accord with CGR can transpire at any and all points in time. Clearly, without a (demonstrated) guarantee to this effect, one cannot rule out the logical possibility of observing "true" classical disequilibria since, in any instance where the achievement of CGR cannot be guaranteed, the achievement of classical equilibrium can only be construed as "accidental".

Previously, I have discussed a comparable requirement which must be fulfilled in order to guarantee that gains from trade are maximized at any and all points in time. This was seen to require the independent demonstration that all factors which might potentially interfere with the realization of this maximum--whether these be knowledge deficiencies which prevent agents from identifying where the maximum locates, or institutional rigidities which block mutually-advantageous trades, or, for that matter, any failure for the expectations of all agents to adjust to consistency with the "true" values of tastes and technology--cannot be present in any observed behavioural instance being explained. What is now apparent, however, is that the above guarantee and the guarantee of the achievement of CGR must be one and the same. In particular, the guarantee of CGR involves nothing other than the demonstration that, in any observed instance, all individuals can successfully adjust all items which are presumed to be open to choice--such as the informational, institutional, and expectational

variables cited above--to positions which are mutually-consistent with (and, thus, which cannot independently constrain the achievement of) a state of maximum gains from trade, as defined by those items which are not open to choice--the given values of tastes and technology.

A final methodological point to consolidate follows directly from the above argument; namely, that while the classical demonstration (guarantee) of the existence of CGR must always be tied to the existence of realized states in which gains from trade are maximized, this demonstration is, in general, not to be confused with (or taken as equivalent to) the demonstration (guarantee) of the existence of an Arrow-Debreu world. As I have stressed in a different context earlier, any avant-garde defender of classical explanation will readily admit existence of many observed failures to produce the transactions or adjustments required to achieve the maxima maximorum implied by Arrow-Debreu formulations; all he contends is that such failures to reach an Arrow-Debreu outcome can be completely explained as a consequence of CGR, given tastes and technology, where the latter is seen to include, say, various technological factors which make for positive adjustment and/or transaction costs. Here a (guaranteed) CGR response of agents to (ultimate, natural) constraints or transacting or adjusting might lead them to (rationally) forego the achievement of an Arrow-Debreu world (as too expensive to achieve)--yet gains for trade are still maximized, relative to posited constraints, and "true" classical disequilibria (for all seeming failures to transact or adjust observably exist) are still logically impossible to observe.

## 2. The Problem of Global Rationality and the "Non-Classical Critique" of Classical Explanation: An Initial Perspective

Arguments which deny the possibility of the achievement of an Arrow-Debreu world but still maintain a classical equilibrium, "maximizing"

character (such as the one presented immediately above) are indeed rather subtle. However, no matter in what context, or at what level of subtlety, these classical arguments are stated, any assessment of the "success" of such arguments must always come back to questions which are rather more basic and obvious. As implied above, these basic questions concern no more than the Classicist's "success" in providing the non-arbitrary guarantee that the CGR which is seen to produce such "maximizing" outcomes is actually operative in any and all instances being explained. This basic guarantee must be provided no matter whether the classical theorist wishes to defend explanations in the Arrow-~~Debreu~~ tradition or to consider more sophisticated "classical" explanatory structures which modify the Arrow-Debreu results.

More specifically, if any (alleged) proof of the achievement of CGR is ever contradicted by the observed existence of a social constraint which fails to adjust to consistency with whatever "tastes" and "technology" are posited in the problem, of "non-rational" expectations, or of a true failure for agents to procure sufficient knowledge to identify the appropriate classical maximizing position (as defined relative to posited "tastes" and "technology"), then the possibility of maintaining a concept of Global Rationality to underwrite observed outcomes as being non-arbitrarily and non-accidentally in accord with classical Individualism is lost. As I will show, it is the preoccupation with the existence of such "failures" which typifies the "non-classical critique" of classical explanation. Moreover, it is the conjunction of this "non-classical" critique with the "classical critique" (of the possibility of successful non-classical explanation) which leads to the severe conclusion that there is simply no possibility that any type of Individualism--whether it be classical or non-classical in form--can hold on non-arbitrary grounds. It

is this setting, of course, which ultimately requires that the debate between classical and non-classical thinkers become one over relative arbitrariness.

2.1 While aspects of the above "skeptical" argument will be developed further in the section which follows, it should be emphasized right away that the basic dilemma for the classical thinker in dealing with his critics concerns how to non-arbitrarily rationalize the achievement of CGR in the short-run. For all intents and purposes, this problem for the Classicist is no more than what to do with the short-run empirical evidence which non-classical thinkers have consistently cited as being in contradiction with the realization of CGR. Such a state of affairs is doubtlessly strategic since, by the conditions of the "classical critique," the classical theorist cannot logically admit "true," short-run classical disequilibrium situations (which are "true" contradictions of CGR) without committing himself, on his own terms, to explanations that either are behaviourally arbitrary or deny Individualism. As such, his only possible methodological option is rendered as one of defending the existence of CGR at all costs. This is why the classical theorist is always willing to deal with alleged contradictions of CGR in the short-run, not by relinquishing this concept, but by respecifying his basic model so as to include additional (short-run) technological constraints, and then arguing that observed outcomes were in fact a product of a CGR response of agents to an environment which contained these extra natural constraints.

Clearly, if the classical theorist can provide an independent (and non-arbitrary) guarantee of the achievement of CGR in the short-run, then his explanatory strategy is completely free of ad hoc elements, and everything is fine. If he cannot--meaning that he is forced to assume short-run CGR, without proving it--then the position of the classical

theorist is weakened severely and his only convincing argument to the non-classical critic is that his arbitrary assumption to the effect that CGR prevails in the short-run is better than a (allegedly arbitrary) non-classical assumption to the opposite effect.

2.2 Once again, the essential consequence of a classical advocacy of the second of the above strategies is that it renders the debate between classical and non-classical thinkers as a debate over (relative) arbitrariness in explanation, so that it becomes essential to understand why such methodologically problematic situations can be so easily produced. As will be exposed in much more detail at a later stage of the exposition, all of the basic problems here derive from the simple fact that the existence of any condition of Global Rationality cannot logically be treated as a "given," rather, this condition must itself be explained as a necessary consequence of the fact that all agents have "sufficient knowledge" to be "rational." Since this proviso applies to both CGR and any concept of NCGR, the ultimate question therefore becomes: Does there exist a non-arbitrary explanation for how all agents come to possess the "sufficient knowledge" needed to guarantee the existence of any condition of Global Rationality? In a ~~long~~-run setting, the required non-arbitrary explanation can, in general, be produced. Accordingly, it is the short-run setting which creates difficulties since, as even Classicists will admit, knowledge limitations (of some type) should form part of any realistic characterization of the short-run (e.g., while agents are in the process of learning).

As will be shown, the basic difficulty in this context is that if "too much" knowledge is assigned to agents in the short-run, then the rationalization for why agents possess this knowledge (and are Globally Rational as a consequence) can only be covered by a long-run argument

(see Boland and Newman (1979); B. Friedman (1979)). On the other hand, if "too little" knowledge is assigned to agents in the short-run, then the guarantee of both CGR and NCGR would appear to be lost and the achievement of any equilibria of either a classical or non-classical Individualism form can be construed as only "accidental". In this latter case, (insufficient) knowledge is truly an independent constraint on the achievement of any and all individualist equilibria.

2.3 It is the recognition of the failure of avant-garde classical theorists in particular to deal adequately with the problem of the sufficiency of knowledge in the short-run which therefore provides some initial insight into why avant-garde classical ventures into short-run explanation have not been (and cannot be) very successful. The present--and, I think, unacceptable--classical research strategy is to assume CGR (i.e., "the postulate of rationality") in the short-run and then, in characteristic fashion, to examine a CGR (i.e., "efficient") response to an informational constraint (once again defined as a technological cum natural given, as part of an extended concept of "tastes" and "technology"). It is of course straightforward to generate an infinity of "informationally-dependent" classical equilibria out of this setting (since the value for given "technology" now depends upon the particular informational constraint which is posited)--but this approach apparently fails to illuminate the only question of fundamental importance.

This is the question of how the existence of Global Rationality can in fact be logically consistent with the existence of a binding informational constraint when, by the nature of the argument, the guarantee of Global Rationality depends upon the "sufficiency" of individual knowledge. In this classical context, the only options would appear to be that either: (i) CGR prevails (in which case individual knowledge must have

been sufficient for CGR and therefore cannot independently constrain the achievement of "rational" outcomes); or (ii) an informational constraint is binding (and both the achievement of CGR and the realization of classical equilibria are rendered accidental).

Further appreciation of arguments of this type must await further exposition, and it is now appropriate to return to more familiar terrain. In the last half of this chapter, therefore, I wish to consolidate various aspects of the "classical critique," the "non-classical critique," and the characteristics of short-run versus long-run arguments, by examining the historically-familiar context in which such issues arise--namely, in the context of the long-standing controversy between "Keynes and the Classics."

### 3. "Keynes and the Classics"; the "Classical Critique" versus the "Non-Classical Critique"

For all the different dimensions of the Keynesian viewpoint which might be probed (see Leijonhufvud (1968), Tobin (1972, 1977); Weintraub (1979) also Solow (1979, 1980); Modigliani (1977)), there can be little doubt that the "essence" of this viewpoint rests on one fundamental proposition. This is that classical explanatory structures cannot provide a general and non-arbitrary account of all observed instances of aggregate economic behaviour. As indicated above, the pivot of such a viewpoint-- and, indeed, one which must be central to any "non-classical critique" of classical explanation--is the idea that there exists no guarantee of the achievement of states in which gains from trade are maximized in the short-run (even if it is granted that this guarantee can be procured in the long-run). Accordingly, if the possibility that states of classical disequilibrium can transpire in the short-run cannot be ruled out, and if classical structure in principle has no explanatory equipment by which to illuminate such states, then the classical programme must be viewed as



logically incomplete with respect to some phenomena. This view can then be directly tied to a more specific foundational idea: that the possibility of observing "true" classical disequilibria cannot be logically exercised precisely because, in the short run, it can be only a matter of accident that all informational, expectational, and institutional variables can take up states which are compatible with the realization of CGR and, thus, classical equilibria. If informational, expectational, and institutional factors do independently constrain the achievement of classical interaction, then it follows that it is singularly impossible to account for observed behaviour by reference to tastes and technology alone.

The conjunction of the "classical critique" of non-classical explanation (discussed earlier) with this "non-classical critique" of classical explanation is what creates the long-standing debate between "Keynes and the Classics." More precisely, the controversy can be defined completely by reference to the Keynesian charge that explanations via classical Individualism must be logically incomplete for the short-run, and the classical charge that Keynesian explanations of the short-run cannot avoid behavioural arbitrariness, or the denial of individualist character.

### 3.1 Some Ground-Rules for Interpreting the Debate

Given the above perspective, any interesting interpretation of the "Keynes and the Classics" debate must begin, I think, from the recognition of two basic methodological characteristics of the setting in which this debate has gone on. The first of these has been anticipated already: that if both of the critiques put forth by the respective camps were in fact true, then there could be in principle no satisfactory individualist explanation of short-run behaviour at all. The ultimate conclusion which would have to be reached may be put as follows: while explanations in

accord with Individualism may in principle possess a non-arbitrary, long-run statics and dynamics (if these explanations are "classical" in form), there exists no way to complete these explanations for the specification of their short-run, disequilibrium statics or dynamics in a fashion which is both non-arbitrary and logically consistent with the basic postulates of Individualism. Here, the conclusion would be that the logically consistent development of any individualist programme can never produce logically complete explanations (e.g., the stability of, and dynamics to, the equilibria of classical Individualism can never be explained in a fashion which is consistent with the postulates of rational individual choice). The corollary to this proposition would be that any attempt to render explanations via Individualism logically complete must require at least one assumption which is logically inconsistent with the postulates of Individualism.

The second important point to recognize is that the debate between Keynesians and Classicists can be substantive (in the sense that a meaningful reconciliation between the two positions is logically conceivable) if and only if both sides of the debate are willing to accept the objective of producing explanations in accord with Individualism. More precisely, if Keynesians really are not interested in meeting the standards of individualist explanation in a short-run context (i.e., they will accept explanations in which individual rationality is irrelevant), then it is somewhat beside the point for Classicists to charge Keynesians with promoting a short-run explanatory arbitrariness, as defined relative to individualist standards. Under such conditions, there is really nothing important for Keynesians and Classicists to argue over.

The conjunction of the above arguments therefore leads to the overall conclusion that, for the "Keynes and the Classics" debate both to be

substantive and to possess a conceivable resolution, the individualist explanatory standards must be agreed upon by both sides and at least one of the respective "critiques" must be shown to be false. In short, either Classicists must come through with a systematic demonstration of the explanatory power of classical Individualism in the short-run--through CGR-- or Keynesians must come through with the demonstration of the possibility of producing a non-arbitrary, non-classical Individualism for short-run explanation--through NCGR. Nothing else will do.

### 3.2 The Characteristic "Opaqueness" of the Debate

In light of the above, there can be little doubt that the "opaqueness" which has long been characteristic of this debate (see, for example, the "Friedman and his Critics" symposium (1972)) stems, at least in part, from the basic failure for Keynesians to make it explicit whether individualist explanatory standards are really to be maintained, or relinquished, in the discussion. As I have remarked above, if Keynesians actually endorse the denial of Individualism as the route to the achievement of non-classical determinacy, then there is little in Keynesian doctrine which can be intellectually debated by Classicists; the doctrine simply joins the ranks of other non-individualist explanations of observed aggregate behaviour such as traditional Marxism or Institutionalism. (I will later refer to this strategy as the retreat to "holistic" determinacy.) On the other hand, if Individualism is really being defended--as I think is in fact the case--then the question is whether Keynesians are just unwittingly introducing a logical inconsistency into Individualism by thinking that short-run, non-classical states can be non-arbitrarily determined without a well-defined concept of NCGR or, alternatively, whether they are actually completing Individualism for its disequilibrium structure in an internally consistent and logically complete fashion.

However, even if Keynesians really do defend Individualism, but unwittingly have tolerated inconsistencies in the employment of this methodology (the second option above), while Classicists have otherwise failed to demonstrate that classical structure can successfully cover all short-run cases, it is still difficult to make the Keynes and the Classics debate appear to be very interesting. After all, in such circumstances, both parties still sign on (at least implicitly) to the contract which states that explanations via Individualism can either be logically incomplete or logically inconsistent; that they cannot be both logically complete and logically consistent. Here the only apparent difference between Keynesians and Classicists would be therefore that the latter are more cautious; rather than committing the grave error of introducing an internal inconsistency into individualist structure by using non-individualist assumptions to determine a short-run dynamics to classical equilibria, Classicists would prefer to leave Individualism incomplete and concentrate only on the properties of long-run classical equilibria. Correspondingly, it would be only a characteristic impulsiveness on the part of Keynesians which would lead them to prefer a logically inconsistent, but logically complete, Individualism to its incomplete, yet logically consistent counterpart.

### 3.3 A Brief Look at the Traditional Issues

It is apparent that few Keynesians of an avowedly individualist persuasion would accept the above characterization as an adequate statement of what they are doing; they would claim that their introduction of short-run institutional cum informational constraints was an explicit attempt to make Individualism more explanatory and more general, not an attempt to deny Individualism altogether. Of course, the problem here is that to simply claim that (autonomous) institutional and/or knowledge

constraints must be explanatory prior to the achievement of classical equilibrium is not the same thing as actually providing a complete explanation of short-run, non-classical behaviour, where such constraints are indeed explanatory, and where Individualism is also preserved.

Evidently, the defender of the "classical critique" vigorously denies both that this Keynesian programme can ever constitute a more general structure than its classical counterpart and, more emphatically, that it can ever be non-arbitrary and logically consistent with Individualism. Once again, the Classicist's initial concern is with no more than an apparent Keynesian willingness to treat institutional "distortions"-- social constraints which are not derivable from tastes and technology-- as independently explanatory and therefore, as not needing further explanation as an (endogenous) product of "rational choice." This is the point which the Classicist immediately uses to argue that Keynesian structures must constitute an artificial transaction (and not a generalization at all) of the explanatory scope of classical Individualism, since the latter can successfully explain all social constraints and, thus, is forced to treat none of them as "givens."

3.3.1 It is obvious that the above classical objection would be identical no matter whether the assumed institutional distortions happened to be identified with exogenously-fixed, classical disequilibrium prices and/or wages and/or interest rates (e.g., the Keynesian "liquidity trap"), or, more generally, with the existence of monopoly power, externalities, and/or "exogenous" government policy. The general methodological rule of Individualism is simple: accept only those explanations which formally explain all social institutions, and reject all others as being either non-individualist or behaviourally arbitrary, relative to Individualism. If this (individualist) rule is then buttressed by the "classical" rule

which states that the only non-arbitrary way in which to formally explain all social constraints is to derive them from (given) tastes and technology, then it follows by definition that any social distortion which might be successfully explained in these terms can be regarded as only an "apparent" distortion; it cannot conflict with "maximizing" behaviour. Here the possibility of successfully explaining, in individualist terms, the nature of a world in which any "true" social distortions are sustained simply vanishes--and this is no more than a direct implication of the "classical critique."

The fact that Classicists themselves sometimes analytically "assume" (without further explanation) the social impediments needed to underwrite the existence of monopoly power (or the existence of externalities), or "assume" a non-trivial role for government institutions (such as monetary policy) in autonomously influencing aggregate behaviour--while nonetheless scolding all others assuming (exogenously) fixed prices--only illustrates the old idea that inventors of rules seldom follow them, although it would probably constitute a serious distortion of the "true" classical programme if defenders of this tradition adhered to this practice very frequently. Needless to say, any such inconsistencies in treatments of institutional variables by Classicists also make for bad strategy, since they allow Keynesians to defend their own assumption of exogenously-fixed institutions on a tu quoque basis.

3.3.2 In any event, the above analysis is sufficient to explain why the Classicist response to typical Keynesian efforts to give institutional distortions an autonomous explanatory role is so characteristically negative and why, for example, Friedman (1979, p. 222) can state that "the rigid price assumption . . . is entirely a deus ex machina, with no underpinning in economic theory." (The fact that Friedman himself appears to

assign independent explanatory power to non-price institutional constraints (p. 203, 207) only illustrates a familiar irony.) Indeed, the classicist's commitment to the view that all observed classical disequilibria are only "apparent" disequilibria must, by logic, entail a commitment to the view that all observed institutional distortions are also only "apparent."

More precisely, Classicists will maintain that there are conceivably only four ways that a Keynesian can handle (seeming) institutional distortions, three of which are unsatisfactory, and the last, logically impossible. Thus, to consider the first option, if the Keynesian regards (prevailing) institutional distortions as simply being laid down "from outside," where individuals have no option as to whether to rationally endorse or reform the posited distortions in their conjectured own best interest, then, just as in Samuelson's (1947) price dynamics, Individualism is sacrificed--and this is unacceptable. Alternatively, if the Keynesian admits that any one of an infinite number of, say "distorting" prices (wages) could prevail at any short-run point in time--depending upon the nature of individual tastes and technology, and the knowledge limitations of individuals (as manifested in their expectations)--then Individualism is maintained but, in general, there is no unique determination of the price and wage distortions which will prevail in aggregate. This is the case of arbitrariness, and is also unsatisfactory. Thirdly, if the Keynesian actually demonstrates that the aggregate institutional distortions can be completely explained by reference to the microfoundations of "tastes" and "technology," then the Classicist will respond by pointing out that, in such circumstances, the observed distortions can be only "apparent," and not "real," and, thus, cannot be assigned autonomous explanatory power. This third case is of course the degenerate one by Keynesian standards, since it simply states the classical position.

What, then, is the fourth Keynesian option available? It is none other than explaining the existence and sustainability of ("true") aggregate institutional distortions as a fully agreed-upon "rational choice" of individuals, but where this "rational choice": (i) is not completely explainable by reference to tastes and technology (hence cannot be construed as a classical "maximizing" outcome); and, at the same time, (ii) does not make reference to any independently-binding (i.e., exogenous) social constraints. Clearly, it is only this type of formulation which will ever satisfy classical thinkers, since, in principle, it is neither non-individualist, arbitrary, or degenerate. In fact, such a formulation must exemplify the only successful route to achieving a non-arbitrary, non-classical Individualism. As I have stated earlier and as I will discuss again below, the essence of the "classical critique" is that this fourth option is not logically possible.

3.3.3 To what extent do Keynesians appreciate the four options confronting them and the classical appraisal of the potential success of these options? Once again, this is the difficult question, since it raises the issue of whether or not Keynesians wish to defend individualist explanatory standards--a matter which is seldom made explicit in their writings. Allow me to illustrate.

Solow's (1980) Presidential Address obviously reveals an understanding of the basic dichotomy between classical and non-classical explanation. It is also evident that Solow's basic predisposition is to defend non-classical explanations of observed unemployment--where "market failure" overrides "market efficiency" and where "what looks like involuntary unemployment is involuntary unemployment" (p. 3). So much is clear; the mystery begins when Solow provides his own conjecture concerning why involuntary unemployment transpires. He states (p. 3):



I suspect that the labour market is a little different from other markets, in the sense that the objectives of the participants are not always the ones we normally impute to economic agents, and some of the constraints by which they feel themselves bound are not always the conventional constraints. In other words, I think that among the reasons why market-clearing wage rates do not establish themselves easily and adjust quickly to changing conditions are some that could be described as social conventions, or principles of appropriate behaviour, whose source is not entirely individualistic.

Even if it were possible to accept without question that Solow's argument is saying that observed unemployment cannot be successfully explained by reference to tastes and technology alone (i.e., by reference to classical Individualism), the ambiguity here nonetheless arises over exactly what is meant by social conventions being "not entirely individualistic." Are the social constraints cited ones which are seen to possess a "life of their own," which are therefore not explainable as a consequence of "rational choice"--since they override individual rationality altogether--and which, consequently, must be treated as truly exogenous determinants of transpired unemployment? Alternatively, are these constraints really seen to be an endogenous consequence of individual rational choice, except where the rational choice implied is not "classical," but "non-classical," in character?

It obviously matters which of these two characterizations is implied, since the characterizations are contradictory to each other. If the former viewpoint is implied--that the social constraints in question are not a product of rational choice--then the first of the above Keynesian options applies, and Individualism is denied outright. Here, "not entirely individualistic" ultimately must mean "not individualist at all." On the other hand, if the latter interpretation is employed--that the social

constraints are a consequence of a non-classical rational choice--then option four is relevant, and a non-classical Individualism is implied.

My basic point is that it is almost impossible to tell from Solow's exposition whether Individualism is being denied outright or, alternatively, whether a non-classical Individualism is being proposed--and, unfortunately, this ambiguity extends to virtually all Keynesian analyses which give a strategic role to "true" institutional distortions. The ambiguity cannot be treated lightly. If the denial of Individualism really constitutes the ultimate Keynesian strategy, then the "classical critique" is beside the point; if the provision of a non-arbitrary, non-classical Individualism is really the ultimate Keynesian objective, then the "classical critique" is of crucial importance, and Keynesians must find some way around it.

3.4 The Contemporary Debates: Barro on "Contracts" and Lucas on "Business Cycles"

Any appreciation of the dimensions of the "classical critique" examined above and in the previous chapter must consistently emphasize the point that Keynesians are only ever going to convince Classicists of the worth of non-classical explanation if they can show that an explanatory framework in accord with option four is logically possible; Classicists will never regard option one as worthy of serious consideration. The ambiguities in the Keynesian position discussed above are therefore rendered important only insofar as they point up a Keynesian ambivalence over how to put forth an "acceptable" debating position to proponents of classical theory. Moreover, and ambiguities aside, it follows that the only way that Keynesians are ever going to convince Classicists that option four is a real alternative is if they can show that a concept of Global Rationality can hold in situations where gains from trade are not maximized (relative to given "tastes" and "technology"). Thus, it is only a

non-arbitrary demonstration of the logical possibility of NCR which can ever circumvent the "classical critique."

In this light, it is perhaps not surprising that all the contemporary "Keynes and the Classics" exchanges have invariably been concerned with the question of how the existence of ("true" and sustainable) institutional distortions can be explained as a consequence of Global Rationality. Furthermore, since Keynesians have not yet shown how this can be possible, the door is apparently still left wide open for Classicists to stress their characteristic conclusion--that a non-arbitrary separation of Global Rationality from the conditions of classical maximization is not logically possible.

Thus, Barro's (1979) critique of the once-hopeful literature on "implicit contracts" (see D.F. Gordon (1973); M.N. Bailey (1974); Azariadis (1975); also Okun (1975); Newman (1976); and R.J. Gordon (1976)) --as a programme to show that observed wage and price rigidities over time need not be treated as "givens"; that they can in principle be explained as an endogenous outcome of agents' rational choices over intertemporally-specified contracts--is fully characteristic of this avant-garde classical viewpoint. So, for that matter, is Lucas' (1980) appraisal of modern business cycle theory, which includes an explicit critique of the traditional non-classical programme to interpret business cycles as a classical disequilibrium phenomena; as phenomena which is typical of economies "adjusting to" classical equilibrium rather than being a manifestation of classical equilibrium itself. Once again, the essential feature of both of these viewpoints is that they are grounded on a proposition which is hardly more than a matter of definition: that if the achievement of Global Rationality can never be logically divorced from the conditions under which gains from trade are maximized, then the theorist must always

be faced with a cut-and-dried choice between: (a) the endorsement of classical equilibrium explanation--which is non-arbitrary, relative to Individualism, by virtue of the fact CGR is ensured; and (b) the endorsement of (any and all) non-classical explanatory forms--which must be behaviourally-arbitrary, ~~relative~~ to Individualism, because CGR cannot be ensured and NCGR does not exist.

3.4.1 Allow me to illustrate these ideas in more concrete, and familiar, terms. Thus, consider (à la Barro) the explanatory attempt to render some "assumed" Keynesian rigidity (say, in wages) as an endogenous consequence of agents' rational choices with respect to long-term contract specification. The basic recognition here is that, if the institutional rigidity in question can be successfully explained as a consequence of a (classically) "optimal" contract choice, then, by the logical tie of CGR and the realization maximum gains from trade, the (determined) rigidity can hardly emerge as a bona fide distortion of classical results; rather, it must follow from the achievement of classical results. Accordingly, what used to be a "true" Keynesian rigidity--which, when not explained as a consequence of (classical) Global Rationality, actually implied "true" employment distortions--is now immediately transformed into only an "apparent" rigidity --which is not capable of producing distorting levels of employment at all. This "classical" result of course follows from the fact that it is the (assumed) perfect flexibility of the shadow price associated with contract endorsement which now does all of the work in this structure and not the institutional rigidity at all; the institutional rigidity is simply constrained to be compatible with the classical equilibrium values of all prices (including the shadow price in question), as derived from tastes and technological structure alone.

It may be remarked parenthetically that it is of course true that

one would not expect to see contracts at all in a classical setting if transactions cum information costs were zero (e.g., in an Arrow-Debreu world). Accordingly, the thrust of this classical interpretation of institutional rigidities once again, must hinge on specifying (exogenous) "technology" in the problem in such a way as to imply positive transactions and/or information costs; the existence of contracts therefore constitutes a CGR response to the existence of such technological constraints. Gains from trade are of course higher in an Arrow-Debreu world than in a world where contract choice is rational, but gains from trade are maximized (relative to different technological constraints) in both cases.

What other interpretations of observed institutional rigidities are available, besides this classical view, where all "explainable" rigidities cum distortions can be only apparent? According to the proponent of the "classical critique," there are no interpretative options left, except those which entail behavioural arbitrariness, relative to Individualism.

To see this, consider, for instance, a setting in which the conditions for classically-optimal contract choice are ~~not~~ satisfied, say, because individuals simply do not have sufficient knowledge of the costs and benefits of the alternative contractual arrangements open to them (and, thus, misperceive the classical equilibrium shadow-price of contract endorsement), or, more simply, because the domain of feasible contracts (relative to activities) is "incomplete." This non-classical setting could easily produce "true" institutional rigidities, and thus rationalize "true" distortions in the level of employment--but the proponent of the "classical critique" cannot see anything beyond behavioural arbitrariness here. Again, the reason is clear-cut: a commitment to the (non-arbitrary) explanatory power of only CGR (and, thus, the denial of the explanatory power of NCGR

as such) in any account of "sub-optimal" contract endorsement could lead only to the conclusion that no distorting contract would ever be endorsed by the class of "sensible" people--as Barro (p. 56) puts it--who exploit all available gains from trade. Accordingly, if sub-optimal contract choice was actually observed, then it would be impossible to explain--without non-individualistic criteria--why agents endorsed the particular sub-optimal contract that they did, out of the infinity available.

The above arguments directly reveal the methodological reasons why it has proved to be so difficult to provide an "acceptable" explanation of "true" (involuntary) unemployment by reference to the existence of long-term contracts or similar types of rigidity. If the existence of contracts can be explained "classically"--as a consequence of CGR--then it simply cannot illuminate "true" employment distortions. On the other hand, if contract determination is treated as an institutional "given" (i.e., as a truly autonomous constraint on individual interaction), then "true" employment distortions are straightforward to underwrite but, given the conditions of the "classical critique," this can be done only at the cost of forfeiting Global Rationality (and Individualism) altogether, thereby legitimizing behavioural arbitrariness. Clearly, it is the existence of logical dilemmas of this type which explain why the possibility of producing explanations in accord with NCGR (and, in general, non-classical Individualism) are so important to the matters at hand, since it is only this form of explanatory structure which can illuminate the type of "sub-optimal" contract choices that produce "true" employment distortions without, in principle, relinquishing individualist explanatory standards.

Of course, it should be stressed that the "contracts" example discussed here represents only one specific situation in which logical problems of this exact type are raised. In fact, two of the most important and general

questions in contemporary macroeconomic theory, and ones which have invariably figured in all "Keynes and the Classics" exchanges--namely, of how an "autonomous," non-arbitrary, and individualist macrotheory can be constructed, and of how a non-arbitrary and individualist theory of "non-neutral" money can be rationalized--confront the very same logical problems.

Thus, by analogy to the "contracts" case, if all macroeconomic (monetary) phenomena can be explained as a consequence of CGR, then macro (monetary) variables cannot logically possess any autonomous explanatory cum constraining power; all macro (monetary) variables are forced to take up values which are consistent with the equations of a classical, Walrasian, equilibrium (as determined from tastes and technology alone) and cannot, by themselves, effect the position of this equilibrium. Alternatively, if any macro (monetary) variable is assigned an exogenous status (hence, is assumed to be autonomously constraining, and not further explainable as a rational choice of individuals), then, barring accident and given the "classical critique," an individualist theory of macroeconomic (monetary) behaviour is logically impossible. Once again, it is only a non-classical Individualism which can potentially reconcile the "autonomy" of macro (monetary) variables with the dictates of individualist explanation.

3.4.2 Perhaps the most up-to-date consideration of the methodological problems under consideration is found in Lucas' (1980) paper on business cycle theory (see also Lucas (1976)). While the strength of Lucas' arguments are often compromised by his seeming commitment to "instrumentalism"--a philosophy of science which hardly sits well with an interest in questions of "explanation"--there can be no doubt that the essence of his critical viewpoint lies in one basic proposition: that historical attempts to unify the explanation of short-run, disequilibrium dynamic, behaviour

with that of a classical, long-run--to effect a "neoclassical synthesis"-- have failed, and must fail for intrinsic logical reasons. On this basis, Lucas ultimately proposes that it is better to interpret all the (seemingly) disequilibrium dynamic phenomena associated with short-run cyclical movements in employment and output as classical equilibrium dynamic phenomena, rather than to ever admit "true" disequilibria per se.

Obviously this viewpoint has a number of far-reaching implications associated with it, the most important of which is that it trivializes the entire historical tradition--from Smith and Marshall--of having to demonstrate the "stability" of competitive equilibrium, by specifying an invisible hand mechanism. What need is there for an invisible hand which guarantees the stability of the competitive process if economies can never be out of competitive equilibrium? Alternatively, what explanatory role can the invisible hand really play, if, by the "classical critique," it can be specified only arbitrarily? Another noteworthy (and perhaps controversial) implication is that a "true" classical equilibrium Phillips Curve need not be vertical.

What, however, is the essential methodological reason for why Lucas promotes this extreme viewpoint? It is recognized that, just as with Friedman (1970), Lucas' argument starts from one basic (and, indeed, correct) recognition: that to explain any movement from states which are not classical equilibria to states which are classical equilibria, one requires exogenous variables (e.g., specification of adjustment parameters) in addition to "tastes" and "technology" (see p. 702). Now, Lucas admits that the "neoclassical synthesis" (e.g., Samuelson (1947)) did suggest a programme to append additional free parameters to a classical general equilibrium structure. However, he contends again (rightly, I think) that, while this strategy appeared to allow virtually any specification of



disequilibrium adjustment parameters--"an attractive feature to the non-dogmatist"--it was usually employed only as an invitation to theoretical arbitrariness (see p. 709).

The central question which Lucas poses is therefore: Is there any way in which the relevant parameters of economies "in adjustment" can be (endogenously) determined in a non-arbitrary fashion? Evidently, the way the problem is set up, there can be only two methodological options to consider, either: (i) such adjustment parameters can actually be determined from (an extended concept of) "tastes" and "technology" (assuming CGR) in which case they can be non-arbitrarily explained as classical equilibrium adjustment parameters; or (ii) these parameters can be fully explained by reference only to tastes and technology, plus some other set of truly exogenous variables, in which case they qualify to be endogenous, yet bona fide non-classical, coefficients of adjustment.

In this light, it is apparent that Lucas ends up defending option (i) only because, by the "classical critique," option (ii) is supposed to be logically impossible. More precisely, since Lucas will not accept the invocation of arbitrarily-specified (i.e., free) adjustment parameters, and since he accepts the view that it is logically impossible to make these parameters endogenously-determined and individualistic unless the achievement of Global Rationality cum maximum gains from trade are ensured, he cannot avoid setting up the argument so that he has to choose between arbitrary specifications of any and all non-classical adjustment scenarios and the achievement of classical equilibria per se; there is simply no option in between. Thus, the only twist that Lucas can offer is to define a classical equilibrium dynamically, instead of statically; there is still no room for non-arbitrary explanations of short-run cyclical phenomena by way of a non-classical Individualism.

To close this chapter, I now interpret the content of these avant-garde

classical arguments in terms of the overall logic of the "Keynes and the Classics" debate and provide an integrated summary of the fundamental options open to both sides.

### 3.5 "Keynes and the Classics": A Summary of the Methodological Options

In the preceding sections, I have attempted to illuminate a variety of dimensions of both traditional and modern versions of the "Keynes and the Classics" controversy, particularly concentrating on the logic of the "classical critique," the logic of the "non-classical critique," and questions of the explanatory role for Global Rationality. Although my emphasis in the sections immediately above has been on contemporary expressions of the "classical critique," it is not to be thought that these classical arguments intrinsically have any more weight than those of any neo-classical (e.g., Keynesian) critique of classical explanation. As is perhaps apparent, what makes the problems of both sides (symmetrically) difficult is the simple fact that the required classical task of providing a non-arbitrary guarantee for the existence of the condition of CGR, which entails the maximization of gains from trade (and which therefore undoes the "non-classical critique"), is logically just as difficult as the required non-classical (Keynesian) task of providing a non-arbitrary guarantee for the existence of the condition of NCGR, which is consistent with the failure of individuals to maximize gains from trade (and which therefore undoes the "classical critique").

For all the many statements of what the "Keynes and the Classics" debate essentially consists of, I believe that there is little more in this debate than that which is contained in the above idea. Granted, it goes without saying that all the substantive issues connected with this controversy rotate around whether there exists a non-arbitrary justification

for either CGR or NCGR in the short-run; there are no important points of debate concerning the long-run. Thus, in general, Keynesians will grant that CGR can be non-arbitrarily justified in the long-run and that a long-run concept of NCGR is rather beside the point. The essence of the Keynesian critique of classical programmes consists of nothing other than the claim that there exists no non-arbitrary guarantee for the realization of CGR in the short-run (hence, classical structure must be explanatorily incomplete for the short-run), while the essence of the classical critique of Keynesian theory is that there exists no non-arbitrary concept of NCGR which fits the short-run (hence, Keynesian theory must be behaviourally arbitrary in this temporal dimension).

The logic of the situation here is therefore quite straightforward: for the "Keynes and the Classics" debate to reach a meaningful resolution, at least one side must come up with a non-arbitrary rationale for why their particular concept of Global Rationality must apply to short-run situations. If neither can, then the debate irretrievably degenerates to one over relative arbitrariness in short-run explanation and there can be no interesting choice between (the relative defects of) the two positions. The reason for this is evident: to guarantee even a non-arbitrary (i.e., "rational") short-run choice between an arbitrary Keynesianism and an arbitrary Classicism in fact necessitates that at least one of the respective concepts of Global Rationality under discussion can be non-arbitrarily employed. But this is exactly what is denied by the conditions of the argument: if both CGR and NCGR can receive justification on only arbitrary grounds, then what is to guarantee that the choice between two frameworks on the basis of one or the other of these criteria is other than arbitrary? Here even the attempt to effect a choice between the two viewpoints must lead either to an infinite regress, or the denial of rationality.

as such, or to the employment of a long-run argument to justify a short-run doctrinal decision.

In pointing up the difficulties which symmetrically plague any Keynesian or Classical attempt to penetrate the short-run, one further point which I have implied above and which I do not wish to underplay is the fact that Classicists have frequently presented their position with much more clarity than have Keynesians, and have in general been much more methodologically self-conscious about their theoretical proposals. As I have stressed consistently, a basic problem with virtually all Keynesian expositions is their failure to make clear the need to preserve Individualism (Global Rationality) at all in short-run explanation and, in particular, to see that it is only through the construction of a non-arbitrary, non-classical Individualism that they possess a debating position which can be taken seriously. For Keynesians to justify the incorporation of "given" institutional distortions within a non-classical explanatory structure only on the grounds that such distortions "observably exist in the real world" hardly illuminates why these distortions "rationally" exist, and serve to improve the intellectual quality of this debate as little as the attempt to move to the consideration of "partial" or "bounded" rationality concepts, a strategy which can do no more than raise the question of the existence of a Global Rationality criteria by which to pick between alternative partial rationality formulations.

The upshot of the case is therefore that the only interesting Keynesian strategy from a debating standpoint is to maintain Global Rationality (as NCGR), to forego the strategy of treating observed, short-run distortions as "given," and to show that "true" institutional distortions can follow as a logical consequence of NCGR, where NCGR can be non-arbitrarily justified to hold in a temporal dimension which is shorter

than the long-run. On the other hand, the required debating strategy for classical thinkers can only involve the provision of the guarantee that all observed short-run institutional distortions are, in reality, only apparent and can be explained as a logical consequence of CGR, where CGR can be non-arbitrarily justified to hold in a temporal dimension which is shorter than the long-run.

The essential point to observe about the above (and one which will become more and more strategic as the exposition proceeds) is that if a non-arbitrary justification for either concept of Global Rationality ultimately must be founded on a non-arbitrary account of how all agents procure "sufficient knowledge" to act in accord with (the relevant concept of) Global Rationality, then all the basic questions connected with the Keynes and the Classics debate can be seen to reduce to the one question of the extent to which any concept of short-run knowledge acquisition can be used to underwrite the achievement of any condition of short-run Global Rationality. Here the important point is that in such a short-run context it is strictly illegitimate for either Keynesians or Classicists ever to rely upon long-run arguments concerning "successful learning" and the like (even if this learning is posited to be only up to the "true" (stationary) values of a probability distribution or, weaker still, a probability distribution over all conceivable probability distributions). In short, all the traditionally convenient, long-run strategies to justify the sufficiency of individual knowledge for Global Rationality--strategies which have long served as the basic instrument by which to guarantee the "structural closures" of economic models--are ruled out in the context under discussion, and this is what makes the ultimate methodological problems of both sides of this controversy so precarious and so similar.

## CHAPTER FIVE

THE THEORY OF AGGREGATE ECONOMIC COORDINATION:  
SOME BASIC CONCEPTS, DEFINITIONS, AND NOTATION

In the preceding four chapters, I have attempted to illuminate in a variety of ways the logical structure of an important, long-standing, and still unsolved explanatory problem in economic theory. While the analyses so far may still appear to be far too general (and abstract) to indicate exactly how to proceed on the dilemma in question, at least one basic methodological point has been established: that, given the formal distinction between "individualist" and "non-individualist" explanation on one hand, and "classical" and "non-classical" explanation on the other, all the essential methodological issues concern the logical possibility of "non-classical" explanations being "individualist" in form. If a non-arbitrary, non-classical Individualism can be rationalized, then the long-standing dichotomy which equates "individualist" explanation with only "classical" explanation, and "non-classical" explanation with only "non-individualist" explanation, can be broken--and this is the only serious strategy to consider when considering how to illuminate any and all observed phenomena which (truly) contradicts the implications of classical theory.

What is missing, nonetheless, from the above analysis is an explicit consolidation of the fact that all the explanatory options under consideration--whether they be individualist/non-individualist, or classical/non-classical in character--constitute attempts to explain (all) observed aggregate outcomes as aggregate coordinated outcomes. Thus, all theorists, whether they be Classicists, Keynesians, or even Marxists, have aimed traditionally to provide some (determinate) theory of general equilibrium, even if they have violently disagreed on what this general

equilibrium is supposed to look like and, in particular, on what set of truly exogenous variables can be seen to be "just sufficient" to completely explain observed phenomena as general equilibrium phenomena.

The purpose of this chapter is to introduce the most economical set of concepts and definitions which are needed to do justice to any (and, in particular, historical) attempts to explain observed aggregate outcomes as coordinated ones. The straightforward part of this exercise is to define explicitly those categories of variables which have traditionally been seen to play a necessary role in any account of aggregate coordination. The three general classes of variables that are identified are ones which have already been mentioned, and are: (a) the properties of nature (to be denoted by N); (b) the properties of individuals (to be denoted by I); and (c) the properties of social/institutional entities (to be denoted by S).

The more important and complex issue has to do with establishing a general set of concepts to illuminate, on one hand, the relationships between observed states and coordinated states and, on the other, the relationship between states in which coordination is present and ("dis-equilibrium") states where coordination is absent. In this connection, four basic ideas will be presented.

The first is that any attempt to explain observed aggregate phenomena as aggregate coordinated phenomena can be viewed as an attempt to specify a set of exogenous variables (e.g., drawn from the elements of the sets, N, I, and S) which is "just sufficient" to limit the set of conceivable aggregate states of the economy to those which are realizable and sustainable, and, therefore, which can be "observable" as equilibria. The second idea is that the aggregate coordinated ("general equilibrium") states which are defined by, and explainable by, the exogenous "givens" of one particular theory of coordination will, in general, not constitute

the aggregate coordinated states of other theories of coordination, which make reference to a different set of "givens." Thus, the (explainable) aggregate coordinated states of one theory are in general the (non-explainable) states of aggregate chaos ("general disequilibrium") of others --and vice versa. A third implication follows from the first two: if states of general disequilibrium therefore can be defined only relative to a given theoretical explanation of aggregate coordination, then, in principle, there can be no such thing as "true" disequilibria in a universal sense. Any purported, observed disequilibrium should in principle be explainable --as general equilibrium phenomena--by reference to some set of exogenous "givens" of some theory of aggregate coordination. The final point is that, just because all observed aggregate states are potentially explainable as an "equilibrium" consequence of some theory of coordination, does not imply that all such observed states can be explained as an "equilibrium" consequence of any particular theory of aggregate coordination.

Before proceeding, it is useful to briefly illustrate these ideas in the context of "classical" explanation--if only to define a familiar point of reference. Thus, as has been implied by the analysis of Chapters Two and Three, a classical Individualism theory of aggregate coordination is one which posits that "tastes cum rationality" (I) and "technology" (N) are a "just sufficient" set of exogenous variables to explain (determine) an aggregate coordinated state. According to this theory, the specification of given values of N and I are causally sufficient to entail an (endogenous) set of classical equilibrium "prices" and "quantities." Since, the purpose of this theory is to explain, as "equilibria," only those aggregate states which are consistent with the "reasons" for coordination posited by the theory (as embodied in the given values of N and I), it follows moreover that any aggregate state which is inconsistent with these posited



given values must be, by definition, a non-explainable state of classical disequilibrium. This is simply because the existence of such a state cannot be shown to be a logical consequence of the "reasons" for coordination specified by the theory.

It becomes immediately evident that the term "disequilibrium" only has meaning here when defined relative to classical explanatory structure-- when it is used to indicate the necessary failure for classical "givens" to illuminate aggregate states which are inconsistent with these givens. "Disequilibrium" therefore can indicate only a property connected with explanations of the real world; it never can refer to a property of the real world as such. Any reference to a disequilibrium state, relative to classical theory, only reveals the point that, if such a state were in fact explainable as a (non-accidental) coordinated state, then such an explanation would have to make reference to non-classical "reasons" why this coordination could transpire. Accordingly, such a theory would have to specify a set of non-classical givens which were just sufficient to entail the classical disequilibrium state in question as a state of non-classical equilibrium. A further implication is that states of classical equilibria per se must be viewed as disequilibria, relative to this latter, non-classical theory of coordination.

There are two final points to emphasize. First, that even if it is granted that any observed aggregate state can be construed as a general equilibrium state, relative to some set of exogenous givens, this, in itself, does not provide the guarantee that all observed phenomena can be explained as consequences of the "givens" of classical general equilibrium theory. Thus, if there exists any observed aggregate state which is not completely explainable by reference to N and I alone, then "true" classical disequilibria can exist, and classical structure must be explanatorily

incomplete with respect to some observed phenomena. The second point is that, in principle, there are a wide variety of non-classical theories of coordination available to explain observed classical disequilibria as non-classical general equilibria. The ultimate problem (to be addressed in later chapters), is how to specify the exogenous givens of a non-classical theory of aggregate coordination in such a way as to preserve the properties of individualist explanation. This is, by definition, the problem of constructing any non-arbitrary, non-classical Individualism.

I now turn to the exposition of "the basics" of this analysis.

1. The Definition of the Properties of Individuals, the Properties of Nature, the Properties of Society, and the Domain of Aggregate Action

The general setting assumed is one where there are  $n$  individuals,  $k$  "ultimate" natural constraints, and  $\ell$  social entities/constraints. The set,  $I$ , is taken to denote the set of "properties of individuals," the  $n$  elements of which are indexed by  $I_j$ . The set,  $N$ , is taken to denote the set of "ultimate" natural cum physical constraints--as representing the "properties of nature"--the  $k$  elements of which are indexed by  $N_h$ . Finally, the set,  $S$ , is taken to denote the set of social entities/constraints--as an embodiment of the "properties of society"--the  $\ell$  elements of which are indexed by  $S_g$ .

It is apparent that the sets,  $N$  and  $S$ , must be defined in a way which includes a rule for distributing the elements of these sets to the  $n$  individuals in the environment. Given such a rule, and assuming that all natural/social constraints are distributed to (have incidence upon) someone,  $N$  can be defined more precisely as a  $k \times n$  array (indexed by  $V_{hj}$ ), while  $S$  can be rendered as a  $\ell \times n$  array (indexed by  $s_{gj}$ ).  $N^j$  can then be used to denote the vector of  $k$  natural constraints which have incidence upon the

$j^{\text{th}}$  individual in particular;  $S^j$ , to denote the vector of social constraints which have incidence upon  $j$ , while  $I_j$ , as above, simply represents the (own) properties of this individual. ( $N^j$  and  $S^j$  of course must be distinguished from  $N_j$  and  $S_j$ , since the latter denote the  $j^{\text{th}}$  natural (social) constraint.)

It is assumed next that there are  $m$  economic "activities" (or "commodities") which individuals in principle can undertake (procure) in the defined environment. Since there are  $n$  individuals defined in the problem, a complete description of any aggregate state of the economy is achieved by listing the precise actions of each of the  $n$  individuals over the  $m$  economic activities. Define any arbitrary  $m \times n$  array of this type as  $Z$ , where  $x_{ij}$  can be used to denote the action of the  $j^{\text{th}}$  individual with respect to the  $i^{\text{th}}$  activity (commodity), and where  $Z_j$  can be used to denote the actions of the  $j^{\text{th}}$  individual over all  $m$  activities. (It is of course fundamental to distinguish the "actions" of  $j$ ,  $Z_j$ , from his "properties,"  $I_j$ .)

In line with standard convention, it can be assumed that each  $x_{ij}$  can be represented by a real-valued "quantity." Accordingly, two aggregate states of the economy, say,  $Z_A$  and  $Z_B$ , can be described as identical if and only if all of their  $x_{ij}$ 's are quantitatively identical. Although it will not prove necessary to indicate formally, it is also acceptable to think of each  $x_{ij}$  as being partitioned into separate production, consumption (and trade) "quantities," and/or as designating a vector of "quantities" over different points in time.

Given the above, it is then possible to define the set of all conceivable aggregate states,  $\Pi$ , as the set of all conceivable  $Z$ 's (i.e.,  $m \times n$  arrays of "quantities"). Since it is not necessary to define  $\Pi$  in

further detail, it is economical to let the notation,  $Z$ , stand for any arbitrary element in  $\Pi$ . It is assumed finally that the sets,  $I$ ,  $N$ , and  $S$  are all defined on  $\Pi$ .

In the next section, the set of aggregate coordinated states,  $\Pi^*$ , and the set of aggregate observed states,  $\Pi^0$ , will be defined, where (i) both  $\Pi^*$  and  $\Pi^0$  are proper subsets of  $\Pi$ ; (ii)  $\Pi^*$  is seen to be "explained" by reference to the values (or states) of some or all of the elements of  $I$ ,  $N$ , and  $S$  (the relevant elements/categories chosen and the particular  $\Pi^*$  determined, depending upon the particular theory of aggregate coordination considered); and (iii) any successful explanation of  $\Pi^0$ --as an aggregate coordinated state--must demonstrate that  $\Pi^0$  is contained in the  $\Pi^*$  which is generated by (the values of) the exogenous "givens" of the particular theory of aggregate coordination in question.

At this juncture, however, it is appropriate simply to register the point that the above framework of definitions and notation largely fits with the structure of concepts and categories used for modern economic theory analysis. In fact, since the definitions presented here are no more than a generalization of certain specific concepts used in standard economic theory--for the purpose of broadening the interpretative foundations of this theory--it is quite appropriate to identify the sets,  $I$ ,  $N$ , and  $S$  with their more specific and familiar economic theory representation.

1.1 Given the above perspective, any  $I_j$  ( $\in I$ ) therefore may be completely defined by the two familiar components: (i)  $j$ 's "tastes" (or preferences) over alternative (conceivable) states of the aggregate economy (i.e.,  $\Pi$ ); and (ii)  $j$ 's "rationality principle." In general, the latter may be seen as a decision rule which specifies the "best" (or "appropriate") way(s) for  $j$  to conjoin his "tastes" with all (truly) limiting features of his decision environment to produce his decision act,  $Z_j$ . In the context at

hand, it can be assumed moreover that the "rationality" principle" is a "maximum principle" (for all  $j$ ), which states that all agents aim to maximize utility (or profits).

To anticipate the analysis which will follow, it is worthwhile to make the point that, in principle, at least one (though usually all) elements of  $I$  must be regarded as exogenous variables in any theory of aggregate coordination of an individualist form. Conversely, the claim that no element of  $I$  can be a truly exogenous variable in the explanation of transpired coordination must imply the denial of individual explanatory character as such and, in particular, must remove any explanatory role for individual rationality. In such a case, individual rationality therefore can only be seen either as an endogenous product of a (non-individualistic) coordinated state, or as irrelevant to the determination of this state.

It is also noted that the commitment to the view (above) which states that all agents aim to maximize utility (profits) does not entail a commitment to the view that all agents actually succeed in maximizing (notional) utility (profits) in a state of aggregate coordination. The affiliation of these two views of course holds under classical general equilibrium explanation, but it holds in no other case. In non-individualist theories of coordination, individual aims are, by definition, not autonomous data in the problem while, under non-classical Individualism, (notional) aims are not successfully realized, except by accident.

1.2 The same type of "specific" interpretation can be put forth for the set,  $N$ . Evidently, the important word in the definition of  $N$  is "ultimate," since "what is ultimate" may involve some theoretical choice. In traditional general equilibrium models of pure exchange, for example,  $N$  is defined in terms of  $k = m$  output endowments, while in broader models which include production,  $N$  is identified with  $k$  technologies and/or

factor endowments. In still broader models which incorporate technological change, the "ultimate" constraints of nature may be defined only at the level of a "super-technology" or a "technology of technologies." (Recall that any of these specifications of  $N$  must include a rule for distributing the  $k$  "ultimate" constraints to the  $n$  individuals; thus, defining each individual's  $N^j$ .)

For all the leeway which might be seen to exist in specifying the "ultimate" constraints of nature, it is important to recognize that such specificational decisions are not just arbitrary; they affect the explanatory power of any theory of aggregate coordination. It is no doubt precisely for this reason that avant-garde classical theorists in particular have found it so attractive to add a series of "non-conventional" technologies--such as a transactions technology, an adjustment technology, and an information gathering cum search technology--to traditional Arrow-Debreu production (activity) formulations, in order to explain observed phenomena which was properly outside the province of these earlier structures (and which could therefore be regarded only as a manifestation of true disequilibrium). This strategy of attempting to expand explanatory power by increasing the dimension of  $N$  might be conveniently described as the "N-plus" option. (Note that this option may or may not require that the  $I$ -vector be extended over the new activities implied by the additional technologies; this depends upon the way in which the new constraints are inserted into the structure.)

While the consideration of the possible success or failure of an "N-plus" explanatory option is obviously crucial to any appreciation of the possible success or failure of avant-garde classical programmes, a much simpler point which must be made in the immediate context at hand is as follows: that, whatever natural constraints a theorist deems (for any

reason) to be "ultimate" natural constraints in his explanatory structure must be regarded as autonomously-binding constraints on all individual action and, therefore, must be given the status of (truly) exogenous variables in his explanation of the achievement of aggregate coordination. Accordingly, "non-ultimate" natural constraints can be regarded only as endogenous (or irrelevant) constraints in this context, and can be seen most conveniently not to be part of  $N$  at all but, rather, to be part of the "activity set" defined by any  $Z \in \Pi$  (e.g., a structure with endogenous factor supplies cannot usefully take the supply of factors as constraint of nature, since factor supply is deemed to be an "activity" to be coordinated--along with all other activities--given other prior, and truly ultimate, natural constraints). Under this interpretation it becomes a matter of definition that all natural constraints which qualify for inclusion in  $N$  are exogenous variables.

1.3 The specification of the set,  $S$ , in traditional economic theorizing may seem to be less obvious than that of  $I$  or  $N$ . For the theorist of a broad "social science" persuasion, it might be tempting to identify the elements of  $S$  with all the legal, normative, and regulatory structures which must exist in any general mechanism of socio-economic coordination and which in turn manifest the existence of a very definite systems of property rights and incentives (see Newman (1976)). On the other hand, for the theorist who is largely interested in modern public policy questions, there might be a temptation to associate the elements of  $S$  with the specific institutional mechanisms of government (and government policy), and with specific institutional cum contractual arrangements underlying firm and market organization. In fact, a case can be made for taking all of the above items to be part of the set,  $S$ , inasmuch as they can be shown to intermediate, facilitate, and/or constrain aggregate interaction in a "social," as opposed to a "natural," way. The basic point, however, is what

would be still missing prima facie from the above list is the specific type of social institution that economic theorists have long held to be the most important to their analysis, namely, the set of "relative prices" which can be defined between each and every pair of economic activities. I have implied this view of "prices as social institutions" throughout all earlier analysis.

It is not my purpose here to inquire into the reasons why "prices" so often seem to be endowed with a quasi-objective (hence, non-social) status in traditional economic explanations, except perhaps to note a long-standing reluctance on the part of theorists to admit explicitly "institutional" considerations into the domain of economic theory proper. Rather, the only point which needs to be made is that the viewpoint espoused here is one that denies the possibility of any convincing arguments to the effect that the instruments of price rationing must play a fundamentally different role in a process of socio-economic coordination from that played by various laws, norms, and regulations which ration, say, by "quantity." The assumed perspective for this analysis is therefore that it is not methodologically satisfactory to play down the "social" character of prices while emphasizing the "social" character of laws, norms, and other more obvious forms of social control.

In playing down the distinction between prices and other non-price institutions, my purpose of course is to play up the importance of the distinction between whether any social institution (or set of institutions) possesses exogenous status, or endogenous (irrelevant) status in the explanation of transpired coordination. Thus, the central point about individualist explanations is that no social institution can be assigned exogenous status, while the central feature of non-individualist explanation is that one or more social institutions can be treated as exogenous "givens." This



distinction holds quite independently of what particular type of institution is specified to play a role in the coordinating process (i.e., whether the institutions specified are prices or something else, or a mix of prices and something else).

Traditional analyses of classical general equilibrium, for instance, may suggest (indeed, correctly) that if  $(\ell = m - 1)$  equilibrium relative prices are a "just sufficient" set of social institutions to ensure a classical equilibrium, then all other non-price institutions are unnecessary (or, what is the same, are implied by the  $m - 1$  prices). This analysis may also suggest that the only reason that price institutions rather than, say, quantity constraints uniformly serve as the basic coordinating instruments in this theory is because prices are a more efficient (and, thus, cheaper) institutional instrument than any other available. However, this theory does not suggest either that non-price institutional mechanisms would come into dominance if they were in fact more efficient at coordinating than prices, or that such non-price institutions could ever possess exogenous status in the explanation of coordination. The simple point, therefore, is that, under classical explanation, all social institutions --regardless of type--must be compatible with the achievement of classical equilibrium and, thus, be fully derivable from  $N$  and  $I$  alone.

2. The Definition of the Set of Aggregate Coordinated States and the Set of Aggregate Observed States, and the "Explanation" of Aggregate Observed States as Aggregate Coordinated States

Given the above definitions of, and interpretations of, the sets  $I$ ,  $N$ , and  $S$ , and the definition of the set of aggregate conceivable states,  $\Pi$ , the next steps is to define two proper subsets of  $\Pi$ . These are the set of aggregate coordinated states,  $\Pi^*$ , and the set of aggregate observed states,  $\Pi^0$ . The elements of both of these sets will be treated analogously

to those of  $\Pi$ :  $Z^*$  indicates any arbitrary element in  $\Pi^*$  while  $Z^0$  indicates any arbitrary element in  $\Pi^0$ . (It is to be noted that  $\Pi^0$  formally must be regarded as itself a proper subset of the set of observable aggregate states--since it need not follow that all observable states are actually observed--although this point will be kept implicit in the analysis.)

2.1 To gain an initial perspective on why both of these additional concepts are necessary for the analysis at hand, it is useful to start from a basic orienting proposition: that the ultimate task of any theory of aggregate economic behaviour is to offer a complete explanation of the set of aggregate observed states,  $\Pi^0$ . The question therefore immediately arises: Why is it necessary to make reference to  $\Pi^*$ , or to theories of  $\Pi^*$  (rather than  $\Pi^0$ ) at all? The answer to this question is, I believe, quite subtle and, while traditional theorizing has shown an obvious preoccupation with states of coordination or equilibrium, the question has been seldom addressed.

The explanation for this focus on "coordination," I believe, stems from a rather basic philosophical notion: that, if economies were ever in a state of true aggregate chaos (as opposed to coordination) at a point in time, then it would be impossible to describe such a state in terms of well-defined, unique, or sustainable aggregate attributes. The essential implication of this position is that only arbitrary observation reports about aggregate chaos are possible--a view which in turn implies that it is self-defeating to attempt to explain  $\Pi^0$  non-arbitrarily if the observed states which comprise  $\Pi^0$  can be defined only arbitrarily. It is then this type of philosophical argument which, I conjecture, is responsible for the traditional presumptions to the effect that only aggregate coordinated states are "observable," that only (observed) coordination is therefore properly explainable, and, more precisely, that the essential reason for

why aggregate coordinated states can be described/observed in non-arbitrary terms (and states of aggregate chaos cannot) is because coordinated states are in principle "stable" or "sustainable" enough to be described/observed in these terms (i.e., the states are not immediately changing into something else).

2.2 Let us accept the above view as correct--that any aggregate observed state must constitute some type of aggregate coordinated state, as a precondition to its being observed--and then define  $\Pi^0$  to comprise the set of aggregate states which, for whatever reasons, have been "stable" or "sustainable" enough to be observed at a point in time (or, in general, at all points which comprise past history). For the purposes at hand, what this means is that, if a non-arbitrary (and, possibly, unique) set of historical numbers can be generated, say, at a given point in time, to fill out all the elements of a conceivable state of the aggregate economy,  $Z$ , then this  $Z$  qualifies to be a  $Z^0$  ( $\in \Pi^0$ ), defined at that point in time. As implied above, it is possible to define  $\Pi^0$  explicitly as a profile of observed states over time, but such an interpretation is not required to expose the points of immediate concern. It is also convenient to assume that  $Z^0$  is in fact unique at a point in time, which implies that  $Z^0$  is identical to  $\Pi^0$ .

The important additional point to stress, given the above arguments, is that any  $Z$  can qualify to be a  $Z^0$  if and only if it is also an aggregate coordinated state,  $Z^*$  ( $\in \Pi^*$ ). This implies that the  $Z$  in question must be compatible with some theory of aggregate coordination, which entails the  $Z$  in question as a  $Z^*$ ; otherwise, the  $Z$  could never have been observed as such.

2.3 Any careful reading of the above arguments must reveal the essential feature of the interpretation of observed and coordinated states being

proposed; namely, that since the "observability" of the aggregate states which comprise  $\Pi^0 = Z^0$ , and their differentiation from other states which are conceivable but not observable, requires that the observer already possess some (prior) theory of aggregate coordinated states--which lays down the theoretical criteria by which to distinguish states which are stable or sustainable from those which are not--any  $Z^0$  must always constitute a confirming instance of the theory of coordination which rendered the state in question observable qua observable. Moreover, since  $\Pi^0$  is defined (above) as the set of aggregate states which can be construed as observable cum coordinated states for any reason, and since each particular theory of aggregate coordination specifies particular "reasons" for coordination (in its exogenous "givens"), it can only follow that the set of all possible theories of coordination must be regarded as generating any and all  $Z^0$ . Thus, each and every  $Z^0$  must be a  $Z^*$  of some theory, and, if this is true, each and every  $Z^0$  must be explainable in principle by the exogenous givens of the theory(ies) of coordination which have rendered the aggregate stage an "observed" state in the first place. If it is possible to define the set of  $Z^*$ 's which can be logical consequences of all possible theories of aggregate coordination (i.e., which follow from all possible constellations of explanatory givens) as  $\Pi^*_{\text{Global}}$ , then it follows that  $\Pi^*_{\text{Global}}$  must contain  $\Pi^0 (= Z^0)$ .

2.4 Given the above, the second part of this analysis follows from the recognition that the acceptance of the view that all  $Z^0$  are explainable (as  $Z^*$ 's) by some theory of coordination does not entail a commitment to the view that all  $Z^0$  are explainable (as  $Z^*$ 's) by any particular theory of coordination--which employs a particular set of exogenous givens.

To understand this, consider one particular theory of aggregate coordination, say Theory A. It may be taken as axiomatic that the objective

of Theory A is to provide a logically-consistent and complete explanation of  $\Pi^0$ . To achieve this, Theory A must, first, posit a (non-empty) set of exogenous variables which is just sufficient to limit  $\Pi$  to a set of (determined) equilibria,  $\Pi_A^*$ , and then, second, show that (any)  $\Pi^0$  is contained in  $\Pi_A^*$ . If the first part of this exercise can be successfully accomplished, then  $\Pi_A^*$  can be said to be successfully "explained," meaning that for any given values of the exogenous variables posited by the theory, all Z's other than those which are logically entailed by these givens are ruled out as being neither "realizable" nor "sustainable" states, leaving only the determined set of Z\*'s which comprise  $\Pi_A^*$ . (It follows trivially that, once any Z\* is determined by the exogenous givens, all individual actions which make up the Z\* are also determined.)

More formally, if Theory A is to be a structurally successful (i.e., non-trivial and determinate) explanation of observed aggregate states as coordinated states, then it must satisfy the following three basic conditions: (a) that, for each and every conceivable state,  $Z \in \Pi$ , it can specify whether the Z in question is logically entailed by the given values of the exogenous variables pointed by the theory--in which case it is an explainable  $Z^* \in \Pi_A^*$ --or logically inconsistent with these posited givens--in which case it is a non-explainable "disequilibrium" Z, relative to the explanation of  $\Pi_A^*$ ; (b) that the set,  $\Pi_A^*$ , be non-empty; and (c) that the set,  $\Pi_A^*$ , be a non-infinite set and dimensionally smaller than  $\Pi$ . If Theory A was "overdetermined," then (b) would be sacrificed. If Theory A was "underdetermined," then (c) would be sacrificed. The strongest way of satisfying (b) and (c), of course, is to demonstrate that  $\Pi_A^*$  contains one and only one Z\*, but it is not necessary to insist that all equilibria are unique for the purposes at hand.

The essential point which follows the above analysis is that, even if

there may be many possible theories of coordination which do not pass the test even as far as (a), (b), and (c) are concerned, even those which do satisfy these conditions need not be explanatorily complete with respect to all observed phenomena. Thus, while the fulfillment of (a), (b), and (c) are indeed sufficient conditions for the successful explanation of any  $Z^0$  which happens to be a  $Z^*$  in  $\Pi_A^*$ , these conditions in no way provide the guarantee that any and all  $Z^0$  must lie in  $\Pi_A^*$ .

What this means is that, in lieu of the independent guarantee that all  $Z^0$  must lie in  $\Pi_A^*$ , there is no way to rule out the possible occurrence of (existence of)  $Z^0$ 's which are not in  $\Pi_A^*$ , even if  $Z^0$ 's of this type are ruled out from an explanatory point of view. This just says that, if any  $Z^0$  (at any point in time) cannot be construed as a  $Z^*$  in  $\Pi_A^*$ , then Theory A is rendered explanatorily incomplete with respect to some observed phenomena, and the clandestine instance in question can be regarded only as a "true" disequilibrium, relative to the states explained by this theory. The existence of such a disequilibrium, of course, constitutes a refuting instance of the theory as specified.

Once again, it is stressed that Theory A can be seen to be explanatorily incomplete with respect to observed phenomena even if it is granted that any (potential) disequilibria which conflict with this theory (and which cannot be ruled out as "impossible" occurrences by theory) could be observable qua observable only if they were implied  $Z^*$ 's of alternative explanations of aggregate coordination. By the above interpretation, an observed refuting instance of one theory of coordination must be a confirming instance of some other theory. This just says that, it is possible for  $Z^0$ 's to be incompatible with particular theories of coordination (such as Theory A) without undermining the idea that all  $Z^0$ 's must constitute explainable general equilibria of some type.

It is now appropriate to tie these general ideas to the "specifics" of the debate between classical and non-classical thinkers.

3. The Foundations of the Contemporary Debates over the "Explanatory Completeness" of Classical and Non-Classical Theories of Aggregate Coordination

The importance of the general perspective developed above is that it can place into context a number of widely-discussed contemporary issues, perhaps the most basic of which concern the question of whether "true" disequilibria can be seen to exist and, if so, whether they might be illuminated by way of a "non-market clearing paradigm" (see Barro (1979) and related discussion). In particular, the above arguments permit classical thinkers to acceptably claim that (observed) economies must be in general equilibrium all the time (including the observable future) and, thus, to acceptably deny the possibility of observing markets which do not clear. Moreover, since non-classical thinkers can also agree with this viewpoint --as it does not imply a commitment to the position that all observed general equilibria must be "classical"--it is therefore necessary to conclude that discussions of "true" disequilibria and "true" non-market clearing are somewhat beside the point; the relevant discussion is over alternative explanations of equilibria. Needless to say, the only danger in any of these discussions is that, when classical theorists contend that observed economies are in equilibrium all the time, they really mean that they are in classical equilibrium all the time. This is exactly the inference which is precluded by the arguments of the last section, and it is appropriate to initiate the discussion by a consideration of this problem.

Let me begin, therefore, by posing the basic question: What does a defender of classical equilibrium theorizing have to do in order to ensure the observed economies can be explained as being in classical general

equilibrium all the time (rather than in some other type of equilibrium)? Clearly the answer is: he would have to provide the independent guarantee that all  $Z^0$  (for all times) are fully explainable only by reference to the (relevant) values of  $N$  and  $I$  and, thus, constitute the  $Z^*$ 's of a classical equilibrium, and no other. Such a demonstration would then constitute proof that the "true" reason for the stability of all observed states was that everyone was maximizing gains from trade, that they therefore had no incentive to change these states, and, correspondingly, that all other possible "reasons" for this observed stability were spurious. The "spuriousness" of other (non-classical) reasons for observed coordination could then be successfully grounded in the idea that aggregate states in which gains from trade are not maximized are intrinsically "unstable" states--since at least some individuals could gain by changing them immediately--and are therefore not capable of (non-arbitrary) observation. This view would then immediately produce the theorem that "whatever is observed must be classically optimal," which is directly equivalent to the proposition that "all classical disequilibria are only apparent disequilibria."

Why does any non-classical thinker find the above classical arguments so unsatisfactory: The answer is: because he contends that the "reasons" for coordination specified by Classicists can be only long-run reasons; hence, it would be impossible for classical theorists to guarantee that classical  $Z^*$ 's would ever (let alone always) observably transpire unless an infinity of time were granted. This is why non-classical thinkers have always been prepared to accept the idea that shorter run  $Z^0$ 's do exist and that, barring accident, these must be construed as manifestations of some non-classical equilibrium, which emerges for non-classical "reasons." It is, of course, precisely this situation which makes classical theorists so anxious to demonstrate that their reasons for coordination apply to both the long-run and the short.

What are these non-classical "reasons" for coordination? A proponent of a non-individualist form of non-classical explanation might, for



example, suggest that all short-run observed coordination was explainable, not by N and I, but by the exogenously-determined values of N and/or S. (For the illustrative purposes at hand, assume N and S.) Correspondingly, his reasons for claiming that all short-run  $Z^0$  could be explained as the  $Z^*$ 's of non-individualist general equilibria would be that such states are sustained (hence, are observable) because the autonomous constraints of nature and society so severely impinge on individual free choice that individuals can have no choice but to accept the going states, whether they are in their best interests or not.

Evidently, both the classical theorist and the non-individualist can agree on the propositions that economies can be observed only in equilibrium, and that aggregate outcomes can be illuminated only in "equilibrium" terms, while totally disagreeing on the nature of the explanatory "reasons" for why observed coordination transpires. More precisely, the two competing sets of reasons for coordination can only be equivalent by accident: if for a common N, the S which the non-individualist is prepared to take as given in his explanation just happens to be an S which the classical theorist can derive from N and I. However, if this accidental case is dismissed, and if indeed Classicists are really willing to attempt to explain short-run  $Z^0$ 's by classical means, then there is genuine explanatory conflict to consider, since at most one of the explanations can be the "true" one.

In this light, there can be little doubt that non-classical thinkers of the non-individualist type described here have taken great pains to show that virtually every instance of short-run behaviour can be explained as an outcome of the operation of given material forces and given institutional rigidities (even if, for particular cases, this may involve considerable reinterpretation of what N and S consist of). There also can be little

doubt that these thinkers have always taken allegedly-observed contradictions of the implications of classical theory in the short-run--which, from above, must be confirmations of some other theory of coordination--as in fact confirmations of the non-individualist theory that they espouse. Unfortunately, however, none of this counts very much in the debate.

As discussed in earlier chapters, the only thing which the classical theorist notes about non-individualist explanations which give autonomous explanatory power to S, and deny it to I (rather than the other way around) is that they are only artificially determinate accounts of observed equilibria. Thus, the Classicist would contend that if individual explanatory standards were really maintained in such explanations, S could not be assigned exogenous status and, without the exogenous role for S, the explanation would be underdetermined (i.e., behaviourally-arbitrary). Thus, no matter how many (seeming) confirmations of his theory that the non-individualist can produce, the classical theorist will not listen. The Classicist simply contends that non-individualist theories are too incomplete (without the explanation for why S is what it is) to ever be meaningfully tested as an account of the short-run. Accordingly, it is only those non-classical theories which meet the standards of Individualism (i.e., non-classical Individualism) which the Classicist will accept as capable of being tested interestingly.

By the same token, there can be little doubt that classical thinkers are currently attempting to explain (hitherto unexplainable) short-run Z<sup>0</sup>'s by redefining, and extending the domain of, their N and I variables. Evidently, the process of redefining N and I to turn alleged short-run refutations of the theory into actual confirmations can easily be pursued without limit, and this recognition must constitute a matter of critical concern to any non-classical thinker. In particular, if it happened that

the set of  $Z^*$ 's which classical theory could be seen to underwrite ultimately extended to all  $Z$  in  $\Pi$ , then it would be clear that classical explanation, though irrefutable, would be explanatorily degenerate, since it logically ruled out no phenomena whatsoever.

The basic point, therefore, is that, if the above option of turning all classical explanation into ad hoc explanation is categorically avoided, then no matter how sophisticated a specification of  $N$  and  $I$  variables that classical theorists might eventually come up with, the avoidance of degeneracy in their explanation absolutely requires that they rule out (hence, not explain) some  $Z$ 's in  $\Pi$ . This is, once again, where Classicists must squarely confront the non-classical charges concerning the short-run. Thus, if Classicists cannot provide the guarantee that the phenomena which they rule out as non-explainable "disequilibria" (relative to whatever specification of  $N$  and  $I$  "givens" is decided upon) is also incapable of (observably) transpiring in the short-run, then they cannot avoid the possibility that at least one short-run state may (observably) occur which is not compatible with (hence, fully explainable by) the posited  $N$  and  $I$ . Such a situation must leave classical theory underdetermined with respect to this phenomenon.

It is, of course, this (potential) underdetermination of classical structure with respect to the short-run which constitutes the central pivot of any "non-classical critique" of classical explanation. As stressed in the previous chapter, this critique can only be undone by one thing; namely, the demonstration that Classical Global Rationality must prevail in all short-run instances. This is indeed the only instrument which Classicists can successfully use to fend off the charge that classical structure is irretrievably underdetermined for the short-run. The only remaining question is: What can defenders of non-classical programmes do

about the underdetermination which Classicists charge them with?

To summarize, both defenders of classical and non-classical explanations can agree that observed economies must be in some type of general equilibrium all the time and that concepts of "disequilibrium" have meaning only relative to explanations of the world. As well, both camps have access to strategies which can ensure the provision of (seemingly) determinate equilibrium accounts of virtually any observed phenomena which comes along. However, neither camp has traditionally provided the theoretical equipment by which to guarantee that all observed equilibria being explained actually follow as a logical consequence of the particular theory of aggregate coordination defended. This is why both sides charge their counterparts with providing explanations of observed phenomena which are underdetermined and, hence, logically incomplete. As I have emphasized, the only route open for Classicists to avoid this charge is to provide the guarantee that Classical Global Rationality prevails throughout the short-run. Correspondingly, for non-classical theorists, the only acceptable route open is to deny all non-individualist specifications of non-classical theories and to produce a logically complete, non-classical Individualism.

## CHAPTER SIX

INDIVIDUALIST THEORIES OF AGGREGATE COORDINATIONAND THEIR COMPETITORS: THE ANALYTICAL OPTIONS

Given the above concepts and definitions, my purpose in this chapter is to analyze systematically all the possible theories of  $\Pi^*$  which might be relevant to the objective of explaining observed departures from classical equilibrium behaviour (as forms of non-classical equilibrium behaviour) and which can be generated under the assumption that the elements of I, N, and S (as defined above) constitute an exhaustive set of (potentially) exogenous variables that can be drawn upon to explain  $\Pi^*$  as (some)  $\Pi^*$ . The assumption that no other explanatory variables beyond I, N, and S exist is indeed an heroic one -- but it has strategic expository importance here, for it allows a complete "first stage" of analysis to be defined.

The proceeds of this first stage are basically twofold. First, it is possible to define a formally complete meta-theory of the possible explanatory roles that I, N, and S can play in alternative theories of coordination. Here it is shown that the most important issues are connected with the specification of the role for S. Second, the meta-theory permits an explicit identification of all individualist/non-individualist and classical/non-classical options for explaining  $\Pi^0$ , and thus allows an explicit isolation of the properties that any framework of non-classical Individualism explanation must have, relative to all other candidates.

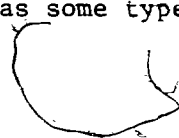
It is essential to stress that the understanding of the nature of non-classical individualism achieved in this first stage is by means of an "impossibility theorem": that, if the "heroic assumption" about exogenous variables (posited above) holds, then a (successful)

non-classical Individualism explanation of  $\Pi^0$  is logically impossible.

Since it is also shown that logically-consistent and logically-complete expressions of any classical Individualism, or of any non-individualist, framework to account for observed coordination in fact can be achieved under the "heroic assumption," the conditions for the success of all explanatory frameworks other than that of non-classical Individualism can therefore be established at this first stage alone. Accordingly, the objectives of demonstrating the logical possibility of successful non-classical Individualism explanation of  $\Pi^0$  is seen to require a "second stage" of analysis, one in which the "heroic assumption" is abandoned, and additional exogenous factors beyond those in I, N, and S are permitted, of which "knowledge" is self-evidently the most important.

It is only the first stage of the problem which concerns me at this point; the second stage will be the dominant concern of all later chapters. It should also be remarked that the clarity which is achievable in the second stage of analysis depends crucially on how well the first stage is done.

Before I move on to any details, allow me to provide a brief overview of the general problem at hand. As I have consistently emphasized, the setting in which all the critical issues connected with classical and non-classical explanation emerge is one where at least one short-run  $Z^0$  is (truly) not explainable as a classical equilibrium  $Z^*$ . (For convenience, denote such a  $Z^0$  as  $\hat{Z}^0$ .) In this circumstance, the conjunction of the given values of N and I are not sufficient to explain  $\hat{Z}^0$ , or to explain all elements of S as being an endogenous consequence of these "givens". From an explanatory standpoint, therefore, this situation depicts one of ("true") classical disequilibrium (where "true" social distortions exist) and, consequently, defines a state which can be explained only as some type of



non-classical equilibrium. The essential question can be put: How is it possible to specify a role for S which is compatible with  $\hat{Z}^0$  and which is also consistent with the requirements of individualist explanation?

The major thrust of the analysis of this chapter is that there exists no satisfactory answer to this question under the analytical assumptions posited. In particular, since the individualist holds to the view that no element of S can be regarded as an exogenous determinant of any  $Z^0$ , and since, by the nature of the case, N and I are deemed to be insufficient to explain  $\hat{Z}^0$ , it follows directly that the non-classical individualist has no interesting options to work in illuminating this non-classical phenomena --if the "heroic assumption" holds. Either he is consistent with his individualist strictures about S, and simply leaves the explanation of  $\hat{Z}^0$  as "underdetermined," or he gives up these strictures, and permits at least one exogenous element of S to complete the determination of  $\hat{Z}^0$ . The only way that the individualist can avoid this dilemma is if he has truly explanatory variables besides I, N, and S to play with; in short, if the "heroic assumption" is false.

It is also seen that the above problem situation is no more than a statement of the "classical critique": that either all  $Z^0$  are explainable as classical equilibria, in which case any combination of S and  $Z^0$  (=  $Z^*$ ) can be completely and non-arbitrarily determined from N and I alone, or the explanation of any state of observed coordination which is not so determinable must either be behaviourally arbitrary or non-individualistic. If the "classical critique" must hold under the "heroic assumption," then it is straightforward to note that the denial of the heroic assumption (which introduces stage two of the analysis) is a precondition to any interesting analysis of the logical possibility of a non-arbitrary, non-classical Individualism which undoes the "classical critique."

As I have also implied, it is in this second stage that knowledge and informational considerations are invariably placed into the problem. The focus on knowledge as the additional factor to consider is clearly not accidental; what other interesting explanatory factors besides knowledge are left to consider? Accordingly, the fundamental question to be entertained becomes: Is the introduction of exogenous knowledge (i.e., autonomously-binding knowledge constraints) into this setting, along with exogenous N and I (but not S), sufficient to produce a non-arbitrary, non-classical Individualism for the short-run? Unfortunately, the answer to this question will ultimately prove to be "No," so that a third stage of analysis will have to be defined. In this light, the overriding objective of all of the analysis which ultimately follows may be put as follows: to demonstrate that neither stage one nor stage two treatments of the logical problem at hand can succeed and, thereby, to infer what an acceptable stage three treatment must look like.

Needless to say, my concerns at this point are somewhat less enterprising than those sketched above. The only point of immediate relevance lies in the recognition that the "classical critique" of non-classical explanation, the defence of the universal applicability of classical explanations, and the acceptance of explanatory strategies to treat S as a given are all products of stage one alone. Such viewpoints therefore do not manifest a very advanced stage of critical analysis. To claim that N and I are always sufficient to explain  $\Pi^0$  (and the S which corresponds with it), or that S can always be treated as the appropriately determining, additional given -- if N and I are not so sufficient -- are indeed the "easiest" forms of explanation of aggregate behaviour to produce. They do not leave any room for the complexities of (explanatory) knowledge, since, by definition, some combination of the elements of N, I, and S can always be construed to be a



sufficient set of exogenous factors to completely explain observed coordination. The state of knowledge is therefore always constrained to be consistent with these posited givens and can possess no autonomy. The (second stage) demand of the non-classical individualist to consider knowledge as an autonomous factor in explaining observed coordination is, accordingly, just as it should be for any theorist who finds the commitment to the universal applicability of classical explanation on one hand, or the commitment to the denial of Individualism as such on the other, methodologically (and empirically) unsatisfactory.

I now turn to the details of stage one, as defined.

### 1. The Axioms of Individualism

It is useful to focus any general critical discussion of alternative theories of aggregate coordination around the axioms of Individualism (originally described in Chapter Three), since a complete understanding of what these axioms entail can also provide direct insight into the ways in which these axioms can be denied. Recalling that any arbitrary element of the set,  $I$ , is denoted by  $I_j$  ( $j = 1, 2, \dots, n$ ), any arbitrary element of the set,  $N$ , by  $V_{hj}$  ( $h = 1, 2, \dots, k; j = 1, 2, \dots, n$ ) and any arbitrary element of the set,  $S$ , by  $s_{gj}$  ( $g = 1, 2, \dots, l; j = 1, 2, \dots, n$ ), these axioms are as follows:

Axiom (1): All elements of the set,  $I$ , are exogenous variables in the explanation of any  $Z^0$  (as a  $Z^*$ ),

Axiom (2): All elements of the set,  $N$ , are exogenous variables in the explanation of any  $Z^0$ , but  $N$  cannot (completely) determine a  $Z^0$  by itself (e.g., without the autonomous determining power of  $I$ ),

Axiom (3): All elements of the set,  $S$ , are endogenous variables in the explanation of any  $Z^0$ , and must be structurally co-determined with the  $Z^0$  being explained.

Allow me now to offer some comments on these axioms.

As above, the explanation of  $Z^0$  will always mean the explanation of

$Z^0$  as a  $Z^*$ . The stipulation in Axiom (2) -- that all elements of  $N$  are exogenous -- is a matter of definition, given the interpretation set forth in Chapter Five, Section 1.2. Also, as remarked in Chapter Three, the individualist admits the exogeneity of  $N$  as such only to avoid the critical charge that an explanation of a coordinated state in which  $N$  is not presumed to be autonomously-binding is trivial, since "scarcity" and positive opportunity cost do not prevail.

Axiom (3) states a view which will now be denoted formally as the "individualist conception of social institutions." It states categorically that no social institution can possess a "life of its own"; ~~that~~ all social institutions are therefore epiphenomenal, and can represent only a shorthand abbreviation for the aggregate consequences of the rational decision making of all individuals. It is this view which explains why the individualist always contends that the explanation of the achievement of "rational" coordination must be identical to the explanation of the set of social institutions which are just compatible with the existence of that coordination.

It also explains why the individualist sees the (seeming) constraining power of any observed institution as just a question of the extent to which individuals rationaly endorse the institution. Thus, if  $n-1$  individuals rationally endorse, say, a price, or a law, or a government policy regulation, the last individual will be fully constrained by the consensus of the others, and he can be seen to be "bound" by an institution in this sense, and in this sense alone. On the other hand, if no one rationally endorses an institution, then it can bind no one at all. In all cases, since the constraining power of social institutions must be explained as a consequence of the rational endorsement decisions of individuals, the constraining power of institutions can never be autonomous.

It is noted, furthermore, that since this last claim above translates

into "no elements of the set, S, can be exogenous variables in the explanation of  $Z^0$ " -- which is consistent with the claim that all elements of S are either endogenous or irrelevant variables in such an explanation -- my statement of Axiom (3) can therefore be seen to reflect the historical tradition which denies the potential "irrelevance" of aggregate social entities. There is, of course, no intrinsic reason to defend this tradition, but there is also nothing to be gained (except a spurious complexity) by introducing, say, "irrelevant" prices into the framework. Accordingly, the phrase "not exogenous" will in general be identified with the term, "endogenous."

Finally, Axiom (1), in principle, could be modified to "at least one, but not all elements of the set, I, are exogenous variables in the explanation of  $Z^0$ ," and still be seemingly consistent with the general notion that individualist explanation is logically denied only if no one's I plays a role in determining  $Z^0$ . Unfortunately, the weaker forms of Individualism which might be generated under this alternative assumption are difficult to defend on logical grounds. This is largely because the individualist is wary of explaining the failure of anyone to "represent" their preferences as a given "in nature," or as a product of some social institution which is not a "rational choice" of all individuals, and is therefore exogenous. If any individual's decision to not have (at least some) of his preferences "count" in the determination of coordinated states therefore must be consistent with rationality, then, quite simply, at least some of his preferences must have counted in his very decision to rationally abdicate his sovereignty.

## 2. "Classical" Individualism

Given the above interpretative qualifications, the next step is to define "classical" Individualism as the view which endorses Axioms (1),

(2), and (3), and adds the additional axiom:

Axiom (4): All elements of S (and the state(s) of aggregate coordination which are codetermined with them) are endogenous variables, and are completely explainable by reference to the elements of the sets, N and I.

In deference to historical tradition (see Popper (1945) and Agassi (1960)), and, in particular in deference to the contractarian inspiration to explain the formation of the social order from a natural state in which all individuals have psychologically "pure" (and, thus, socially-untainted) preferences (see Rawls (1971); Nozick (1974); Buchanan (1975b), also Newman (1979)), "classical" Individualism will henceforth be denoted as "Psychologistic" Individualism (PI). It is understood that the term "psychologistic" and the term "classical" are perfectly identical.

It is apparent that the most important feature of this viewpoint is that, not only are all elements of S taken to be endogenous (Axiom (3)), but also all such elements are seen to be explainable by reference to "more basic" elements -- those of N and I. Let me therefore denote any social entity which can be completely explained by reference to I alone, or to N alone, or to N and I together, as a "reducible" social entity (see Wisdom (1970)), and any theory of coordination which can explain all such social entities (and the coordinated state which is codetermined with them) in these terms as one which exhibits the property of Global Reducibility. Since PI can explain all elements of S by reference to elements of N and I, PI therefore exhibits Global Reducibility, and it is convenient to denote the Globally-Reducible set of S implied as  $S^*$ . Accordingly, PI can be defined as the theory which states that the exogenous factors, N and I, are just sufficient to explain  $S^*$  and  $Z^*$  ( $\in \Pi_{PI}^*$ ). It is recalled that this theory is explanatorily complete with respect to all observed phenomena if and only if all  $Z^0 = Z^*$  ( $\in \Pi_{PI}^*$ ).

Before moving on, it should be remarked that some implications of

Global Reducibility -- such as the proposition that, in a PI-equilibrium, all equilibrium relative prices must be derivable from tastes and technology, along with equilibrium "quantities" (i.e.,  $Z^* \in \Pi_{PI}^*$ ) -- are clearly well understood. However, other implications -- such as the proposition that all institutions of government policy and all institutions underlying market structure must also be (endogenously) derivable from tastes and technology in a PI-equilibrium -- appear to receive a less frequent hearing, and this has obscured critical debates.

Thus, the ideas that government policy (even including "monetary rules") cannot affect behaviour in a classical equilibrium that neither relative prices nor (real) policy variables can change unless at least one element of  $N$  or  $I$  change, simply follow from the definition of Global Reducibility. If either prices or policy really had any autonomous power to change anything, then at least one element of  $S$  would have to be regarded as exogenous, and both Global Reducibility and PI-explanation would have to be sacrificed (as overdetermined). All this says is that policy and prices can autonomously affect real behaviour only outside of a PI-equilibrium. Keynesians of course might state this last idea as the proposition that policy can have a non-trivial role in influencing aggregate behaviour if and only if at least one price is "stuck" at a value which is not consistent with "tastes" and "technology."

## 2. The Denial of Individualism and the Denial of Psychologic Individualism: An Initial Perspective

It is a matter of definition that all critics of "classical" (PI) explanation have attempted to deny at least Axiom (4), and have proposed non-classical explanations of observed coordination which do not rely on this axiom. By the same token, it is a matter of definition that all critics of Individualism have attempted to deny at least one of Axioms (1), (2),

or (3), and have proposed non-individualist explanations of observed coordination which do not rely on the fulfillment of such. Unfortunately, the major historical problem is that critics of "classical" (PI) explanation have often thought that PI and Individualism were identical positions, so that they ended up criticizing either (1), (2), or (3) to remove (4), rather than removing (4) by itself, and keeping (1), (2), and (3). It is clearly only this last strategy which can produce a non-classical Individualism, and its neglect has traditionally compromised serious critical discussions of PI explanation and its alternatives.

In order to understand the complete set of "stage one" options open to deny at least Axiom (4), it is useful to start by considering the strongest critiques of PI -- which deny Individualism outright -- first, and then moving to an analysis of the weaker critiques of this position. More precisely, the analysis will begin by examining those theories of coordination which deny Axiom (1) in particular, and then showing that the consequence of the denial of (1) is that at least one of (2) or (3) must be denied as well. It is demonstrated then that only the denial of both (1) and (3) generates a non-classical theory of coordination which denies Global Reducibility. After this, a weaker position which denies (3) alone will be considered, and, finally, a position which denies (4), but maintains all of (1), (2), and (3). This last viewpoint -- which maintains Individualism but denies Global Reducibility -- defines the requirements of a successful non-classical Individualism. However, the thrust of the analysis of this chapter is that this last position cannot be logically defended if the "heroic assumption" holds.

2.1 To begin, therefore, consider a claim which is often put forth by thinkers of a broadly Marxist, Institutional, or Galbrathian perspective (but one which would be most certainly denied by most Keynesians):

that individual preferences and rationality can never in fact be autonomous variables in the explanation of observed coordination, since these items are determined (shaped by) social and/or natural forces. More specifically, if it is argued that all elements in I can be completely explained as an endogenous product of (at least some) elements of N and/or S, then the following axiom holds instead of (1):

Axiom (1'): No element of the set I is an exogenous variable in the explanation of any  $Z^0$ .

It follows immediately, however, that the attempt to deny (1) -- and replace it with (1') -- while maintaining both (2) and (3), can never produce a successful account of observed coordination. By this constellation of assumptions, and recalling the "heroic assumption" that no variables beyond the elements of N, I, and S can be explanatory, the only possible set with explanatory power is N and, as it stands, elements of N are not sufficient to explain  $Z^0$ . This is why critics of (1) logically have to make a further adjustment in at least one of (2) and (3) to achieve a determinate non-individualist explanation. Let me deal with these options in turn.

2.2 As has been implied on a variety of occasions, all traditional participants in debates over "coordination" have been willing to accept the idea that a non-trivial account of observed coordination demands that N be seen to exert at least some minimal influence on transpired coordination. Accordingly, no one will attempt to deny (2) in such a way as to make nature endogenous in the problem. Such a strategy is also ruled out by the evident underdetermination in the problem at hand. Thus, the only interesting way to deny (2) here is to move in the other direction, i.e.,

Axiom (2'): The set of all elements of N, by itself, is just sufficient to explain any  $Z^0$ .

Under (2'), (1') and (3), the position which may be termed, Naturalism, can be

constructed. Under this view, all elements of both  $S$  (as  $S^*$ ) and  $I$  (as  $I^*$ ) are endogenously-determined, along with  $Z^*$  ( $\in \Pi^*$  Naturalism), from the set,  $N$ , alone.

The interest of Naturalism in the context at hand evidently lies in the fact that it is the only non-individualist account of observed coordination which does not deny Global Reducibility. In fact, it is the most extreme form of explanatory reduction to "basic elements" possible, since it declares both the properties of social entities and the properties of individuals to be epiphenomenal, relative to the ultimate "laws of nature." Thus, for all this position may have had some following by those who, on one hand, were interested in demonstrating that equilibrium prices could be completely determined by considerations of technology and "cost of production" (see Arrow and Starrett (1973)) and, on the other, by those who wanted to defend the view that preferences and rational maximizing behaviour were really part of "human" nature (see Becker (1976)), it is apparent that Naturalism can never constitute the "acceptable" debating position for critics of PI. Since it simply does not deny the Global Reducibility of social entities and, thus, shares the "reductionist" spirit of Psychologistic Individualism itself, Naturalism constitutes more a position that defenders of PI would like to fall back on, if they ever had to relinquish the individualist character of their explanations.

2.3 If the denial of (2) is unacceptable to the critic of PI, then given the "heroic assumption" and the maintenance of (1') instead of (1), the mantle must fall to (3). The denial of (3) produces the following axiom:

Axiom (3'): At least one (but possibly all) elements of the set,  $S$ , are exogenous variables in the explanation of  $Z^0$ .

The "at least one, but not all" case of this axiom will be denoted as its "weak" form and the "all" case as its "strong" form.



The non-individualist character of (3') is obvious: the axiom must deny both the Global Reducibility associated with (4) -- if at least one element of S is not explained, then, by definition, it cannot be explained by reference to N and I -- and the "individualist conception of social institutions" (3). The basic inspiration behind the denial of (3) is the idea that it is logically impossible to explain social entities as a consequence of any more primary variables; they are therefore non-reducible and autonomous in the explanation of observed coordination. The autonomy of "social wholes" implied by this viewpoint is why the denial of (3) alone -- and its replacement by (3') -- is usually taken to define the position of Holism (see Popper (1945); Agassi (1960)). This view in turn entails the "holistic conception of social institutions": that social institutions do have a "life of their own" and that they cannot in principle be explained either as a rational choice of individuals (since institutions block or overrule rational choice), or as a product of natural limitations alone.

The conjunction of (1'), (2), and (3') then constitutes the standard "acceptable," debating position for critics of "orthodox" (PI) explanation (see Brunner and Meckling (1977)). Since the position produced by the endorsement of (3') alone has already been designated Holism, it is useful to denote the above conjunction of axioms as defining the position of Sophisticated Holism (SH). Assuming, as is customary, that a symmetrical application of the "holistic conception of institutions" to all social entities leads to the view that all social entities are exogenous variables in the explanation of any  $Z^0$  (the "strong" form of (3')), then SH may be stated formally as the view that the conjunction of all exogenous elements of N with those of S is just sufficient to explain  $Z^*$  ( $\in \Pi^*_{SH}$ ), and I (as  $I^*$ ).

The essential characteristic of the SH-critique of PI explanation is that it denies both Individualism and Global Reducibility (unlike Naturalism). The denial of (4) through the denial of (1) and (3) may then be written as:

Axiom (4'): No element of the set, S, is explainable by reference to N and I alone, or need be explained at all.

The reason for why (4') is written up in such a way as to deny the possibility of any element of S being "reducible" follows from the proposition that, if even one element of S is "non-reducible," then any successful explanation of  $Z^0$  (as  $Z^*$ ) must require that all elements of S be "non-reducible." This point will be made more precisely in a moment.

The final feature to note about SH-explanation is that it is, structurally, the "family twin" to PI, since the roles of S and I have just been reversed. In any SH-equilibrium, individuals are "puppets" of social cum natural forces and have no power to shape the world in their own best interest, given their autonomous preferences and rationality. In any PI-equilibrium, individuals are rational choosers of the social arrangements which best satisfy their own autonomous preferences, given the limitations of nature. It is the structural similarity of these two positions which perhaps explains why the PI-SH debate has always been such a dominant concern for both defenders and critics of classical Individualism explanation alike.

### 3. Breaking the Dichotomy Between Sophisticated Holism and Psychologicistic Individualism

It is evident that the PI-SH debate goes nowhere. Since defenders of PI regard SH as the most flagrant example of a "behaviourally arbitrary" explanation of coordination -- since it simply offers no explanation for why individuals could not reform the posited (holistic) institutional constraints if they were in fact inconsistent with "maximization" -- it is

logically impossible for non-classical thinkers to ever convince Classicists of the worth of this position. This entails the familiar dichotomy: either one accepts PI explanation or accepts behaviourally arbitrary explanations; there is nothing in between. Hence, the search for something less flagrant than SH, which is not PI, and which can therefore intermediate PI and SH. To produce such a theoretical intermediation is, in all fairness, the basic Keynesian inspiration, and it has also become a recent preoccupation of all those interested in a theory of non-neutral money, a theory of contracts, and a general theory of property rights (see references above).

Since SH consists of the conjunction of Axioms (1'), (2), and (3') -- which by implication must deny (4), Global Reducibility -- it can be seen immediately that there are really only two interesting options open for the "intermediating" theorist to consider: (a) to reinstate (1), keep (2) and keep (3') -- the last in its "weak" version -- or (b) to reinstate all the axioms of Individualism, (1), (2), and (3), and establish some way to deny (4) by itself. The first strategy, of course, denies (4) by denying (3). The basic point here is that both of these strategies aim to do the same thing -- to deny (4) without producing SH; however, the strategies are structurally different and can be (and have been) unsatisfactorily confused with one another.

3.1 Consider that version of the first strategy which appears to constitute the smallest conceivable departure from PI explanation. Thus, assume that (1) and (2) are endorsed and that (3') is defined so that one and only one social entity is treated as an exogenous variable in the explanation of  $Z^0$ . For concreteness, the social entity might be associated with one exogenously-fixed price, wage, or interest rate, or even a "barrier to entry." Since, by the nature of the case, this social entity is

presumed to be not derivable from N and I, it is "non-reducible," and can be denoted  $\hat{S}$ . The proponent of this viewpoint will then contend that  $\hat{S}$ , N, and I are the just sufficient set of exogenous variables to completely explain all other social entities and the aggregate coordinated state which goes with them. This explanation is still clearly in accord with Holism (since (3) is denied), so that the Z\* determined still must be regarded as an element of  $\Pi^*$  Holism, but this is not what the defender of this view wishes to stress. Rather, his basic point is that individual preferences count in this explanation of coordination (since he maintains (1)) and that he leaves ample room for rational choice, since agents can pick all but one social institution in their own best interest. Moreover, he will emphasize that it is precisely these features which make his position qualitatively distinct from that of SH.

3.2 Unfortunately, the defender of SH will be constrained to point out to the proponent of this intermediating position that the only reason that he obtains his "free choice" is because he has made asymmetric use of the "holistic conception of social institutions": Why did he treat only one social entity as exogenous, rather than them all--and why the particular  $\hat{S}$ ? Thus, the defender of SH will claim that his adversary's attempt to weaken SH by singling out  $\hat{S}$ , and  $\hat{S}$  alone, for holistic treatment is quite arbitrary, and if he removed this arbitrariness--by treating all social entities as exogenous--then individuals would simply have no free choice on any element of S. This view, by implication, would also entail that Axiom (1) could not be maintained, since if all elements of both N and S were predetermined, then it would be rendered only accidental that these predetermined values would fit with those of exogenous I. According to the SH-critic, therefore, the attempt to wed (1), (2), and (3') in order to effect an intermediation of PI and SH must fail on grounds of arbitrariness; the only

way to remove the arbitrariness is to transform the intermediating position into SH itself. (Note, of course, that the charge of arbitrariness here comes from the SH quarter and not the PI quarter.)

3.3 The defender of PI, on the other hand, begins his critique by noting that the defender of the intermediating position has done more damage than he apparently intends. Thus, the Classicist will note that if  $\hat{s}$  is taken to be non-reducible (meaning, in "classical" parlance, is--except by accident--a "true" social distortion), then all the other social institutions must constitute non-reducible, social distortions as well, since they can be completely explained as an endogenous product of transpired coordination if and only if they are derivable from N, I, and  $\hat{s}$ . He will state that this is no more than an application of the "old" theorem that if one price is ever "stuck" at a non-competitive value, then, in equilibrium, all other prices must be "wrong" as well. (In general, it will be convenient to denote the set of elements of S, all of which are not "reducible," as a Globally Non-Reducible set,  $\hat{S}$ , where  $\hat{S}^*$  represents the equilibrium configuration of  $\hat{S}$  to be explained.) Moreover, the Classicist will take this observation to imply a fundamental criticism of the idea that rationality can really prevail in the assumed explanatory context.

In this respect, what the defender of PI will grant is that an explanation in which some elements of S are taken to be endogenous, and which therefore endows individuals with some option to set, or reform, these elements of S in their own best interest, is in principle more to his liking that explanations which straitjacket individuals by removing social adjustment options altogether. The problem he sees, however, is that the explanatory framework in question does not guarantee that "rational" adjustments in the endogenous elements of S can be possible if these are constrained autonomously by  $\hat{s}$ . Stated alternatively, if the (unexplained)

$\hat{s}$  can be consistent with rational choice only by accident, and all other elements of S must reflect  $\hat{s}$ , along with N and I, in equilibrium, then it follows it can be only a matter of accident that any element of S can take up a coordinating position which is consistent with the maximization of gains from trade. If this is the case, then the defender of PI must also conclude that Classical Global Rationality cannot prevail, except by accident.

The upshot of the discussion, therefore, is that the scenario under investigation only exhibits "partial" rationality, and according to the proponent of PI, this situation still cannot avoid behavioural arbitrariness. The reason is simply that partial rationality by itself (i.e., without the locking in of  $\hat{s}$ ) can only produce underdetermination, while buttressing partial rationality by an autonomous determination of  $\hat{s}$  can only deny Individualism. Moreover, given PI explanatory standards, the only way to avoid the problems here is to show that  $\hat{s}$  can actually be explained by reference to some specification of N and I and, therefore, constitutes only an apparent distortion. Under these circumstances, all the remaining social entities can be seen to take up their unconstrained "classical" positions in equilibrium, and the "maximizing" explanation can hold. Axioms (3) and (4) are reinstated.

In any event, the above analysis explains why Classicists have always been so uncomfortable with all Keynesian explanations of aggregate coordination which start from an arbitrary invocation of a private sector rigidity (e.g., in prices or wages) and then invoke "rational," and presumably non-rigid, government policies to correct the situation. Not only would it be contended that there is little rationale for assuming that government institutions (in S) are less sluggish than private sector institutions (in S) but also it would be claimed that the entire role for "rational" government in the explanation hinges on the arbitrariness of the institutional

assumptions made in the first place; namely, that private sector agents can endorse and sustain institutions which are not in their best interests. As is apparent from the recent classical literature on "optimal" contracts (see references in Chapter Four; also Blanchard (1979)), would it not be better to explain the determination of fixed price/wage contracts as a (classically) rational choice, given N and I, and thereby non-arbitrarily exercise the role for government altogether?

3.4 The prospects for the "intermediating" position created by the conjunction of (1), (2), and (3') are therefore clear. Defenders of PI will always claim that the position is behaviourally arbitrary if it leaves any social institution unexplained (i.e., if it does not remove the Holism entailed by (3'), by reinstating (3)). Defenders of SH will always claim that the position is arbitrary if it does not endorse the "strong" form of (3'), thereby denying (1) outright. In short, the position is not critically convincing to anyone, for all it may seem to be an acceptable, "liberal" fusion of two extreme and unpalatable viewpoints.

#### 4. Non-Classical Individualism

The only position remaining to consider is one which maintains (1), (2), and (3)--and therefore satisfies the requirements of individualist explanation--but denies the Global Reducibility implied by (4)--and therefore is non-classical in character. It is in principle the only potentially successful, non-arbitrary intermediation of PI and any form of Holism. The only axiomatic adjustment required is the replacement of (4) by the following:

Axiom 5: All elements of the set, S (and the state(s) of aggregate coordination which are determined with them) are endogenous variables, and are in principle completely explainable only by N and I, plus some additional set of exogenous variables.

There are three points to emphasize about Axiom (5). First, it states

that the elements of N and I alone are logically insufficient to explain any  $Z^0$  (as a  $Z^* \in \Pi_{PI}^*$ ). This implies that the set S can only be explained as a Globally-Reducible  $S^*$  by accident (Axiom (4) is denied) and that the general objective of this explanatory programme is to explain the Globally Non-Reducible set,  $\hat{S}^*$ . Second, and by definition, Axiom (5) rules out the possibility that any element of S can be treated as an exogenous variable in the "additional" set of exogenous variables (which maintains (3)), while simultaneously ruling out the second clause in (4'). Finally, it is apparent that the essential task of this programme is to specify precisely the elements of the set of "additional" exogenous variables which are just sufficient to explain observed coordination as non-classical Individualism coordination.

At this point, it is convenient to reduce the cumbersomeness of the phrase "non-classical Individualism," and to denote this programme as "Generalized" Individualism (GI). Hence, Psychologicistic Individualism (PI) and Generalized Individualism (GI) will be seen henceforth as the two competitors for the mantle of Individualism: The objective of GI can then be formally stated as that of specifying a set of additional exogenous variables which, when combined with all the elements of the sets, N and I, are "just sufficient" to completely explain  $\hat{S}^*$  and  $Z^* \in \Pi_{GI}^*$ .

It should be noted that the term "generalized" is not used here arbitrarily. Since PI is formally underdetermined relative to GI, GI is the general explanatory framework which includes PI as a special ("accidental") case. This is unlike any Holistic (traditional Keynesian) framework, which is even underdetermined with respect to PI, and thus is a special case of the latter, since it takes for granted social constraints which it should (and PI can) explain. The fact that Keynesians often argue that their structure is the "general" one only illustrates a quite unsatisfactory



confusion of the non-reducibility and (global) endogeneity of S implied by GI with the exogeneity of S implied by Holism. The fact that defenders of PI often claim that their framework is the "general" one only illustrates the unsatisfactory equation of PI with all Individualism, and, thus, the failure to recognize the GI option at all.

In short, GI structure provides the only theory of aggregate coordination which can explain the (sustained) existence of equilibria with "true" social distortions without sacrificing the postulates of Individualism and Global Rationality. Indeed, it is "non-reducibility" implied by this view which makes it fit so well with the investigation of the questions of non-neutral money, (classically) "sub-optimal" contracts and policies, and all issues connected with monopolistic distortion, while it is the maintenance of Global Rationality in the explanation of such (bona fide) social distortions which makes it fit so well with the appropriate standards of non-arbitrary and logically complete explanations.

##### 5. The Stage One Conclusion: Generalized Individualism Is Logically Impossible

As I have stressed from the outset of this chapter, my approach to the understanding of Generalized (i.e., non-classical) Individualism here is largely by way of the (negative) demonstration that, if elements of N, I, and S are deemed to constitute an exhaustive set of (potentially) exogenous variables by which to explain observed coordination--the "heroic" assumption of stage one--then GI is logically impossible.

5.1 The proof of this point is elementary: if N and I are not sufficient to explain  $Z^0$  as a state where  $S^*$  and  $Z^* \in \Pi_{PI}^*$  prevail (Axiom (4) is denied), then, given the "heroic" assumption, any determinate explanation of  $Z^0$  must assign an exogenous role to at least one element of S. This immediately denies (3)--which denies Individualism--and denies (5)--which denies GI.

Thus, the denial of PI is the denial of Individualism as such. The objective of GI, of course, is to deny (4) without denying (3) or (5) and, to achieve this, a "second stage" of analysis must be opened up whereby the internal inconsistency between Axiom (5) and the "heroic assumption" is removed--by abandoning the "heroic assumption."

5.2 As I have also indicated earlier, what characterizes "stage two" analysis is that the additional factor, exogenous knowledge, is seen to be the strategic variable in completing the explanation (determination) of any  $Z^0$ , given that N and I alone are presumed to be insufficient to perform this task, and that elements of S cannot be assigned exogenous status.

The fact that GI structure cannot be structurally completed without the introduction of exogenous knowledge is therefore just the opposite side of the coin to the fact that PI and any form of Holism can be structurally completed without reference to exogenous knowledge at all. PI explanation and Holistic explanation are indeed the only interesting products of stage one analysis and the theoretical vacuum which must exist between these two modes of explanation under the "heroic assumption" is, moreover, what makes the "classical critique" so powerful and inevitable. The stage two, GI demand to transfer knowledge from the endogenous (or irrelevant) category to the exogenous category is therefore a straightforward attempt to define an explanatory setting where the "classical critique" cannot logically hold.

5.3 In exposing the logic of the above argument in simple terms, I am of course not suggesting that interactions between proponents of PI and GI must be particularly straightforward. While both of these views indeed unite on their denial of Holism, the only interpretation that I can presently make of the contemporary avant-garde classical position (see the Barro and Lucas references above) is that it is willing to accept the logical impossibility of ever constructing a successful GI-structure. This is equivalent to the

proposition that stage two (or, for that matter, stage three or four) analysis cannot in principle succeed and, accordingly, that there is no possible way around the "classical critique" of stage one. A related, and equally important, view is that the above situation is not really problematic, since knowledge considerations can be successfully handled in a stage one, PI fashion anyway.

It is the last claim above which deserves careful consideration, since the success of any PI programme to (endogenously) explain all knowledge phenomena associated with any and all  $Z^0$  must rest on the provision of a crucial guarantee--and one which has been consistently emphasized above. This is that, in no conceivable instance (in particular, short-run instance) can knowledge ever autonomously constrain the achievement of the Classical Global Rationality (CGR) which entails the realization of maximum gains from trade. With the guarantee that knowledge is always "sufficient" to allow CGR to operate, it indeed follows that any  $Z^0$  can be successfully explained as  $Z^* \in \Pi_{PI}^*$ , where  $S = S^*$ , and there is no intrinsic reason to consider GI explanations of  $Z^0$ , when PI can do the job already. Here the GI proposal to consider exogenous knowledge, "true" social distortions, and the like is a genuine mistake; there is no reason to move to a consideration of stage two explanation except in the name of destroying (already-demonstrated) stage one theorems.

5.4 In the light of the above, the interest and thrust of any GI-argument rests on only one contention: that PI thinkers cannot logically provide the guarantee that knowledge is always sufficient for the existence of CGR in the short-run. Accordingly, proponents of PI cannot rule out the logical possibility of the existence of some (short-run)  $Z^0$  which is intrinsically incapable of being explained as a PI-equilibrium where "true" distortions are absent. Such a "classical disequilibrium" state must

therefore be explained as a non-classical equilibrium, and the only individualist, non-classical explanatory candidate available is GI. In stating this position, it is emphasized that GI thinkers have no objections whatsoever to the classical arguments that CGR must prevail in the long-run, where agents possess an infinity of time to learn where the PI-optima are.

The only possible GI strategy to cover the explanatory incompleteness of PI explanation in the short-run by moving to "stage two" explanation is therefore to produce some specification of exogenously-constraining knowledge, which rules out the possibility of CGR and thereby renders achievement of classical equilibrium  $S^*$  an accident, but which is nonetheless logically consistent with the possibility that Non-Classical Global Rationality (NCGR) always prevails. The guarantee that NCGR always prevails in the short-run (while CGR does not) is then the guarantee that any  $Z^0$  which cannot be explained as PI-equilibria can be explained successfully as a  $Z^*$  ( $\in \Pi_{GI}^*$ ), where  $S = \hat{S}^*$ , given  $N$ ,  $I$ , and the exogenous constraints of (limited) knowledge.

The questions which immediately suggest themselves, and which will be a dominant concern in all the subsequent analysis are as follows:

- (a) Is it logically possible for knowledge to be sufficient to guarantee NCGR without being sufficient to guarantee CGR?
- (b) Is it logically possible to demonstrate that the knowledge sufficient for NCGR can be generated in less than the amount of time which is required to generate knowledge sufficient for CGR? And
- (c) If the guarantee of short-run knowledge which is logically sufficient for NCGR cannot be established, then does this mean that the only logically complete explanations of short-run  $Z^0$ 's available must be non-individualistic in character (e.g., Naturalism or some form of Holism)?

## CHAPTER SEVEN

KNOWLEDGE AND THE "SIMPLE" CLASSICAL SYSTEM

It is useful to begin a discussion of the knowledge considerations introduced above by considering the simplest possible "stage one" treatment; namely, that of PI under an Arrow-Debreu specification. Thus, it is assumed explicitly that individual decisions are not constrained by a transactions technology, or by an adjustment technology, or by an information gathering cum search technology; in short, the costs of transacting (adjusting, procuring information) are uniformly zero. The initial question is: What knowledge must individual agents possess in order to guarantee the realization of a  $PI-\Pi^*$  and  $S^*$ ? It will be seen directly that whatever knowledge is "sufficient" to guarantee a  $PI-\Pi^*$  and  $S^*$  must constitute exactly the knowledge which is sufficient to guarantee the realization of decision making in accord with Classical Global Rationality (CGR).

1. The Knowledge Requirements of PI-Coordination

Recalling that PI is the theory of aggregate coordination that posits that  $N$  and  $I$  constitute a just sufficient set of exogenous variables by which to explain observed coordination, let me begin the discussion by making some basic observations about the PI problem of "sufficient" knowledge as seen through the eyes of any one individual.

Thus, for any individual, say  $j$ , it may be assumed that there are two decision parameters which  $j$  regards as immediately relevant to his economic position--his "personal givens,"  $N^j$  and  $I_j$ . Evidently,  $j$ 's knowledge of his own personal givens is sufficient for  $j$  to calculate a set of potential "maximizing" decision acts but it is not sufficient to guarantee that any of these potential acts actually can coordinate with those of the  $(n-1)$  individuals in the environment. For  $j$  to establish the appropriate

guarantee of PI-coordination--which is therefore a guarantee of the "realizability" of (at least one of) j's potential "maximizing" acts--further knowledge is necessary; he requires some faithful summary of everyone else's "personal givens," from which he can determine those maximizing acts of his own that are in fact compatible with the realization of a PI aggregate coordinated state. Thus, the immediate (and unavoidable) conclusion is that j must gain access to that knowledge which faithfully reflects (the values of) every element of N and I.

Such conditions on the extent of j's knowledge are indeed stringent but what is also apparent is that the above requirement only constitutes a necessary condition for the realization of j's desired action. Since the realization of j's maximum is conditional on the realization of the maxima of all others--which presumes that they also have access to knowledge which faithfully reflects every element of N and I--it follows that the sufficient condition guaranteeing the coordination of j's maximizing decisions with those of everyone else can be only that all n individuals have access to all the information in N and I, and act (rationally) on this knowledge. Thus, all individuals must be able to act upon the same determination of a PI- $\Pi^*$  from the given N and I that j does.

The above analysis therefore leads to a rather stark conclusion right from the outset: that the "informational sufficiency" of PI necessarily requires that all individuals possess knowledge which faithfully reflects (the value of) every element in the vectors, N and I. This is the condition which guarantees that a PI- $\Pi^*$  can be realized, and any observed state which might be explained as a PI coordinated state from less information than this can be construed as only an accidental occurrence.

#### 1.1 "Perfect" Knowledge and "Sufficient" Knowledge

It is apparent that the PI informational requirement specified above

can be seen to mean one of two things:

- (a) that all individuals have perfect and complete knowledge of (the values of) all elements of  $N$  and  $I$ ; or
- (b) that all individuals have perfect and complete knowledge only of their own personal givens,  $N^j$  and  $I_j$ , plus a "rule" or "signal" derived from, and which faithfully reflects, the values of all elements of  $N$  and  $I$ .

The evident importance of case (b) is that it does not assume that agents have access to the values of the "personal givens" of each and every individual, whereas (a) does. However, since (b) posits that individuals have access to a faithful aggregate summary of the complete set of elements of these vectors, it is still consistent with the universal achievement of "sufficient" information to reconcile the (known) personal givens with one another and, thus, to realize PI coordination.

Both (a) and (b) satisfy the condition which will be denoted "Universal Sufficient Knowledge (for PI coordination)," henceforth  $USK_{PI}$ . The case, (a), of course defines the condition of "Universal Perfect Knowledge" ( $UPK_{PI}$ ), and is the strongest form of  $USK_{PI}$ . In this respect,  $UPK$  stipulates enough knowledge for any individual to actually calculate the aggregate coordinating signal posited in (b), whereas knowledge of this coordinating signal by itself does not permit the inference of (the values of) all elements of  $N$  and  $I$ . In this regard, (a) may be denoted as a case of maximally-sufficient knowledge and (b), a case of minimally-sufficient knowledge.

It should be stressed that, in what follows, the case of minimally-sufficient knowledge will ~~prove to~~ be the most important. This largely stems from the attention paid to Hayek's (1948) ingenious insight that perfect knowledge was not required to guarantee PI-coordination: if all agents knew their own ~~personal~~ givens, plus the aggregate signal,  $S^*$  (traditionally construed as a set of classical competitive general

equilibrium relative prices), then they could reach PI coordination without direct access to the values of  $N$  and  $I$ , even though  $S^*$  was derived from  $N$  and  $I$ . In this light, it will prove convenient hereafter to indicate the strong form of  $USK_{PI}$  only by  $UPK_{PI}$  and reserve  $USK_{PI}$  (without qualification) for the general expression of the minimally-sufficient case.

## 1.2 The "Conjectural" Reconstruction of the Knowledge Requirements for PI Coordination: The Theory of Expectations

In order to illuminate the properties of PI-equilibria which follow directly from the fulfillment of the above knowledge requirements, it is now convenient to assume the same scenario as the one from which the discussion began, but to interpret it in a slightly different way. Thus, assume each individual has independent knowledge only of his own personal givens,  $N^j$  and  $I_j$ , and attempts to determine a maximizing action. As before, individual  $j$ 's attempt to act on these parameters alone will leave him with an unlimited set of potential maximizing acts, none of which, however, are guaranteed to be consistent with the realization of a  $PI-II^*$  and  $S^*$ .

The interpretation of this setting now proposed is that each individual's decision problem is structurally underdetermined without some "conjecture" concerning the potential behaviour of all others. This viewpoint then opens up the role for individual "expectations" in the setting --as the additional variable in each individual's decision problem which, when combined with  $N^j$  and  $I_j$ , can successfully limit potential behaviour to expected realizable behaviour, and therefore remove the posited underdetermination. It should be stressed that the need for "expectations" in this formulation must coexist with the need for additional individual knowledge beyond  $N^j$  and  $I^j$  (discussed above), so that it is not surprising that the condition of  $USK_{PI}$  is the condition which guarantees the expectations of all individuals can be realized. This is the ultimate point of the



analysis which is to follow.

### 1.2.1 j's Theory of the Global Reducibility Position

Given the above perspective, it is appropriate to interpret the structure of individual  $j$ 's problem explicitly as one where  $j$  is constrained to hold some theory about the aggregate coordinated state under which he can just realize his best-possible utility position. By the nature of the problem, this is then a theory of the PI aggregate coordinated state in which a Globally-Reducible  $S^*$  prevails. More explicitly, this theory (henceforth, denoted  $T_j$ ) is a theory about the true properties and circumstances of others, from which can be deduced an "expectation" of the true properties of nature and individuals in aggregate. Denote these expectations, respectively, as  $E_j(N)$  and  $E_j(I)$ , where, by assumption, one element of each of these conjectured aggregate vectors-- $j$ 's personal givens,  $N^j$  and  $I_j$ --is assumed to be known from the outset (i.e.,  $j$  can verify that specific part of his posited theory which concerns his own properties and circumstances):

Now, it follows directly that  $E_j(N)$  and  $E_j(I)$  are sufficient data for  $j$  to calculate  $E_j(S^*)$ --the expectation of the set of social constraints that  $j$  would just like to endorse in order to realize his best-possible maximum-utility position. Individual  $j$ 's  $E_j(S^*)$  thus embodies  $j$ 's conjecture on the possible  $PI-\Pi^*$  which could prevail in the environment in question, given that his expectations of  $N$  and  $I$  were in fact "true."  $N^j$ ,  $I_j$ , plus  $E_j(S^*)$  then can determine  $j$ 's set of own actions,  $Z_j$ , which he perceives to be compatible with this (conjectured)  $PI-\Pi^*$ .

It is apparent that the analysis for  $j$  holds for all  $n$  individuals in the setting. Individual  $b$ , for instance, must hold a similar theory,  $T_b$ , from which he can deduce  $E_b(N)$  and  $E_b(I)$ . In turn  $b$ 's expectation of the set of social constraints that he would just like to endorse in order

to realize  $PI-\Pi^*$  interaction,  $E_b(S^*)$ , can be derived from  $E_b(N)$  and  $E_b(I)$ .

### 1.2.2 j's Theory of the Actual Coordinated State

Just because  $j$  would like to realize his "target"  $PI-\Pi^*$  does not mean however that he actually expects it to transpire. An aggregate state in which  $S$  is not derivable from  $N$  and  $I$  might actually transpire, so that "j's theory of the actual coordinated state which will come to fruition" (henceforth, denoted  $T'_j$ ) will only be identical to his theory of the  $PI$  Global Reducibility position ( $T_j$ ) if he anticipates that maximization (relative to  $N$  and  $I$ ) will actually take place. In general,  $T'_j$  expands  $T_j$  by incorporating an independent conjecture on the properties of the set,  $S$ , which will actually be realized in a coordinated state.  $T'_j$  therefore implies the additional expectation,  $E_j(S)$ , which is (conditionally) conjoined with the  $E_j(N)$  and  $E_j(I)$  of the original  $T_j$ . Of course, in the case where  $j$  actually anticipates the realization of a  $PI-\Pi^*$  and  $S^*$ , there is no difference between  $T_j$  and  $T'_j$ .  $E_j(S) = E_j(S^*)$  is derived completely from  $E_j(N)$  and  $E_j(I)$  and therefore has no structural autonomy. On the other hand, in the case where  $j$  does not anticipate the achievement of a  $PI-\Pi^*$ --he anticipates  $PI$  "in disequilibrium"-- $E_j(S)$  becomes the strategic autonomous datum by which  $j$  can calculate the non-maximizing coordination that he anticipates to prevail.

### 1.2.3 The Expectational Requirements of $PI$ Coordination

It follows directly that the conditions under which a  $PI-\Pi^*$  can be realized are that everyone expects the same  $PI-\Pi^*$  to be realized (given the same  $T_j$ , where  $T_j = T'_j$ ), everyone anticipates that each other expects the  $PI-\Pi^*$  in question to be realized and, finally, that the mutually-anticipated  $PI-\Pi^*$  is in fact logically consistent with the given values

for N and I.

More precisely, the first condition--that all individuals' expectations of the PI coordinated state are identical--may be conveniently summarized by the expression:

$$E_1(S^*) = E_2(S^*) = \dots = E_j(S^*) = \dots = E_n(S^*) \quad (1)$$

The next condition is that the "second-order" expectations of all individuals are identical. In particular, define:

$$E = \{E_1(S^*), E_2(S^*), \dots, E_j(S^*), \dots, E_n(S^*)\}$$

Then, it follows that the vector of all individuals "expectations of expectations" can be written:

$$\{E_1(E), E_2(E), \dots, E_j(E), \dots, E_n(E)\}.$$

The claim that the second-order expectations of all individuals are identical therefore becomes the claim that:

$$E_1(E) = E_2(E) = \dots = E_j(E) = \dots = E_n(E). \quad (2)$$

The final condition is that the S\*-environment that all individuals expect, and expect others to expect, is one which is consistent with the "true" givens of a PI general equilibrium problem under consideration.

This condition entails the realization of the identical expectations in (1) and (2) above; i.e.,

$$E_j(S^*) = S^*, \text{ for all } j. \quad (3)$$

It is worthwhile noting that the fulfillment of conditions (1) and (2)--which implies the "coordination" of expectations--does not imply the fulfillment of (3)--the "realization" of expectations. (1) and (2) specify the conditions under which individuals can rationally endorse all elements of the set S with unanimity; it is therefore a potential situation of aggregate coordination. Individual action based on this unanimity can only be guaranteed to be realizable, however, if the uniformly-anticipated

institutions are ones which are compatible with the "true" givens of the general equilibrium problem (e.g., everyone could expect Utopia, and expect everyone else to anticipate likewise, but a Utopia need not be physically realizable). This is why (3) is such a crucial condition. Finally, it might be remarked that, assuming that condition (3) holds, it is primarily the achievement of condition (2) which allows any PI equilibria to be interpreted as "self-fulfilling."

#### 1.2.4 The Knowledge Requirements for the Fulfillment of the PI Expectational Conditions

Given the above, the next question to consider is just what theoretical knowledge agents must possess in order to guarantee the fulfillment of (1), (2), and (3) above. The integrating answer is: They must possess  $USK_{PI}$ .

To see why this is so, consider first the "strong" case of "sufficient" knowledge-- $UPK_{PI}$ . By definition, under this knowledge assumption, it must follow that  $E_j(N) = N$  and  $E_j(I) = I$  (for all  $j$ ), which immediately implies the fulfillment of condition (1) above, since all individuals must arrive at a common  $E_j(S^*)$ . Furthermore, since under  $UPK_{PI}$ , all individuals can know that all other individuals are also endowed with perfect knowledge of  $N$  and  $I$  (note that this point has been kept implicit in my earlier exposition of  $UPK_{PI}$ ), this is sufficient for each individual to know that everyone anticipates the common Globally-Reducible  $S^*$ . This implies the fulfillment of condition (2), where all individuals write up their own choice problems under the assumption that  $T_j = T'_j$ . Referring to an individual's specification of his choice problem under the assumption that  $T_i = T'_i$  as a "PI specification," it is apparent that the universal endorsement of a "PI specification" by individuals follows from the condition that everyone knows that no one expects PI disequilibria. Finally,

since  $E_j(N) = N$  and  $E_j(I) = I$  (for all  $j$ ), it must also follow that  $E_j(S^*) = S^*$ , which satisfies condition (3).

Thus, under the conditions: (1) that the  $E_j(S^*)$ 's of all individuals are identical; (2) that all individuals use a "PI specification" of their individual choice problems (which guarantees the identity of "second-order" expectations) and (3) that the uniform  $E_j(S^*)$ 's are actually consistent with the true values for  $N$  and  $I$  (which follows from  $E_j(N) = N$  and  $E_j(I) = I$ ), the realization of  $PI-\Pi^*$  interaction can be guaranteed.

As has been emphasized above, there is no reason to make an explicit commitment to  $UPK_{PI}$ , rather than to a (minimally-sufficient) concept of  $USK_{PI}$  in this exposition.  $USK_{PI}$  is still sufficient individual knowledge to guarantee the truth of a theory of  $S^*$ , even if it is not sufficient to guarantee the truth of a theory of  $N$  and  $I$  as such. Thus, a  $USK_{PI}$  formulation produces exactly the same  $E_j(S^*) = S^*$  result so long as  $USK_{PI}$  includes the assumption that each individual knows that all others anticipate the same Globally-Reducible  $S^*$ . (Note that since a strategic component of a Globally-Reducible  $S^*$  is the set of coordinating PI "prices," this claim is, in general, equivalent to the proposition that each individual knows that everyone anticipates the same PI equilibrium prices, which in turn is equivalent to the assumption that everyone uses a PI-specification of their individual choice problems in calculating anticipated prices.)

#### 1.2.5 The Knowledge Sufficiency of the Arrow-Debreu Assumptions

The principal implication of the above analysis is that any observed aggregate state ( $Z^0$ ) can be explained as a  $Z^* \in \Pi_{PI}^*$  if and only if conditions (1), (2), and (3) above can be guaranteed to be fulfilled--and this, in turn, requires the guarantee that  $USK_{PI}$  is achieved. Evidently, the Arrow-Debreu assumption that knowledge can be costlessly (and, presumably, instantaneously) procured by all agents represents the most extreme way of

guaranteeing  $USK_{PI}$ , since it also guarantees  $UPK_{PI}$ . If this assumption were demonstrably true, and defined in such a way that it covered all points in time, then it would follow directly that any and all  $Z^0$  must be explainable as PI-equilibria, and there would be no reason to consider the possibility of observing non-classical states. As will be discussed in much more detail later, however, the problem with any of the traditional assumptions of "costless knowledge" is that they are only invoked as an arbitrary means of closing a PI-structure, so that other potentially non-arbitrary ways of closing a PI-structure--when knowledge is "costly"--ultimately must be considered.

## 2. The General Structural Properties of PI-Equilibria

The above analysis reveals a number of important general properties of PI-equilibria which follow specifically from the knowledge requirements of this theory, and these must be consolidated before proceeding.

### 2.1 Unanimity, Rationality, and Realized Expectations

While it is well established that an essential feature of PI explanation is that it ties the existence of states of aggregate coordination to the existence of states of aggregate unanimity (e.g., on "quantities" traded and the "prices" traded at), the above analysis makes it perfectly clear that the unanimity on  $S^*$  and  $Z^*$  ( $\in \Pi_{PI}^*$ ) follows from the universal endorsement of  $E_j(S^*)$ , given  $T_j$ . Thus, "expectational unanimity" is a necessary condition for unanimity "in action"; the sufficient condition for the latter is that expectational unanimity follows from  $USK_{PI}$ , which ensures  $E_j(S^*) = S^*$ , for all  $j$ .

Moreover,  $S^*$  and  $Z^*$  ( $\in \Pi_{PI}^*$ )--e.g., competitive equilibrium "prices" and "quantities"--can be explained as a rational choice of all "maximizing" individuals, given  $N$  and  $I$ , which satisfies the requirements of the "individualist conception of institutions." Since the realization of a

("rational")  $S^*$  is a logical consequence of the universal endorsement of  $E_j(S^*)$  and the guarantee of the truth of everyone's  $T_j (= T'_j)$ , it also follows that expectations must be non-accidentally in accord with Classical Global Rationality as a precondition to the realization of ("rational")  $S^*$ . This proposition just states that, if a classical equilibrium set of prices and quantities transpires, then expectations must have been "rational."

The above points then can be seen to illuminate a further dimension of the "individualist conception of institutions": that a fundamental reason why  $S$  can be granted no autonomy under Individualism is because the rational endorsement of  $S$  by individuals (which entails the sustainability of  $S$ ) can be seen only as following from the  $T_j$  and  $E_j(S)$  that individuals hold. By this view, therefore, social institutions are no more than an aggregate manifestation of individual expectations, as based on the theories of coordination that agents hold.

In turn, the sustainability or stability of  $S^*$  in particular follows from the fact that the realization of  $S^*$  constitutes the successful achievement of a position of maximum gains from trade (given  $N$  and  $I$ ). This simply states that everyone's predicted maximizing position, given  $USK_{PI}$ , is the one which is just implied by the (true) given values of  $N$  and  $I$ ; hence, no one will (knowingly) attempt to upset this equilibrium in the pursuit of further gain, once the equilibrium is established. An alternative statement of this last idea is that no individual can be in the position to rationally "reform" any social institution at the same time as he forms part of the unanimous consensus which rationally endorses  $S^*$ .

The above insights then can be seen to bring into focus three further features of  $PI$ -equilibria which must serve as a benchmark for the analysis of any and all non-classical theories of coordination, and which

I deal with in turn.

## 2.2 The "Expectational Independence" of PI Equilibria

The first of these features may be stated in terms of the following proposition: If knowledge is sufficient for the achievement of (non-accidental) PI-coordination (i.e.,  $USK_{PI}$  prevails), then the determination of any particular  $S^*$  and  $Z^*$  ( $\in \Pi_{PI}^*$ ) is independent of expectational considerations. This proposition just states that any particular PI-equilibrium can be calculated from the values of  $N$  and  $I$  alone without reference to  $E_j(S^*)$  or, for that matter, to  $E_j(N)$  and  $E_j(I)$ . This result follows from the conditions that, at a PI-equilibrium: (i)  $S^*$  is fully derived from  $N$  and  $I$ ; and (ii)  $E_j(S^*) = S^*$  for all  $j$ ; hence, neither  $S^*$  nor  $E_j(S^*)$  can possess any autonomous determining power. An equilibrium which possesses these characteristics may be referred to as an "expectationally independent" equilibrium.

## 2.3 The Endogeneity of Knowledge

The corollary to the above proposition is one which I have stressed consistently in previous chapters: If knowledge is "sufficient" for a PI-equilibrium, then knowledge can never be an exogenous variable in the explanation of transpired (PI) coordination. This result follows from the observation that it is only if knowledge can autonomously constrain the achievement of  $E_j(S^*) = S^*$  that knowledge can be an exogenous determinant of aggregate coordination. Thus, if  $E_j(S^*) \neq S^*$  (derived from  $N$  and  $I$  above), then the state of (constraining) knowledge must be used to explain why  $E_j(S^*)$  is what it is, which will in turn explain the type of non-classical equilibrium which can logically prevail.

The essential point therefore is that considerations of knowledge can enter the problem only through the  $E_j(S)$  term. If knowledge is compatible with the achievement of  $E_j(S^*) = S^*$ , then knowledge cannot be



exogenous, since  $S^*$  is completely determined by  $N$  and  $I$ , and  $E_j(S^*)$  must fit  $S^*$ . If  $E_j(S^*) \neq S^*$ , then knowledge can be assigned autonomous explanatory power and, correspondingly, the type of non-classical equilibrium which can be explained under these conditions must be "expectationally dependent." In short, the exogeneity of knowledge must be the denial of the "expectational independence" of PI-equilibria.

### 2.3 The Denial of Informational Asymmetries in PI Equilibrium

The final proposition to emphasize is as follows: The determination of any (stable) PI-equilibrium is independent of the initial distribution of knowledge between individuals. All this proposition states is that, in the neighbourhood of any non-accidental PI-equilibrium, all "informational asymmetries" which may have existed prior to the achievement of this equilibrium must be removed. In short, all individuals must possess the same "sufficient" knowledge for PI-coordination, which is exactly what  $USK_{PI}$  guarantees. The additional point that informational asymmetries could not in any case be explanatory under PI structure simply follows from the above recognition that knowledge considerations per se cannot be regarded as exogenous determinants of PI-coordination.

### 2.4 A Cue to the Non-Classical Treatments of Knowledge

As I have remarked earlier, the above propositions serve as a benchmark for the analysis of all non-classical explanatory options. Thus, barring accident, informational asymmetries can be preserved, and given an explanatory role, only in accounts of non-classical coordination. By the same token, explanations in which knowledge is exogenous (barring accident) must be non-classical in form, where the equilibria being explained are "expectationally dependent." If the demonstrated purpose of any PI-programme is to establish which particular knowledge environments are logically sufficient to guarantee the realization of PI-equilibria

(e.g.,  $USK_{PI}$ ), then it is apparent that all the basic issues of non-classical explanation concern which particular knowledge environments are logically sufficient to guarantee non-classical coordination in accord with  $\hat{S}^*$ , while, at the same time, are logically insufficient to rationalize coordination in accord with  $S^*$ .

In this regard, it becomes essential to recognize that defenders of the "holistic conception of social institutions" (e.g., defenders of SH) trivialize this knowledge problem. Since Holists are prepared to take elements of  $S$  as "givens," they simply do not have to worry about taking the explanation back to expectational cum informational concerns at all. Here,  $E_j(S)$  can be seen to follow from the exogenous determination of  $S$ , rather than the other way round. (The fact that defenders of PI do not have to worry about expectations and knowledge either in explaining  $S^*$  --since everything follows from  $N$  and  $I$ --once again only illustrates why PI and SH are the easiest "first stage" explanatory strategies to consider.)

The only substantive "second stage" position is therefore that of GI. Since a proponent of GI--like any other defender of Individualism--is not prepared to take  $S$  for granted in his explanation, he must explain  $\hat{S}^*$  by reference to at least the  $E_j(\hat{S}^*)$ 's which agents hold. In general, however, he is not prepared to even take  $E_j(\hat{S}^*)$  as a "given" since, like the proponent of PI, he wishes to see individual expectations as an endogenous consequence of more "ultimate" factors. This is why the proponent of GI is prepared to accept the notion of "expectationally dependent" equilibria without granting that expectations, as such, are exogenous. It is this methodological situation which in turn explains why the only ultimate exogenous variables (besides  $N$  and  $I$ ) which the proponent of GI can acceptably consider are the autonomous constraints of knowledge and the "logic of theory choice" which agents confront, given such informational

constraints.  $E_j(\hat{S}^*)$ ,  $\hat{S}^*$ , and the non-classical  $Z^*(\in \Pi_{GI}^*)$  which goes with them, must therefore all be seen as endogenous products of a process of coordination involving only N, I, and the ultimate considerations of constraining knowledge.

### 3. Alternative Knowledge Environments and the Achievement of PI-Equilibria

In the above analysis, I have stressed the crucial importance of  $USK_{PI}$  in any successful explanation of any PI-equilibrium. To conclude this chapter, it is useful to reinforce all the earlier analysis by demonstrating that no weaker assumption than  $USK_{PI}$  can be logically compatible with the achievement of non-accidental PI coordination. Two alternative assumptions concerning knowledge environments are sufficient for this purpose: "Universal Insufficient Knowledge" ( $UIK_{PI}$ ) and "Non-Universal Sufficient Knowledge" ( $NUSK_{PI}$ ). It goes without saying that the sustainability of these two alternative knowledge environments must be grounded on assumptions other than knowledge is "costless"--but this is not my immediate concern. My only point is that these alternative environments are not consistent with PI explanation.

#### 3.1 Universal Insufficient Knowledge ( $UIK_{PI}$ )

$UIK_{PI}$  is an assumption at the opposite extreme from  $USK_{PI}$ , and can be defined simply as follows:

$USK_{PI}$  does not prevail (i.e., no one can know the "true"  $S^*$ ).

I think that it is worthwhile to record that Hayek (1945, 1948) felt that this type of environment--where individuals can never independently know society or nature as a whole--is probably the only interesting context in which to discuss questions of aggregate coordination. In particular, such a viewpoint allowed the explanation of the facts

that "... many of the institutions on which human achievement rests have arisen and are functioning without a designing and directing mind" and that "... the spontaneous collaboration of free men often creates things which are greater than their individual minds can ever fully comprehend ..." (1948, pp. 6-7). Moreover, it was precisely the inability for anyone to oversee (foresee) aggregate coordinated outcomes which was seen to be fundamental to guarding the freedom of all individual action.

The evident problem, of any  $UIK_{PI}$  setting is that it does not permit individuals to have enough knowledge to justify the truth of  $T_j$ . If any agent manages to hold a true theory of  $S^*$  under these circumstances, then it will be a matter of accident--he cannot show the theory to be true.

In this light, it requires little analysis to recognize that the principal characteristic of such a setting is that each individual can possibly hold any one of an infinity of potentially false  $T_j$ 's, where there is logically no guarantee that all agents will manage to land on the same (false) theory (let alone the same true one). If different individuals hold different  $T_j$ 's then it follows that, except by accident, the  $E_j(S)$ 's of individuals will not coincide. In turn, it becomes logically impossible to satisfy the condition that  $E_j(S^*) = S^*$  (for all  $j$ ) or, for that matter, any one of the three expectational conditions required for PI coordination mentioned above.

The above line of argument doubtlessly creates severe problems for the theorist interested in explaining observed coordination as PI coordination, and it is no wonder that this  $UIK_{PI}$  case often has been regarded as "the end of the line" as far as serious theorizing goes and, in particular, as the "gateway to indeterminate and arbitrary theory." In this light, the obvious attractiveness of the assumption of  $USK_{PI}$  is that it can at least

make the explanation of any agent's choice of theory non-arbitrary and, if there can be at most one true  $T_j$ , then at least agents can be coordinated as to their theory choice, from which expectational coordination can follow.

The basic structural problem involved in any explanation of behaviour under  $UIK_{PI}$  accordingly lies in the sheer difficulty of even illuminating why any agent chooses the (initial) theory that he does--and this is the first step in explaining why he holds the (initial) expectations that he does. In particular, the specified setting provides insufficient equipment to explain an individual's choice of initial theory as a non-arbitrary choice between alternative  $T_j$ 's as to their (relative) truth value. While it is possible to stress the accidental cases--that agents might all land on the true theory, that they might all come up with true and identical expectations even though they started from false assumptions (Friedman's (1953) "F-Twist"; see also Boland (1980))--it is apparent that these cases are hardly strong enough to be compelling. It is, by definition, not possible to explain why these accidental cases would emerge, and this can be only interpreted as tantamount to the admission that, in general, PI-coordination cannot be explained as a logical consequence of  $UIK_{PI}$ . Under such insufficiencies of knowledge, PI-structure therefore possesses an explanatory gap right at its very foundations.

### 3.2 "Non-Universal Sufficient Knowledge" ( $NUSK_{PI}$ )

Consider now a case which lies between  $USK_{PI}$  and  $UIK_{PI}$ --one where some (but not all) individuals are posited to have sufficient knowledge to achieve a PI-equilibrium, and the remainder do not. The question is: Is it possible to guarantee the achievement of PI-equilibria out of  $NUSK_{PI}$ , even if it is not possible to rationalize such equilibria out of  $UIK_{PI}$ , except by accident?

To consider this question in the starkest possible terms, assume

the extreme form of  $NUSK_{PI}$ , i.e., "Non-Universal Perfect Knowledge"

( $NUPK_{PI}$ )

At least one, but not all, individuals can gain access to complete and perfect knowledge of N and I; individuals not so endowed have access only to imperfect knowledge which is also not sufficient for the calculation of a PI coordinated state.

Under this assumption, a direct calculation of a PI equilibrium is still seen to be possible but not all individuals have enough knowledge to undertake the exercise. An alternative name for this case is "Asymmetrical Perfect Knowledge."

Evidently, the most interesting feature of this case is that, in order to underwrite the achievement of PI-equilibria, some mechanism must be posited by which individuals with sufficient knowledge to calculate the appropriate PI equilibrium values transfer this information to those who cannot do so. More formally, those who have perfect and complete knowledge of N and I must be able to "signal" this information to individuals saddled with knowledge insufficiencies, such that the conjunction of the existing (insufficient) information possessed by the latter with the (additional) signal will produce "sufficient" knowledge for everyone to achieve a  $PI-II^*$ . This condition is of course no more than a statement of the theorem that no informational asymmetries can be sustained in the neighbourhood of a  $PI-II^*$ .

In this regard, the most robust (but perhaps most cumbersome) signalling mechanism involves the transfer of information about all  $N_j$ 's and  $I_j$ 's not directly accessible to these individuals. A less cumbersome mechanism simply involves the transfer of the appropriate  $S^*$ , derived from all elements of N and I. As has been remarked earlier, the former mechanism ex post leads to maximally-sufficient knowledge for all individuals whereas the latter entails minimally-sufficient knowledge.

So much is straightforward. However, it is the basic informational asymmetry posited in this environment which creates the inherent theoretical problems, problems which have been well known at least since Plato's "Parable of the Cave." Since the individuals with insufficient knowledge have no way ex ante of checking the calculation of  $S^*$  and  $Z^*$  ( $\in \Pi_{PI}^*$ ) by those who fully know  $N$  and  $I$ , what is to prevent the latter from using their monopoly power over knowledge to exploit those with limited knowledge? More fundamentally, what incentive do those who have perfect knowledge have to provide the "right"  $PI$  signals for those saddled with limited knowledge, or even to invest in any signalling apparatus?

Some may think that these are not fundamental difficulties. Thus, it might be argued that any attempt by those with sufficient (superior) knowledge to act on this knowledge could never be concealed since it would always be reflected in  $S^*$  (e.g.,  $PI$  equilibrium prices). However, this argument already assumes the existence of a signalling apparatus which registers the ("correct")  $PI$ -equilibrium signals, rather than, say, some other type of "monopoly equilibrium" signal. Moreover, it does not provide a rationale for why the signalling mechanism exists and, more specifically, why those with superior knowledge would ever consent to the existence of such a mechanism. As will be shown later, it is exactly this problem which plagues most treatments of the so-called "efficient markets" hypothesis.

Another argument might be that those with insufficient knowledge could always offer a bribe to those with perfect knowledge to make them reveal the just-sufficient (optimal) signals to get everyone to  $\Pi^*$ . However, by the nature of the case, it would be impossible informationally for the uninformed to calculate the optimal ( $PI$ ) value for this bribe without the assumption of  $USK_{PI}$ . After all, the appropriate bribe itself must be a "signal" derived from  $N$  and  $I$  which "coordinates" the transfer of

knowledge from the perfectly informed to the poorly informed. To assume the existence of such a signal and then to posit that individual action produces a "coordinated" and "non-distorting" transfer of knowledge based on this bribe already assumes the transfer of knowledge sufficient to achieve  $USK_{PI}$ .

The upshot of the above discussion is therefore that, short of transforming  $NUPK_{PI}$  into some version of  $USK_{PI}$ , there is no guarantee of the achievement of a PI-equilibrium from  $NUPK_{PI}$  as such. In short, rational (self-interested) use of the superior knowledge on the part of the informed will be for the purpose of exploiting the uninformed--by preserving, rather than removing, the existing informational asymmetry. Such a situation must be logically incompatible with the achievement of an aggregate coordinated state which reflects the best interest of all.

Once again, there is the "accidental" case to consider, where those with the superior information self-consciously refrain from exploiting their monopoly position in their own best interests--the case of the "benevolent elite." The reason why this case must be an accidental one is obvious: there is simply no rationale specified in this explanation of coordination for why those with the informational advantage should act benevolently.

More specifically, the only way to guarantee the benevolence of any knowledge elite in this setting is to explain it as a consequence of an incentive system which constrains the elite to act benevolently. But on what foundation would such an incentive system be rationalized? If the provision of the appropriate incentive system is regarded as part of the problem of aggregate coordination under consideration, then its existence (and enforcement) must already assume the achievement of PI coordination based on  $USK_{PI}$ . Alternatively, if the existence of such an incentive



system is rationalized by an "outside institution," then it is difficult to see how the internal consistency of PI can be salvaged, since PI-explanation cannot permit the invocation of "outside institutions." In short, the only logically consistent way to guarantee the benevolence of the knowledge elite is to remove the elite's informational advantage altogether, by positing the achievement of  $USK_{PI}$ .

3.3 The conclusion therefore is that neither  $NUPK_{PI}$  nor  $UIK_{PI}$  defines a knowledge environment which is sufficient to rationalize the achievement of PI results on other than an accidental basis; only  $USK_{PI}$  can do this. In noting this failure of both  $UIK_{PI}$  and  $NUPK_{PI}$  in the context at hand, it is of course not to be thought that these two cases are very similar. The problem with the  $UIK_{PI}$  case is that no one possesses knowledge sufficient to identify the (PI)  $S^*$  position or, in other words, that no one possesses the knowledge sufficient to establish which of the infinity of possible  $T_j$ 's is the "true" one. Accordingly, the achievement of  $E_j(S^*) = S^*$  can only be sheer accident.

On the other hand, the essential characteristic of the  $NUPK_{PI}$  case is that it is not in the best interests of the knowledge elite to realize  $E_j(S^*) = S^*$  even though it is possible for the elite to calculate  $S^*$  with certainty. The problem here is therefore not an absence of knowledge "in the system" altogether.

Since the elite can guarantee that their own  $T_j$ 's are true, they could, given benevolence, transfer to the uninformed just the knowledge required for everyone to establish the truth of their theory of  $S^*$ . Here,  $E_j(S^*) = S^*$  could be immediately established and  $USK_{PI}$  would prevail. However, under the "general" case of non-benevolence, the elite's maximizing objective is to achieve the  $\hat{S}^*$  which is in their own best interest and to transfer just the "distorting" information to others which realizes

$E_j(\hat{S}^*) = \hat{S}^*$ . It is therefore not the insufficiency of knowledge per se, but the lack of incentive to transfer sufficient information to everyone, which explains why PI coordination can be only an accidental consequence of a (sustained)  $NUPK_{PI}$ . The fact that  $NUPK_{PI}$  (or  $NUSK_{PI}$ ) does not logically fit well with PI results, however, does mean that it can potentially fit very well with GI outcomes, and I will examine this point more closely later.


At this stage, I now move from the analysis of the role of knowledge in a "simple" classical system to a consideration of its role, along with transactions costs and adjustment costs, in an extended ("avant-garde") classical framework.

## CHAPTER EIGHT

TRANSACTIONS COSTS, ADJUSTMENT COSTS, AND  
INFORMATION COSTS IN THE "EXTENDED" CLASSICAL SYSTEM1. The Basic Motivation for an "Extended" Classical System

As I have implied above, all avant-garde expressions of a "classical" (PI) viewpoint represent a response to traditional non-classical criticism to the effect that "simple" Arrow-Debreu (henceforth, A-D) formulations could never offer "realistic" explanations of observed phenomena. Since non-classical critics were willing to identify classical explanation only with A-D explanation and, thus, to perpetuate the view that all non A-D explanations must be non-classical in form, the debating position of the avant-garde classical theorist is clear: he is willing to accept that A-D explanation is inadequate, but refuses to accept that the failure of A-D theory entails the failure of classical explanation as such. His objective is therefore to produce a general non-Arrow-Debreu classical structure, which maintains all the "maximizing" properties of A-D without producing A-D conclusions. In short, the avant-garde classical theorist wishes to produce a theory of the successful maximization of gains from trade in a world where the failure to transact to, or adjust to A-D positions can be explained as a consequence of Classical Global Rationality.

In this context, the principal critical argument which the avant-garde classical theorist puts forth is that A-D theorists were naive to assume a world where the activities of: (a) transacting; (b) adjusting; and (c) procuring information are costless (i.e., not bound by N). Accordingly, his proposal to mitigate the unrealism of A-D formulations is simply to incorporate such activities into an "extended" classical framework, along with the rest of the more conventional A-D activities. In this system, transactions activities, adjustment activities, and



information activities are produced outputs, given an appropriate technology, and are "costly."

It is then the costliness of these activities which becomes so central to the explanation for why A-D outcomes are seldom, if ever, observed: it would not be rational for individuals to attempt to reach an A-D state, given the costs of doing so. As such, the ultimate objectives of the classical theorist are to demonstrate: (i) that it is possible to explain all seeming failures to reach A-D outcomes as true "maximizing" outcomes, relative to his "extended" set of N-constraints; and (ii) that there is consequently no need to retreat to non-classical programmes to explain failures to reach A-D outcomes as bona fide "non-maximizing" behaviour. (Note, of course, that one might refer to additional technologies or "costs" besides the three types listed here, but this is sufficient for the purposes at hand. For instance, Buchanan and Tullock (1962) use "the costs of achieving unanimity" in somewhat avant-garde classical style--to rationalize majority rule--although such a usage gets close to circularity in a theory which assumes unanimity.)

1.1 As I have also stressed, the reason why the avant-garde classical theorist wishes to pursue such a programme of explanation is intimately tied up with his defence of the "classical critique" of non-classical explanation. Thus, the avant-garde classical theorist proposes his explanatory programme only to avoid the behavioural arbitrariness or the denial of individual character which he sees to be the overriding failing of traditional non-classical attempts to explain departures from A-D outcomes.

Here he attacks not only Holists, but also some of his own "classical" allies--both of which (the latter unwittingly) were apparently prepared to assume the existence of externalities, or market failure, or distorting regulatory policies, or long-term "contracts," or monopoly, to explain

departures from A-D outcomes, without also showing how the "distorting" externalities, market failures, and the like could be grounded in rational choice. He contends that to treat any of these distorting conditions as "givens," if they are not natural givens, must be the surest route to arbitrary or non-individualist explanation. This is why the avant-garde classical theorist is absolutely adamant that any non-natural market failures, monopolies, or distorting policy cum contractual arrangements --in short, "social" distortions--be explained as endogenous consequences of the true natural and individual "givens" in the setting. The strategic natural givens cited are no more than the technologies of transacting, adjusting, and information procuring. Of course, if such social distortions can be successfully explained as a consequence of rational choice, given the extended notion of N and I appropriate to any avant-garde classical system, then the sustained existence of these items must be regarded as (classically) "optimal" and not a social distortion at all; there can be no (true) social distortions in a classical equilibrium.

1.2 The above focus furthermore reveals why the avant-garde classical theorist is less interested in the "welfare implications" of classical theory than his more traditional allies. Thus, when the traditional classical theorist assumes, say, the existence of a ("distorting") monopoly and proceeds to demonstrate that one powerful implication of classical theory is that aggregate welfare must be lower under a situation of monopoly than in an environment of competition, the avant-garde classical theorist will simply accuse his traditional counterpart of stating a truism which misses the point.

The avant-garde classical theorist is not, per se, interested in (absolute) welfare levels; rather, he is only interested in whether any observed instance in which a monopoly is present can be "explained" as a

maximizing outcome, given some constellation of technological constraints on transacting, adjusting, or procuring information. Thus, the avant-garde Classicist can easily grant that a  $Z^0$  in which monopoly power is present may involve less realizable gains from trade (at the maximum) than an A-D world, yet still contend that his concern is only with how this  $Z^0$  is explained, irrespective of its welfare status. More precisely, his concern is to show that the  $Z^0$  in question--which is presumably not a  $Z^*$  implied by A-D structure, and which presumably has a uniquely-defined level of welfare and gains from trade associated with it in any case--can be completely explained by reference to classical "givens," and no others. If he can do this, then he can show that it is not necessary to move to non-classical explanations (and, in particular, holistic explanations which grant the exogeneity of elements of S) in order to illuminate the  $Z^0$  in question.

It is precisely for the above reasons that the avant-garde classical theorist finds his traditional counterpart's exposition of monopoly theory so naive and so frustrating. Thus, if the traditional theorist succeeds in rationalizing the existence of monopolistic equilibria (and the welfare cost associated with such) only by assuming an exogenous, non-natural constraint (e.g., a (social)"barrier to entry") in his explanation, then he puts himself in a fatal position right from the outset: he has denied Individualism. If he contends that this is not what he is doing--he really holds that "barriers to entry" are endogenous variables in his explanation --then he simply begs the question of why the "barrier to entry" in question was sustained if it was not consistent with maximization.

What all this means therefore is that the traditional theorist cannot successfully explain (determine) the "deadweight loss" attributed to monopoly, and still maintain consistent explanatory standards. Clearly, his

conventional strategy is to explain competitive outcomes via Individualism and monopolistic ones via Holism--but this pins down the welfare loss of monopoly only at the cost of logical inconsistency. If he attempts to maintain Individualism for the explanation of both situations--which preserves logical consistency--then his only options, barring the consideration of a GI explanatory structure, are twofold. Either he explains the "barrier to entry" as a consequence of rational (classical) optimization--in which case the monopoly is not a true distortion, and has no deadweight loss associated with it at all--or he leaves the explanation of the barrier--as a true distortion--underdetermined, and finds that he has no determinate monopoly outcome to compare with its competitive counterpart so as to calculate a deadweight loss.

Since the avant-garde classical theorist wishes to maintain consistent explanatory standards--to ensure against behavioural arbitrariness--and since he wishes to show that classical givens can illuminate all  $Z^0$ --to ensure that a retreat to non-classical explanations is unnecessary--he simply has no option but to abandon the welfare comparisons of his earlier allies and to claim that monopolies are only apparent distortions, explainable as a consequence of classical maximization, relative to an appropriately-extended concept of N and I. Clearly, if monopolies can be explained as consistent with N and I--as a product of "optimal" barriers to entry, given the existence of positive transactions cum adjustment cum information costs--then it is apparent that the only way to criticize the monopolies so rationalized is to criticize the givens which produced them. However, Classicists would never argue that tastes and technology should have been different, since these are the sacrosanct "givens" which must be beyond social criticism in this theory.

The overriding further implication of this argument is of course that

it is only a GI explanatory structure which in principle can explain monopolies as true social distortions (with a non-trivial deadweight loss) yet, at the same time, as products of individual rational choice. Here monopolistic arrangements (and the "true" welfare loss associated with them) can be regarded as both non-arbitrarily explainable as "distortions" and non-arbitrarily criticizable as "distortions."

1.3 The above analysis of the differences between an avant-garde classical perspective and the perspectives offered by both GI and a more traditional Classicism hopefully provides some initial insight into the possible methodological advantages and disadvantages of adopting this avant-garde view. While the thrust of this avant-garde position is that it is possible to illuminate  $Z^0$ 's, which have long stood as clear contradictions of A-D results, as  $Z^*$ 's of a classical structure with an extended activity set, the thrust of the argument of this chapter is that the avant-garde classical programme must be a "minor" departure from earlier A-D theorizing rather than a "major" one. The basic structural characteristics of the avant-garde programme can in principle be no different from those of its more traditional counterpart. The only categories of exogenous variables which can be utilized in either are N and I (however defined), and both structures explain only outcomes which are in accord with Classical Global Rationality. In short, both structures must be identical manifestations of "stage one" analytical characteristics.

It is this last point which is crucial, since, as I will show, no matter how extended a concept of N and I is used to illuminate observed phenomena, the guarantee that any of these phenomena can be explained as "classical equilibrium" phenomena must rest on the demonstration that the (endogenous) knowledge condition specified in the last chapter--namely,  $USK_{PI}$ --can be satisfied. If the achievement of  $USK_{PI}$  cannot be underwritten



by way of non-arbitrary argument, then the guarantee of a (classical) Globally-Rational response to transaction constraints, adjustment constraints, or informational constraints cannot be procured, and the realization of classical equilibria can be construed as only an accidental occurrence.

The immediate (and problematic) question which springs to mind is: Just how constraining can informational constraints in particular really be in this structure if the guarantee of a "rational" response to informational limitations by agents hinges on the very achievement of  $USK_{PI}$  ?

As I will show, this is the question which embodies a major part of the failure of any proposed avant-garde classical explanatory framework to illuminate the short-run. Here, the conclusion must remain identical to that put forth for the "simple" classical system: there can never be any room for informational limitations which autonomously constrain the achievement of a position of maximum gains from trade; knowledge must be endogenous in the determination of any "extended" classical equilibrium.

Before I deal with these specific issues, however, I wish first of all to provide a brief exposition of the theory of transactions costs and the theory of adjustment costs. It can then be shown that these two extensions of classical explanatory structure are quite beyond criticism so long as the condition of  $USK_{PI}$  can be guaranteed; the theoretical problems of an avant-garde Classicism concern only the issue of how knowledge is treated.

## 2. The Theory of Transactions Costs

As I have implied above, the inspiration for the recent concern with incorporating transactions constraints into classical explanatory structure is to avoid the problems posed by an unsatisfactory traditional research strategy. This strategy was to treat phenomena such as "market failure" and "externalities" as exogenous phenomena--which must compromise the achievement of classical equilibria as such--rather than as something which could be regarded as truly part of a classical equilibrium, as defined relative to an exogenously-constraining transactions technology. If the traditional view was therefore that the observed existence of market failure and externalities could not be explained as a consequence of Classical Global Rationality (i.e., these items were "true" social distortions), then it was apparently not possible to produce the argument that the reason why observed market failures persisted, and externalities were not removed, was simply that it was not "optimal" for individuals to provide the missing markets and internalize the externalities, given the costs and benefits (defined relative to some specification of N and I) of doing so. Accordingly, traditional theorists were forced into the position of having to limit the domain of classical explanation (rationality) to only those circumstances in which markets were universal and externalities were non-existent.

This traditional view was adhered to in almost all A-D analysis (however, see Arrow (1968) and Buchanan and Stubblebine (1962)) and was summarized succinctly by Coase's (1960) Theorem: that classical competitive allocations (i.e., an  $S^*$  derivable from N and I alone) could be guaranteed to prevail only in a world where there were no binding transactions constraints whatsoever--"a zero transactions costs world." Such a world was of course one which was taken to ensure the provision of universal

markets and the internalization of all externalities, since these activities were, by assumption, costless. The apparent corollary to this theorem was as follows: that any observed situation where markets failed as a consequence of the existence of positive (exogenous) transactions costs could be explained only holistically and, therefore, independently of considerations of individual rationality.

The avant-garde strategy to remove the deficiencies of this traditional view is straightforward. Market failures, externalities, and the level of transactions costs are all regarded as endogenous products of classical optimization, given I and N, where N is seen explicitly to incorporate the ultimate natural constraint of a "transactions technology." Thus, classical explanatory power can be preserved even when transactions costs are positive (and, therefore, when externalities are not completely internalized), so long as the outcomes can be construed as a rational choice of everyone, relative to the ultimate constraints, and "costs" implied by, the ultimate transactions technology, plus the rest of the more "conventional" elements of N and I. Once again, the obvious point of this ~~avant-garde~~ exercise is to show that "true" social distortions, relative to A-D structure, can be viewed as only "apparent" distortions.

In order to expose the logic of, and complexities of, avant-garde classical research in the area of transactions constraints (see especially Williamson (1975, 1976), Alchian and Demsetz (1972); Dahlman (1979); Furubotn and Pejovich (1972); also Demsetz (1964, 1967)), allow me now to provide a brief outline of a general theoretical structure in which market failure, externalities, and the level of transactions costs can be explained as endogenous products of PI coordination.

I spend some time with details here for two reasons. First, such a satisfactory general structure has not yet been produced, even by the most

ardent defenders of an avant-garde Classicism. For instance, there still exists the unfortunate tendency to regard the level of transactions costs as an exogenous given in analysis, such as when it is argued that "transactions costs are too high" to permit certain types of interaction, when the only (classical) question is whether these costs are "optimal," relative to posited technology.

Second, as I will show in the next chapter, questions concerning market provision in general have long been tied to specific questions concerning the "informational transferring" capacities of markets, and such issues must be of relevance to any discussion of the knowledge foundations of PI theory. In such a context, the important question is: Are the "signalling" capabilities of markets sufficient to guarantee the achievement of  $USK_{PI}$  by agents, or does the existence of optimal markets (to do this signalling) follow from the (prior) guarantee of  $USK_{PI}$ ?

Since I am not however concerned with these informational questions in the analysis which immediately follows, it is convenient to assume (unless otherwise stated) that information costs and adjustment costs are both zero. In this way, the transactions costs analysis can be run by itself, where the problems of the achievement of  $USK_{PI}$  are trivial. This assumption also has the virtue of being quite accurate to historical tradition, since limited information has been seldom cited as an explanatory factor in the explanation of the existence of externalities or market failure.

## 2.1 A Basic Distinction: "Coordinating" versus "Facilitating" Institutions

The simple perspective that I begin from is that all questions regarding transactions costs, market failure, and the like are "institutional" questions. In this respect, what seems to be implicit in all research on these matters is that there are a variety of different types of social

institutions which are necessary to the successful operation of "a price system."

A basic distinction here would appear to be that between what I will term "coordinating institutions"--typically "prices"--and "facilitating institutions"--typically institutions of "market" structure. Accordingly, the fundamental idea is that coordinating institutions do not emerge or perform appropriately "out of the blue"; rather, their performance characteristics depend strategically on an additional set of institutional instruments which "facilitate" their workings.

In this context, it is appropriate to regard "coordinating institutions" as a set of social constraints which, if perfectly adhered to by all individuals, could hypothetically entail action (and interaction) which is coordinated in aggregate. The reason why I stress the word "hypothetically" is that the mere existence of a (sufficient) set of coordinating constraints (somewhere) neither guarantees that there exists mechanisms by which these constraints can be effectively transmitted to or enforced upon all individuals, nor that there exists mechanisms through which individuals can feasibly undertake the actions (interactions, trades) specified by these constraints to achieve a coordinated state. This idea then provides the foundations for the view that the "emergence," "performance," "effectiveness" of coordinating institutions must depend upon other "facilitating" institutions which provide (at least in part) the requisite guarantees.

More precisely, any given set of "facilitating institutions" can be seen to determine the extent to which:

- (a) the social constraints specified by the coordinating institutions can be efficiently transmitted to and enforced upon all individuals,
- (b) there exist efficient physical avenues for realizing the interaction or exchange necessary to achieve a coordinated state, and
- (c) the interaction or exchange in (b) can be protected or insured;

e.g., as to rights of "property," "contract default" and other forms of exchange risk.

Before going any further it is appropriate to be more concrete about what variety of items can be seen to fit into the categories of "coordinating" and "facilitating" institutions. Thus, standard examples of coordinating institutions might be: prices, output commands, norms or regulations (issued by organizations over specific economic activities) monetary rules, and explicit or implicit contracts (involving specific economic activities). Correspondingly, standard examples of facilitating institutions might be: markets; media of exchange, contract and property law, and regulatory agencies (organizations, heirarchies, "planning boards," monetary authorities). Thus, markets, money and contract/property law might "facilitate" coordination through a set of prices. Organizational heirarchies (as in "firms") might "facilitate" coordination through a system of heirarchical output commands. Statutes regarding the sovereignty of state might "facilitate" coordination through regulations on the output of, say, petroleum, and so on.

Given this distinction, I think that it is important to stress that there need be no (independent) presumption that facilitating institutions are inevitably more rigid than their coordinating counterparts, or that facilitating institutions are inevitably exogenous variables. I should also note that there exists some tendency in the literature to use the term "institution" to refer explicitly to "facilitating" institutions. This possibly explains why "institutions" are often seen to be "the rules of the game" lying behind all economic interaction (see Goldberg (1974a) and North (1978)) and why coordinating institutions such as prices are frequently not regarded as "institutions" at all.

In this light, I think that it is appropriate to state formally that both the set of coordinating institutions and the set of facilitating

institutions consist of elements of  $\mathcal{S}$  and are proper subsets of  $S$ . There is little reason to affiliate one set with the term "institution" and not the other. Moreover, there is no prior presumption about whether the elements of these sets are exogenous, or endogenous, variables. This breakdown is determined by the nature of the theoretical explanation in question.

As will be shown, the important point about PI explanation is that all coordinating and facilitating institutions must be regarded as endogenous variables, derivable from  $N$  and  $I$  alone. Correspondingly, the thrust of all non-classical critiques of classical explanation is that it is logically impossible to rule out the short-run prospect that at least one coordinating/facilitating institution cannot reach its "reducible" position and, therefore, produces a "true" social distortion of maximizing interaction. In holistic critiques, where social entities can be both non-reducible and exogenous, it is easily seen that the idea that at least one facilitating institution can be exogenous is the "institutionalist" analogue to the standard Keynesian idea that at least one price can be exogenous.

## 2.2 A More Formal Structure: The Theory of Transactions Costs

The one concept which is absent from my treatment thus far is that of transactions costs. This is not accidental; the standard explanatory role assigned to transactions costs is too naive to fit with the framework at hand. Certainly, it is familiar to account for the absence of facilitating institutions (e.g., markets) by saying that transactions costs were "too high." However, this is more of a tautology than anything else, and simply does not reveal why these costs were "too high."

Here I wish to present the foundation of a theory where the level of transactions costs is a joint product of (specific types of) coordinating institutions and (specific types of) facilitating institutions, where each

conjunction of coordinating and facilitating institutions is produced at a (positive) "economic" cost. One intuitive idea upon which this theory is based is that sets of coordinating institutions must be "matched" with sets of facilitating institutions and that, for a given level of economic cost, it is "mis-matches" in these institutions which produce the "higher" costs to individuals of transmitting and enforcing the coordinating constraints and physically trading to the coordinated state; i.e., "high" transactions costs. Such a view rejects the naive proposition that it is the level of transactions costs--as determined exogenously--which determines the extent to which facilitating institutions can "support" their coordinating counterparts. Rather, the level of transaction costs is seen in general as an endogenous product of a "technology" which conjoins (values of) coordinating and facilitating institutions, and a "technology" which relates each particular conjunction of (levels of) coordinating and facilitating institutions to a particular level of economic costs. Both of these technologies are exogenous "givens," even though the inputs of production are elements of  $S$ . Evidently, the important point is that if it can be shown--in a PI-spirit--that both coordinating and facilitating institutions are codetermined by  $N$  and  $I$ , then the facilitating institutions, by definition, cannot autonomously constrain the adjustment of coordinating instruments to their appropriate PI values and it is possible for a PI coordinated state to be achieved even with positive transactions costs.

## 2.2 The Partitioning of $S$ and the Status of the Facilitating Substructure

In order to bring out the essentials of the above view, it is appropriate now to partition the set  $S$  into a number of relevant subsets. Thus, the set  $S$  will now be partitioned into the following:

$S_c$ : set of coordinating institutions

$S_f$ : set of facilitating institutions



CR: set of institutions which allocate elements of  $S$  to  $S_c$  and determines their "mix" within  $S_c$ ; this defines a "coordinating regime."

FR: set of institutions which allocate elements of  $S$  to  $S_f$  and determines their "mix" within  $S_f$ ; this defines a "facilitating regime."

The sets CR and FR are used to save considerable notational complexity. Their purpose is to specify the particular types of coordinating and facilitating institutions which can be employed in any given setting. Thus, CR pins down the elements of  $S$  which are available for a "coordinating" purpose (e.g., prices, output commands, social norms, implicit contracts), and specifies the mix between them. Correspondingly, FR pins down the elements of  $S$  which are available for the "facilitating" purpose (whether they be markets, particular media of exchange, planning boards, or organizational hierarchies), and specifies the mix between them. Two further points should be stressed in this connection: (i) that both the coordinating regime and the facilitating regime may be themselves endogenous (choice) variables (e.g., PI explanation), so that the mix of institutional instruments is in no sense "given"; and (ii) that since both CR and FR belong to  $S$  and define the allocation of the  $s_{gj}$ 's to the sets,  $S_c$  and  $S_f$ , there must be a logical consistency between both allocating institutions with respect to all elements of  $S$ .

I now conveniently group together the sets  $S_f$ , FR and CR, and denote this (expanded) subset, the "facilitating substructure" (henceforth FS) for the set  $S_c$ .

For a PI- $\Pi^*$  to obtain, it follows that all elements of  $S$  must be derivable from  $N$  and  $I$  (i.e.,  $S^*$ ), so that it is implied that both FS and  $S_c$  must be mutually compatible at  $FS^*$  and  $S_c^*$ . By this argument, it follows

that if one element of, say, FS, was not explainable by reference to N and I (i.e., was a "true" social distortion), then, in the non-classical equilibrium which would emerge, all other elements of S, such as those in  $S_c$ , would be "distorted" (at  $\hat{S}_c$ ).

### 2.2.2. The Level of Transactions Costs and the Level of Economic Costs

Given the above perspective, it is possible to interpret the general system being proposed in two analytical stages. Abstract first from the economic costs of producing any FS. It is implied that each particular conjunction of (the levels of) CR, FR, and  $S_f$  (i.e., FS) entails a particular level of transactions costs (TC). This expresses the intuitive idea that, independently of considerations of economic cost, a specified level of "markets" may entail a lower TC when combined with "prices" than its equivalent in "output commands"; that a given set of "social norms" may entail a lower TC when employed with "hierarchical organizational structures" than when conjoined with its equivalent in "markets"; that a mix of "implicit (quantity) contracts" and "prices" may entail a lower TC when facilitated by a mix of markets and hierarchies rather than by its equivalent in markets alone or hierarchies alone; or that coordination through prices alone may be facilitated at a lower TC through a monetary exchange technology than through one of barter--and so on. It is of course also implied that no matter how badly coordinating and facilitating instruments are "matched," it is always possible to drive TC to zero--say, at an infinite level of economic cost.

The second analytic stage then explicitly recognizes that each particular FS and TC is costly to produce. Thus, to each given level of FS (and TC) corresponds a level of economic costs, as dictated by a "production function." Since this implies that the activity of producing a given level of FS has an implicit value ("price") which is to be conveyed by the

coordinating institutions,  $S_c$ , it follows that TC may be expressed as a function of CR, FR,  $S_f$ , and  $S_c$ ; in short, of all elements of S.

An important point to note about this structure is that TC can be regarded as exogenously fixed in explanations of observed outcomes if and only if it is also claimed that all elements of S are exogenously fixed (i.e., under SH). If even one element of S is a choice variable, then TC must endogenously vary with it. I now examine the PI case where all elements of S are endogenous variables.

### 2.3 The Extended PI System under a Transactions Technology with USK<sub>PI</sub>

Under the assumption of costless knowledge (USK<sub>PI</sub>), the above system can be solved as a straightforward classical "production theory" problem. Given the posited transactions technology, the coordinated provision of FS (at FS\*) and, in particular the determination of optimal CR\*, FR\*, and  $S_f^*$ , along with TC\* is now simultaneous with the coordinated undertaking of all other activities and the determination of  $S_f^*$ --where all elements of S are determined by N and I alone. Here the most efficient conjunction of CR, FR, and  $S_f$ --relative to (economic) costs--is guaranteed to prevail, and the TC which is produced by this conjunction can be appropriately designated as (classically) optimal. Moreover, since FS\* and  $S_c^*$  must be both compatible with the given values of N and I, FS\* and  $S_c^*$  must be compatible with each other; hence the implied value ("price") of FS provision cannot be other than a PI equilibrium value, compatible with  $S_c^*$ . Finally, externalities may exist in this system, but all are "optimal" (i.e., none are "Pareto-relevant"), since individuals have rationally chosen to leave them in the system. "Market failure" (i.e., not driving all externalities out of the system) is therefore rendered "rational" as well.

2.3.1 One interesting way of testing the generality of the above structure would be to consider explicitly what answers this framework would provide

to the following questions:

- (a) Can a set of PI-coordinating institutions always be supported (facilitated) by an FS\*?
- (b) Can FS-provision always be coordinated by  $S_e^*$ ?
- (c) Can an FS-provision itself always be facilitated?
- (d) Can the provision of an  $S_c^*$  itself always be guaranteed?

The answers to both (a) and (b) are clearly "yes," and I have dealt with (a) above. The answer to (b) is more subtle. What it states is that the FS\* which supports  $S_c^*$  can be achieved at the very same time as the provision of the (supporting) FS\* is coordinated by  $S_c^*$ . Since the determination of FS\* and  $S_c^*$  is simultaneous, there is therefore no need to assume a supporting FS to validate  $S_c^*$  or to assume  $S_c^*$  to validate the provision of a supporting FS.

Now consider (c). Critics of this approach may accept that the provision of FS can be coordinated by  $S_c$  (e.g., that the formation of "markets" can itself be coordinated by "prices") and, accordingly, that it is useful to regard FS-provision as an economic activity just like any other. However, they might claim that, say, market formation is intrinsically a "public good"; hence, suffers from typical problems of "free riding" and "non-appropriability". Since such problems are symptomatic of nothing other than a deficiency in FS (i.e., an "FS-failure"), this argument reduces to the claim that the institutions to "coordinate" the activity of FS-provision itself may be rendered ineffective by a deficiency in facilitating apparatus.

Is this PI-structure reduced to circularity at this point? The answer is no. Assuming the existence of a  $\Pi^*$  (derivable from N and I alone),  $S_c^*$  must be "effective" over all activities, including FS-provision itself. Hence, the coordination of FS-provision through  $S_c^*$  must be consistent with the provision of the sufficient facilitating apparatus to achieve the optimal

FS\* through  $S_c^*$ . In this sense, FS\* is "self-supporting." FS\* supports all PI coordinating values including the ones which regulate its own provision. More generally, what this proposition says is that individuals will always choose an FS\* which specifies facilitating apparatus to make non-appropriability and free riding "optimal." In a more conventional context, it also says that, at a PI- $\Pi^*$ , there must exist a "market" for market formation.

If the answer to question (c) is therefore "yes" as well, what about (d)? (d) is the crucial question, since an affirmative answer to it hinges on the proposition that  $USK_{PI}$  prevails. If  $USK_{PI}$  could not be guaranteed to prevail, then it would be only accidental that FS\* and  $S_c^*$  could be realized, since it would be only accidental that  $E_j(S_c^*) = S_c^*$  and  $E_j(FS^*) = FS^*$  (for all  $j$ ); all the properties of (guaranteed) PI-equilibria would be lost. Here the determination of the level of transactions costs must be explained by reference to either the exogeneity of S (Holism), or N, I, and the exogenous constraint of limited knowledge (GI).

2.3.2 Even if the problem of guaranteeing the achievement of  $USK_{PI}$  is the ultimate concern in making the above analysis viable, this is of course not to say that these PI results, as such, are unilluminating from a critical perspective. In fact, the implied idea that (PI) equilibrium changes in both coordinating and facilitating instruments simultaneously follow from exogenous "shocks" is an important idea to set against what I think is a common presumption. This presumption is that, while PI coordinating institutions (e.g., prices) adjust to such shocks, the facilitating "rules of the game" do not.

Under PI, there is no logical basis for this viewpoint whatsoever. Any change in N and/or I will change the equilibrium values of both  $S_c^*$  and FS\*. Thus, police forces and legal regulations do not remain as the invariant guardians of individual interaction while prices alone change;

any price change following from a changed  $N$  and/or  $I$  must change the implicit prices relevant to the provision of such facilitating apparatus and thus change the "rules of the game." This PI structure may entail that such "rules of the game" will always support PI coordinating institutions, that the "rules of the game" are indeed in everyone's interest; it simply does not entail that they are fixed. But this is exactly the point: if all "rules of the game" were fixed and exogenous, there would be no guarantee that they could support  $S_c^*$  or be in anyone's interest, except accidentally.

I focus on this last issue largely because I think that a central weakness in the literature of modern economic theory is its tendency to separate questions of, say, price adjustment, from questions of adjustment of other (e.g., facilitating) institutions. Here the adjustment of prices is somehow seen to occupy a sacrosanct domain which is independent of the adjustment of all other institutions. Such a view, however, is misleading. There is no reason to glorify prices in particular out of the whole set of coordinating institutions and there is no reason to see price adjustment as occupying a separate, more elevated plane than the adjustment of any other institutions.

#### 2.4 A Perspective on the Traditional Debates

I have set up an extended classical structure with "optimal" externalities and transactions costs, first, to illustrate the ease with which avant-garde classical theorizing can proceed and, second, to provide a point of reference from which to interpret traditional debates in this area. As I will now show, the only conclusion which can be reached with respect to the latter is that these debates can produce no substantive insights.

I believe that a faithful characterization of the "accepted" assumptions of the traditional debates (see references above) involves the

following four ideas:

- (i) that while externalities may originate as a natural cum technological phenomena (i.e., a "jointness" in production or consumption), their sustainability or persistence is an issue connected with social institutions;
- (ii) that the existence of "markets" is "the" social solution to the problem of the existence of externalities, the success of which depends upon the existence (or absence) of transactions costs;
- (iii) that the coordinating regime (CR) consists of a single instrument--"prices," while the facilitating regime consists of a single instrument--organized "markets"; and
- (iv) that "certainty"-- $USK_{PI}$  always prevails.

While some may have departed from (iv)--by claiming that transactions costs really included information costs (see Demsetz (1967); to be dealt with in Section Four of this chapter)--those who did not, and who also defended Individualism, were immediately put in a strange position. Since  $USK_{PI}$  was sufficient to ensure the existence of Classical Global Rationality, it would have been difficult at the best of times to claim that externalities cum market failures were true social distortions, rather than manifestations of the rational choices of a classical equilibrium. If this point had been explicitly recognized, then an extended classical system doubtlessly would have been produced right from the outset, and no one (at least of an individualist persuasion) would have worried about externalities except in instances in which  $USK_{PI}$  really could not be satisfied. More precisely, it would have been recognized that the only way in which to explain true social distortions under  $USK_{PI}$  is to invoke Holism, where social institutions can take up positions which override rationality. Such a strategy would clearly be unacceptable to the individualist.

#### 2.4.2 The Holistic Movement

It is perhaps unfair to many traditional classical general equilibrium theorists to accuse them of being "holistic" in their interpretation of

of externalities (and, indeed, monopolies) when most of their research was so individualistic in spirit. However, these theorists would have never treated the existence of externalities as a bona fide impediment to the achievement of classical equilibria had they recognized that externalities could only be regarded as "apparent" distortions under Individualism and  $USK_{PI}$ . If they had dropped  $USK_{PI}$ , they would have of course been fine as far as Individualism goes, and they perhaps could have begun work on a systematic GI interpretation.

In any event, by force of logic, the principal idea of this holistic tradition is that even though  $USK_{PI}$  prevails, at least one element of FS has a "life of its own," and, thus, can only be regarded as an  $\hat{S}$ . Except by accident, the system must now solve for  $S^*$ , where the implied TC is  $\hat{TC}^* > TC^*$ .

Any examination of the "accepted" assumptions of this debate reveals that it cannot be very difficult to produce holistic explanations of market failure. Since by the very conditions of (iii) above, it is already assumed that the coordinating regime is exogenously-fixed and allows only one instrument--"prices"--and that the facilitating regime is exogenously fixed and allows only one instrument--"markets," it is easily seen that the addition of the one further assumption--that the "supply of markets" ( $S_f$ ) is costly and exogenous--can stop the "adjustability" of FS completely: it can only be accidental that PI equilibrium prices are compatible with the predetermined FS. Here, it is impossible for FS to adjust to consistency with  $S_c^*$ ; in general, the system only solves if  $S_c^*$  is relinquished and squares with the given FS (at  $\hat{S}_c^*$ ). This is the form of the Holistic critique of PI explanation.

There can be little doubt that the type of coordinating/facilitating environment specified here severely constrained most of the traditional



thinking on "market failure," and ended up perpetuating an analytical case which is so special that it could only generate a misleading view about the structure of the relationship between coordinating institutions, facilitating substructures and transactions costs. Indeed, the reason why there are so few apparent degrees of freedom in this problem is only because of the arbitrary initial assumptions that the (given) CR must consist of prices alone and the (given) FR, of markets alone. There is simply no substitution from prices to, say, implicit norms, or from markets to, say, organizational hierarchies permitted. Thus, even the initial specification of the problem would have made it a matter of accident that a PI-II\* could emerge in this environment--unless, of course, it could be independently guaranteed that it was never optimal to substitute out of "prices" and "markets" into competing instruments. The holistic treatment of  $S_f$  did not change the nature of the problem; it simply made the problem worse.

Now there can be little doubt that traditional writers on market failure did recognize that there were no degrees of freedom left in this problem. This perhaps explains why they were led to espouse two unacceptable views: (i) that the level of transactions costs was largely fixed outside the problem under investigation and (ii) that the invocation of outside control institutions (such as government policy with respect to externalities) was the only way that a degree of freedom could be put into this problem so as to lower transactions costs.

According to the latter view, government was supposed to provide the appropriate "economic incentives" for individuals to produce/consume the activities which lacked the markets--in short, provide the markets--or to produce the activities themselves. One wonders what yet other social institutions--the institutions of "rational" government policy--could be doing in this explanation, especially when the private sector apparently was

prepared to let the original institutional failure persist even with  $USK_{PI}$ . Moreover, why should it be presumed that any adjustment in government institutions should be quicker or easier to accomplish than the adjustment in any other institution (such as the original coordinating or the facilitating institutions themselves)? But this was the trap at Holists invariably got into: they arbitrarily assumed the institutional distortions which removed the degree of freedom in the problem and then had to invoke other institutional deus ex machina to open the problem up again.

The exogenous fixity of the level of transactions costs also follows as a straightforward implication of the assumptions of this setting: if all three of the components of FS--the coordinating regime, the facilitating regime and supply of facilitating institutions--are fixed exogenously, a fixed (i.e., determined) level of transactions costs is indeed implied. However, it is not the fixed height of the transactions costs which stops the supply of the facilitating institution, "markets"--as the usual story goes; rather, it is the autonomous fixity in CR, FR, and  $S_f$  which entail the fixed high level of TC. Thus, the fixed height of transactions costs only "appears" to be an explanation of facilitating institution failure because the original problem assumed too many exogenous variables. If at least one element in FS possessed endogenous status, then the level of TC would be a variable, codetermined with whatever is given endogenous status.

#### 2.4.2 The "Zero Transactions Costs" Assumption

If traditional theorists committed themselves to the view that observed externalities and market failure could be explained only holistically--even though  $USK_{PI}$  was presumed to prevail--then the seeming "dual" to this view was the idea that classical explanation could only hold in observed situations where externalities were completely internalized and market failures could not exist. This was the obvious point of the "zero-

transactions costs" assumption.

Since the thrust of this viewpoint was that FS-provision was costless, all "economic" impediments to establishing the appropriate congruency between FS (at  $FS^*$ ) and  $S_c$  (at  $S_c^*$ ) could conceivably be removed. More specifically, since, under such assumptions, it did not matter which types of institutional instruments were used in the coordinating and facilitating roles--they were all costless--a commitment to the view (iii), that the only available instruments of CR and FR are respectively "prices" and "markets," was not a problem: the use of these two specific instruments could be as "optimal" as the use of any others. Since there was no "material" constraint posited on  $S_f$  either, what was to stop the formation of markets up to the point where all externalities were removed?

The obvious attractiveness of such an environment lies, of course, in the idea that it is possible for individuals to continue the investment in any and all coordinating and facilitating instruments up to the point where the marginal benefits of doing so are driven to zero. At such a point,  $FS^*$  must be compatible with  $S_c^*$  (determined by N and I alone), and  $TC^* = 0$ ; all externalities are internalized, are priced in accord with  $S_c^*$ , and market failure cannot exist.

The logic of the above setting is straightforward, but the reason why such a setting was invoked in the context at hand and, in particular, why Coase's Theorem was so closely identified with it, remain difficult to comprehend. This is primarily because the achievement of a zero transactions cost world (i.e., the successful realization of that action which leads all externalities to be internalized) presumes Classical Global Rationality.

Under the assumption of  $USK_{PI}$ , it is of course quite acceptable to assume rationality, but to invoke this concept at this stage in the proceedings while foregoing it earlier on, only raises the question of what

explanatory standards were really being employed in the discussion. Thus, if a rationality based on  $USK_{PI}$  had been assumed from the outset, it would have supplanted the assumed Holism--which entailed the retreat to zero transactions costs--in the first place. Given, however, that Holism was endorsed to account for market failures, the question is: Why should it be revoked just because FS is assumed to be costless; the costlessness of FS does not entail the existence of rational decision making with respect to FS? Indeed, by these standards, why should rationality ever enter the problem formulation?

Once again, the overriding point is that the original reliance on Holism in explanations of market failure was completely unnecessary--since  $USK_{PI}$  was available--so that there was nothing initially standing in the way of viewing market failures (and any and all related distortions) as consequences of Classical Global Rationality and, thus, explainable as only "apparent" social distortions. If this road had been taken--as it should have been--then everyone would have recognized that it was possible to rule out a view which posited that FS was costly and exogenous, not by moving to a view which suggested that FS was costless, but by moving to a position which stated that FS was endogenous (even if costly). Thus, everyone would have accepted that classical explanation could account for ("optimal") market failure and externalities even when  $TC^*$  was greater than zero, and the retreat to the assumption of a world of costless transactions would have never taken place. No exogenous elements of S would have ever been cited in the formulation since, given  $USK_{PI}$ , all social entities could be seen as product of natural and individual givens--just as in the extended classical structure, with a binding transactions technology. Moreover, Coase's Theorem would have been seen as just a statement of the Global Reducibility of  $PI$ -equilibria--that if N and I are sufficient for a  $PI-\Pi^*$ , then, by definition,

no social cum legal rules (e.g., liability rules) can autonomously constrain the achievement of (determine the position of) this equilibrium--and would have been written up to cover the general case where transactions costs were positive, but "optimal."

In any case, the moral of this story is that there can be no conceivable difficulty in accounting for any and all institutional failures as only "apparent" if  $USK_{PI}$  is assumed. The only interpretation of the traditional literature which really makes sense is therefore one which assumes an uncertainty which is sufficient to undermine  $USK_{PI}$ . Here there can be no guarantee of classical equilibria (even with FS provision costless), and the onus on the individualist is to show that GI can offer the preferred explanation of market failure to Holism.

### 3. The Theory of Adjustment Costs

If an avant-garde classical theory of an exogenous transactions technology and endogenous ("optimal") transactions costs was designed to deal with those contradictions of A-D structure which involved apparent market failures, then a theory of an exogenous adjustment technology and endogenous ("optimal") adjustment costs was designed to deal with alleged failures to adjust instantaneously to an A-D general equilibrium.

To understand the objectives of any PI adjustment costs theory, consider the following case under A-D theory. The economy is at  $S_0^*$ , given the initial givens,  $N_0$  and  $I_0$ ; all individuals possess  $USK_{PI}$ . Now, assume an exogenous shock, which changes  $N_0$  to  $N_1$ . The solution values for the system is  $S_1^*$ , given  $N_1$  and  $I_0$ , and, by assumption, everyone can know  $S_1^*$ , such that  $E_j(S_1^*) = S_1^*$ .

Clearly, if the reform of  $S_0^*$  to  $S_1^*$  was instantaneous, then it would be impossible to observe any incompatibility between the givens of the problem and  $S_1^*$ ; it would be impossible to observe classical disequilibria as

such. However, suppose--as a non-classical critic might contend--that the reform of  $S_0^*$  to  $S_1^*$  takes real time to complete, even though  $S_1^*$  is perfectly anticipated (e.g., it takes real time to change the prices, laws, monetary policies, or perhaps even the facade on the legislative buildings). Then, non-classical critics would contend that, at all points in time where this economy was in adjustment to, but not at,  $S_1^*$ , "true" classical disequilibria could be observed, and classical explanatory structure would be incapable of illuminating these points. Classical theory is thus rendered explanatorily incomplete with respect to some observed phenomena in any situation where time rates of institutional adjustment are less than infinite (i.e., "institutional rigidities" prevail).

The avant-garde Classicist regards this non-classical criticism as trivial. He contends that, since  $USK_{PI}$  prevails, it is impossible to construe any observed point along the adjustment path to  $S_1^*$  as being other than in accord with Classical Global Rationality. More precisely, if agents are willing to voluntarily accept a non-infinite adjustment speed to  $S_1^*$ , then it must be because adjustment is costly, and agents are rationally picking "optimal" adjustment costs and "optimal," non-infinite time-rates of institutional change simultaneously, given a binding adjustment technology. Accordingly, the classical theorist would contend that classical disequilibria are still impossible to observe at any point on the adjustment path--since the only correct way to set up the problem in question involves the recognition that a crucial element of the set,  $N$ , is an adjustment technology, which implies positive adjustment costs, where agents are always seen to be rational with respect to these costs.

Under this interpretation, the entire adjustment path may therefore be seen as  $S^*$ , where rationality relative to adjustment costs, prevails, at each and every point on the path, such that  $E_j \left( \frac{dS^*}{dt} \right) = \frac{dS^*}{dt}$ , for all  $j$ . If the

adjustment technology was really not binding, then of course rationality would dictate that  $E_j\left(\frac{ds^*}{dt}\right) = \frac{ds^*}{dt} \rightarrow \infty$ , and  $S^*$  would shrink to the original point,  $S_1^*$ , since adjustment is costless.

There is little point in going into details regarding the specification of the adjustment technology. Its role as a natural given in the avant-garde explanation is self-evident, and there would be little difficulty in specifying its characteristics by analogy to the transactions technology constructed in the last section. What is relevant, however, is the recognition that the success of the avant-garde classical explanation under consideration hinges entirely on the achievement of  $USK_{PI}$ . It is the achievement of  $USK_{PI}$  which makes the structure qualify as a successful (classical) equilibrium dynamics of adjustment or, stated alternatively, a successful classical equilibrium explanation of perfectly-anticipated and unanimous institutional reform. If the assumption of  $USK_{PI}$  was relinquished, then the guarantee that agents would successfully choose the classical equilibrium adjustment path would be lost (i.e., it is a matter of accident) and, if points off the optimal path were ever observed, then they would have to be taken as true classical disequilibrium positions. The charges of non-classical critics would now be fully relevant, and the standard individualist problem of how to explain such points via GI, and not Holism, would arise.

I spend no more time with such explanatory concerns, since any avant-garde classical structure with an adjustment technology and/or a transactions technology posited in the set  $N$ , and assuming  $USK_{PI}$ , is relatively easy to assimilate. The only subtle point which might be mentioned here is that, in the case where both of the above technologies are binding, the classical equilibrium level of transactions costs must be mutually consistent with the classical equilibrium level of adjustment costs--as derived from ("extended")  $N$  and  $I$ . There therefore can be no justification for treating transactions

costs independently of adjustment costs, and vice versa.

Evidently, the only remaining item to examine in the triad of avant-garde classical explanatory weapons is that of an information procuring cum search technology, which presumably produces "optimal" information costs. The crucial questions here are: Can the analysis of information costs be developed in exactly the same way as the previous two parts of the triad? Must the explanation of a classically rational response by agents to the constraints of an informational technology (i.e., costly information) presume the achievement of  $USK_{PI}$  (as in the above formulations), or can rationality with respect to information be grounded in less knowledge than this? Clearly, if  $USK_{PI}$  must in fact be used to close off this last exercise, then PI-structures must still be committed to the guarantee of the demonstrated truth of  $T_j$ , and one can only wonder what substantive informational constraints can really appear in a world where information is costly. I turn to these issues directly.

#### 4. The Avant-Garde Classical Theory of "Imperfect" and Costly Information

The first question which one must ask in considering avant-garde efforts to place an information technology into its classical structure is: Why is it necessary to do it? Presumably, the conjunction of an adjustment technology and a transactions technology should be sufficient to handle any and all observed departures from A-D results, so why invoke any more explanatory instruments?

I conjecture that the reason is this: non-classical critics will invariably claim that the above extension of classical structure to incorporate additional technologies may be artful, but that the successful achievement of such ("extended") classical equilibria still requires that all agents possess the knowledge necessary to guarantee that their  $T_j$ 's are



true; hence, classical structure cannot deal with situations (such as many of the short-run) where knowledge constraints are substantive and uncertainty is "real," rather than "apparent." The avant-garde Classicist's attempts to introduce the constraints of costly (and limited) information is then rendered as the only way by which to remove these non-classical critical charges; hence, to show that classical programmes which are built on costly transacting and adjustment can be viable in "non-extreme" (some might say, "non-trivial") circumstances.

4.1 Let me begin naively on this analysis. In the spirit of the contemporary "rational expectations" movement, assume that, at any point in time, agents are confronted with a production technology, which specifies the relation between the probability of the truth of an estimate (say, of  $S^*$ ) and the economic cost of procuring the information which produces this estimate. Presumably, if knowledge was costless, everybody would collect the information necessary to establish unitary probabilities, and perfect knowledge would prevail. However, if knowledge was costly, then no one would procure information to certainty; hence, some uncertainty must always prevail.

Let me presume, again naively, that the production function specified above is always some function of "existing" information (i.e., the (capital) stock of information already acquired). At any point in time, the technology is fixed, but will change as soon as any one acts on existing information, since this will generate new information for the next period. Thus, in general, there will be a different knowledge technology at each different point in time. (Note, also that there is no presumption that agents are initially endowed with the same knowledge technology.)

4.2 Given the above, now consider the standard classical scenario: agents aim to maximize over all activities--including information

procurement--given I and N, where N is extended to include the above knowledge technology. Clearly, the knowledge technology is the new exogenous variable in this formulation, while the level of new information--to be added to the stock of "existing" information--is the strategic endogenous variable which agents are optimizing over; an "optimal" level of information costs is therefore simultaneously implied along with an "optimal" probability of estimate (i.e., optimal "uncertainty").

Now, consider a point in time analysis. No matter how the above technology is specified, the guarantee that agents can successfully optimize with respect to N and I (extended to incorporate costly information) still requires that, at minimum, they possess an aggregate summary of all information contained in N and I; they must know the solution value to the PI general equilibrium structure which contains the information technology in particular. Thus, they must be able to guarantee the truth of  $T_j$ , which entails  $E_j(S^*) = S^*$  (for all  $j$ ). If  $S^*$  was represented (at least in part) by prices, all this therefore states is that all agents must be able correctly to perceive the PI equilibrium price of information; otherwise, they could have no guarantee of the successful optimization with respect to costly knowledge (uncertainty).

Unfortunately, this is exactly equivalent to the claim that the agents possess  $USK_{PI}$ -- so prima facie the form of the problem hasn't changed. In the next period, the new information generated in the initial period will change the knowledge technology--but agents still must have knowledge (directly, or at least through prices) of this change in N, so that they still require  $USK_{PI}$  intertemporally. This is the basic conclusion.

4.3 There is, I believe, no way around the conclusion reached here: the introduction of knowledge constraints into an avant-garde classical analysis can never be compatible with non-accidental PI equilibria unless

the basic condition of  $USK_{PI}$  can also be guaranteed. All of this is, unfortunately, obvious: the guarantee of Classical Global Rationality depends on the achievement of  $USK_{PI}$ , so it makes no sense to say that agents can be rational with respect to existing information without already presuming  $USK_{PI}$ . Information may be constraining in these avant-garde structures--in the sense that it is "imperfect"--but it, by definition, can never be sufficiently constraining to rule out the existence of that knowledge required for agents to maximize gains from trade, given a knowledge technology. This is no more than the basic "stage one" proposition of Chapter Seven: that knowledge can never autonomously constrain the achievement of PI equilibria; that all autonomous constraints of knowledge must be removed (hence, are endogenized) in the neighbourhood of a PI equilibrium, even though the position of such PI equilibria are determined, in part, by the autonomous natural constraint of a knowledge technology.

The "sleight of hand" aspects of this avant-garde treatment of knowledge constraints, of course, emerge from the fact that, in PI equilibria of the type implied, probabilities of estimate are determined with a value of less than unity, which "appears" to be a less stringent requirement than  $USK_{PI}$ . This seeming paradox is resolved, however, by the recognition that the very "determination" of the probabilities which are compatible with the achievement of PI equilibrium are an outcome of successful classical optimization, given the (non-probabilistic) truth of  $T_j$  based on  $USK_{PI}$ . How can the probabilities on the knowledge production function be representative of an autonomous constraint on behaviour if they are an endogenous outcome of successful optimization, given the truth of  $T_j$ . On the other hand, if  $T_j$  was not guaranteed to be true (i.e.,  $USK_{PI}$  was sacrificed), then the probability of estimate could be autonomous, since there would no longer be any guarantee that it could be successfully derived from N and I. This of course just

says that probabilities can "count" only in explanations of observed states which are not classical equilibria--which just states that PI explanations can hold if and only if "uncertainty" is perfectly-anticipated.

The above argument, I believe, has major critical implications for avant-garde classical research. There is simply no way of avoiding the condition of  $USK_{PI}$  as a requirement for the non-accidental achievement of "rational" classical equilibria. More precisely, it is simply a "red-herring" to argue that individuals can exhibit Classical Global Rationality with respect to existing information without providing the independent guarantee that  $USK_{PI}$  prevails. "Rational" information acquisition does not lead (over time) to a state of  $USK_{PI}$ ; rather, the rationality of information acquisition follows from the (prior) achievement of  $USK_{PI}$ .

4.4 Allow me to illustrate the failure of the avant-garde classical strategy with respect to knowledge in simple terms.

Thus, presume that there exists a complete set of A-D demand and supply curves derived from a non-extended concept of N and I. Consider any one market and let the point at which these curves intersect be denoted  $x_{A-D}^*$  ( $\in Z_{A-D}^*$ ). Suppose now that  $x^0$  ( $\neq x_{A-D}^*$ ) was observed, and the question becomes: How is  $x^0$  to be explained?

By the analysis of Chapter Five, it follows that  $x^0$  can be successfully "explained" if and only if the A-D supply and demand curves are altered so as to pass through  $x^0$ . In short,  $x^0$  must be explained as part of a general equilibrium which is not an A-D general equilibrium, and this can be effected only by positing additional exogenous variables in the problem which will just generate supply and demand curves which do pass through  $x^0$ .

Now, Holists may argue that the reason why  $x^0$  was observed is that exogenous elements of S are determinants of these curves as well as N, with

or without I. Thus, if exogenous elements of S were considered in the problem, one would find that the (S-constrained) demand and supply curves just passed through  $x^0$ , and this  $x^0$  could be completely explained in this fashion.

The individualist, however, will not accept this mode of explanation, since he claims that S (as  $S^*$ ) is a consequence of the intersection of (all) supply and demand curves, and cannot therefore determine the position of these curves. Accordingly, it follows that the classical theorist has no option but to explain  $x^0$  by positing the existence of additional exogenous variables which are beyond the A-D specification but which, nonetheless, are eligible components of N and I. In this regard, suppose that he finds that he can just account for  $x^0$  by extending N to incorporate only a transactions technology. He therefore argues that individuals would have been at  $x_{A-D}^*$  if transacting was costless but, since it isn't, it was rational for individuals to settle for  $x^0$  (where  $x^0$  is an  $x^*$  of an extended classical structure).

Now, everyone would agree that this would be a satisfactory explanation of  $x^0$  if it could be guaranteed that all agents possessed sufficient knowledge to identify with certainty that  $x^0$  was the true maximizing position, relative to the posited specification of N and I. This condition is, of course, exactly  $USK_{PI}$ : individuals have just the knowledge by which to establish where the "true" supply and demand curves derived only from elements of N and elements of I intersect.

Suppose now the same strategy was tried with an information technology and without a transactions (or adjustment) technology. The argument would be identical in form:  $x^0$  could be construed as a maximizing position relative to the costs of information gathering, even if agents would have rationally endorsed only  $x_{A-D}^*$  if information was costless. Nonetheless, it is easily seen that the success of this explanation still hinges on the

guarantee that all agents can identify with certainty where the extended classical supply and demand curves intersect. This requires  $USK_{PI}$ . There is simply no way around the guarantee of  $USK_{PI}$  in a structure which demands that equilibrium positions manifest the unanimity of  $E_j(S^*) = S^*$ , for all  $j$ . Alternatively, no matter how a knowledge technology exogenously affects the equilibrium position of supply and demand, knowledge per se can never be exogenous at the point where a classical equilibrium is realized; if this equilibrium is realized, then, by definition, an insufficiency of knowledge could never have been present.

4.5 The ultimate conclusion is straightforward. If it is not logically possible for Classicists to develop a theory of informationally-constrained, "rational" decision making which requires less knowledge than  $USK_{PI}$ , it is still not possible for Classicists to convince their non-classical critics that they can illuminate short-run situations where informational constraints are really binding; avant-garde classical reference to informational constraints can be regarded as only an unsatisfactory sleight of hand. Accordingly, the only route open for Classicists is the direct one: to provide a non-arbitrary argument for why  $USK_{PI}$  (and, thus, Classical Global Rationality) must prevail in all short-run observed instances. If Classicists can provide this, then the extended classical system emerges triumphant, and there should be no further questions. If not, then classical theory must fail outright in the short-run, and again there should be no further questions. I turn to this ultimate issue in the next chapter.

## CHAPTER NINE

THE LOGICAL IMPOSSIBILITY OF A SUCCESSFUL CLASSICAL  
EXPLANATORY PROGRAMME FOR THE SHORT-RUN: The Problem  
of Short-Run Knowledge Sufficiency

In the last chapter, I have demonstrated that no matter how sophisticated a specification of N and I variables--and, in particular of informational constraints on individual decision-making--the avant-garde proponent of PI might come up with, he cannot logically avoid the task of guaranteeing the fulfillment of  $USK_{PI}$  as a fundamental requirement of being able to successfully explain observed states as classical equilibrium states. Reference to the constraints of costly information in the context of PI structure is therefore simply a "sleight of hand," since knowledge in principle can never be seen as sufficiently constraining to rule out the achievement of  $USK_{PI}$  and thereby remove the guarantee of the truth of everyone's  $T_j$ , which entails the  $E_j(S^*) = S^*$  result. In short, if the achievement of  $USK_{PI}$  was really compromised by posited imperfections in knowledge, then maximization (relative to N and I) could only be regarded as an accident, and there would be no logical foundation for the view that observed states must be a logical consequence of decision-making in accord with Classical Global Rationality.

If the success of PI explanation therefore ultimately comes down to the one issue of whether there exists a non-arbitrary explanation for the achievement of  $USK_{PI}$  by agents, then it follows that the demonstration that PI structure can successfully illuminate the short-run in particular hinges on the existence of a non-arbitrary argument for the achievement of  $USK_{PI}$  which also does not presume that an infinity of time is available for

this state of knowledge to be realized (see Boland (1978); Boland and Newman (1979)). It is therefore required that any successful explanation of the transformation of  $UIK_{PI}$  (or, possibly,  $NUSK_{PI}$ ) into  $USK_{PI}$  not employ "long-run" arguments.

It follows that the condition for PI structure to provide a non-accidental account of even one short-run  $Z^0$  is that the transformation of individual knowledge to  $USK_{PI}$  be non-arbitrarily rationalized as complete at some point in time prior to the long run. The condition for PI structure to be explanatorily complete for all short-run  $Z^0$ 's requires that the transformation to  $USK_{PI}$  be non-arbitrarily rationalized as complete before (or simultaneous with) the earliest point in time at which short-run action begins.

The purpose of this chapter is to argue that there exists no successful explanation of the achievement of  $USK_{PI}$  in less than an infinity of time; all explanations which underwrite this achievement of  $USK_{PI}$  in less than this amount of time are therefore ad hoc and possess nothing other than arbitrary foundations. The central conclusion reached is therefore that, while PI structure can be seen to be quite beyond criticism as a long-run explanation of aggregate states, it has no power to illuminate even one short-run state, except on arbitrary grounds.

If one wishes to procure a non-arbitrary theory of short-run aggregate behaviour, there is no option but to look to the non-classical alternatives, of which only the GI option can even qualify from the outset as one which meets the explanatory standards of Individualism. The ultimate question to be examined in the following chapters is therefore: Does there exist a non-arbitrary explanation for the achievement of some state of short-run knowledge which is less stringent than  $USK_{PI}$ , but which is nonetheless sufficient to guarantee the achievement of (short-run) GI



coordination, where  $S = S^*$  and Non-Classical Global Rationality prevails?

This question is the essential question of any analysis beyond "stage one," and it must be answered, in the affirmative if any programme to explain short-run, classical disequilibria as non-classical (GI) equilibria is ever to be successful. For now, however, the more modest point is only that classical explanatory structure per se cannot in principle penetrate short-run behaviour.

1. An Initial Perspective on the Problem of Knowledge Sufficiency of PI

With deference to historical tradition, it is useful to distinguish two approaches to explaining the achievement of  $USK_{PI}$ . The first (now typically associated with the "rational expectations" movement) may be termed the "individual knowledge procurement" approach and the second (typically associated with a defence of "efficient markets" and the like) can be called the "institutional signalling" approach. While the former requires arguments which can rationalize a process by which each individual can achieve sufficient knowledge on his own (usually through inferential mechanisms), the latter does not; it simply requires a non-arbitrary explanation for why certain institutional mechanisms (e.g., PI equilibrium prices, as signalled by "markets") can always come through to remove any insufficiency of knowledge which individuals might otherwise possess.

I will show in the course of this chapter that the same types of logical arguments must be used to rationalize the success of either one of these approaches--more to the point, they both fail for identical reasons--so there is ultimately not much use in distinguishing them. I keep them separate in what immediately follows for expository clarity, and start the analysis of the possible arguments by which to underwrite the transformation of knowledge to  $USK_{PI}$  by defining an initial  $UIK_{PI}$

environment, from which ~~this~~ transformation can be seen to begin.

### 1.1 A $UIK_{PI}$ Scenario

The  $UIK_{PI}$  setting assumed is one which I will denote "The Intractable  $UIK_{PI}$  Setting," since it leaves virtually no options open by which to rationalize the movement from  $UIK_{PI}$  to any state of  $USK_{PI}$ .

Thus, assume an environment where at a point in time:

- (a) each individual has perfect and complete knowledge of his own "personal givens,"  $N^j$  and  $I_j$ ,
- (b) each individual knows the whereabouts of all other individuals but has no independent knowledge of the personal givens of others,
- (c) no aggregate coordinating signals, or signalling mechanisms (e.g., markets) or other aspects of FS exist,
- (d) by the assumed conditions of N, FS-provision is not a costless activity,
- (e) by the assumed conditions of N, searching out the  $N^j$ 's and  $I_j$ 's of others is neither technologically nor economically feasible; and
- (f) no individual has (exogenous) access to knowledge of the history of the personal givens of others or to the history of past trading outcomes.

It is assumed, moreover, that the following "classical" assumption holds:

each individual aims to select a set of actions which maximize his utility (given his own  $N^j$  and  $I_j$ ).

The above specification is intendedly set up to be "static" in character. Some of the items (notably (f)) involve questions of intertemporality and this specification will be modified later to deal with these issues.

It is noted that, since all agents are assumed to know their personal givens, there is no "technological uncertainty" present; all uncertainty is "market uncertainty." I also note, but leave aside, the objection that (a) and (c) may conflict; that some (facilitating) institution must be assumed to exist in order for individual "endowments" or "property" to be initially defined. The obvious point, however, of defining (a) - (f) in the above way is to

characterize an extreme setting in which no individual can initially establish the gains from trade (interaction) open to him, or identify the types of institutions which will lead to "maximizing" coordination; in short, where the constraints of insufficient knowledge are all-constraining and where PI-equilibria must be accidental.

Now, prima facie it might be conjectured that very few propositions about individual interaction could ever be put forth in such a setting. Why might this be? A possible answer is because, under the assumed conditions: (i) no individual need perceive the gains from any trade or interaction with others; and, accordingly, (ii) all individuals will just consume their own endowments in isolation and will coordinate in a no-trade state. Thus, according to this argument, the posited extent of uncertainty will simply force all individuals to autarky, where autarkic behaviour is just another form of coordination (albeit a grossly inferior form, by PI standards).

Proposition (i) is, of course, correct--individuals need not recognize any gains from interaction under the assumed conditions--but (ii) is misleading, and it is important to understand why before any further analysis is undertaken. The essential point here is that, while it may in fact transpire that no individual conjectures that he can gain from voluntary exchange, there is no reason to believe that involuntary interaction (i.e., predation) will not take place. Once again, the problem is about guaranteeing that any individual can successfully achieve a state of self-containment; that the others won't interfere with or impinge upon him. Evidently, to provide such a guarantee, it is necessary to demonstrate the existence of a (facilitating) institution which outlaws predation and permits only voluntary exchanges. And this is exactly the problem: under PI, this institution cannot be taken as an exogenous given and, under  $UIK_{PI}$ , there is not enough knowledge

in the system to guarantee the unanimous endorsement of such an institution (even if fully informed individuals in fact would endorse the institution with unanimity). Thus, the effective operation of the required aggregate institution can be seen as only an accidental occurrence under the circumstances posited, and it is necessary to conclude that, under  $UIK_{PI}$ , even autarkic equilibria are no more or less accidental than any other types of PI-equilibria.

The upshot of this initial discussion is therefore that the only route to "guaranteed," rather than "accidental," (PI) equilibria is to provide a non-arbitrary explanation for why at least one of conditions (b) - (f), do not hold in observed situations. The "individual knowledge procurement" approach to the transformation of  $UIK_{PI}$  into  $USK_{PI}$  is essentially to reject at least one of (b), (e), or (f), while the "institutional signalling" approach is to reject at least one of (c) or (d). I begin with the former.

## 2. The Individual Knowledge Procurement" Approach to the Problem of Knowledge Sufficiency

It is easily seen that, if the defender of this approach rejected (e) --and replaced it by the assumption of costless search--then he would immediately achieve the knowledge environment presumed by an Arrow-Debreu world--namely, UPK. However, there would be no convincing justification available for why search was in fact costless and, to just assume this situation, could only be arbitrary. If the defender of this approach again rejects (e), but moves only to the assumption of (non-prohibitively) costly search--in the name of realism--then he still faces the problem outlined in the last chapter: to guarantee (classically) "optimal" search, relative to the costs of information, he must already presume the achievement of  $USK_{PI}$ . Accordingly, the defender of PI must find some more subtle arguments to work with, and here he must dip into the depository of traditional

philosophical arguments.

The discussion therefore immediately must turn to a consideration of the two long-standing philosophical traditions which have sought to provide justifications for the existence of true theoretical knowledge of the type which is required to underwrite  $USK_{PI}$ . These traditions are: Apriorism and Inductivism. The former view endows all individuals with a priori true theories from the outset, while the latter view provides the rationale for the achievement of theoretical truth by a (time-based) process of inductive inference from true factual knowledge.

### 2.1 Apriorism

Unfortunately, not much need be said on this option. In the context of the  $UIK_{PI}$  setting specified above, this option simply suggests that agents possess far more independent knowledge than just the factual knowledge of their own personal givens. Perhaps, as is often entertained, all agents really have independent access to the true  $T_j$ --an a priori true model of the "maximizing" aggregate economy. If this is really the case, then the problems of underwriting the achievement of  $USK_{PI}$  are simply trivial. All agents must end up with true and identical  $E_j(S^*)$ 's, such that action based on these common expectations will coordinate at a  $PI-II^*$  in a self-fulfilling fashion.

Clearly, assigning a priori true knowledge to agents in such a way that they can reach at least some condition of  $USK_{PI}$  immediately is a priori not very appealing. This is precisely why Apriorism is so difficult to accept. Thus, it is one thing to argue that agents conceivably possess some a priori true knowledge, even if this knowledge, in and of itself, is not sufficient for  $PI$  coordination; it is quite another to push the extent of a priori true knowledge to  $USK_{PI}$  or  $UPK$  outright. In fact, the exact question raised here is: How does one "explain" non-arbitrarily just how

much a priori true knowledge agents possess? More precisely, since by this approach there is no way to explain why agents possess less a priori knowledge than that required for  $USK_{PI}$  (or  $UPK_{PI}$ )--except by reference to another a priori criterion--what is to stop the argument that the world must always be in PI-equilibrium? It is the sheer ease of this argument which reveals its singular arbitrariness, and that it can only constitute the (philosophical) twin to (economic) arguments concerning costless knowledge and the like. Accordingly, the task of providing non-arbitrary justifications for the achievement of  $USK_{PI}$  must fall to Inductivism.

## 2.2 Inductivism

As is well known from much empirical research in economics, Inductivism is the view that all theoretical knowledge is founded upon, and verified by, true factual propositions. In the context at hand, the guarantee of the truth of  $T_j$  (and thus the guarantee of the truth of the  $E_j(S^*)$ 's held by individuals) now must be explained as a process by which individuals gain access to "sufficient" true facts so as to verify universal theories. (The collection of factual propositions--gathered up to a point in time--is usually taken to comprise an "information set.") Clearly, in the "intractable"  $UIK_{PI}$  setting originally posited, all individuals have access to an extremely limited set of true factual propositions--only those concerning their own personal givens and the whereabouts of others--and needless to say, few inductivists would regard these facts as a sufficient basis from which to rationalize successful individual inference of the conditions of PI coordination. Accordingly, it becomes necessary to account for the existence of some process by which further facts are collected.

It is at this juncture in the argument that the denial of assumption (f) becomes the important strategy to examine. More precisely, if it is accepted that strategies to deny (c), by positing an optimal search

mechanism, are either arbitrary or entail circularity, then the question is whether the granting of individual access to knowledge of past history can do any better. The basic idea is that if individuals can be seen to have access to a wide variety of historical data on aggregate states of the economy (e.g., past price, output, and inflation statistics), then supposedly they might be able to infer the "true" conditions of (current) aggregate coordination by this route.

The essential point to acknowledge about this proposed strategy is that it is quite beyond criticism--and offers a completely non-arbitrary theory of knowledge procurement to  $USK_{PI}$ --so long as it is presumed that agents have access to all the historical facts--a "complete" information set. This is however exactly where the "infinite time" problems arise, since if history is unbounded, then the guarantee of the successful inference of the truth of theories (like  $T_j$ ) from the facts must await the end of historical time--"the long-run." If the guarantee of  $USK_{PI}$ --which is just the knowledge which is equivalent to a complete and accurate factual history--can only be procured in the long-run, then it is straightforward to arrive at the conclusion that PI-equilibria can be non-arbitrarily justified to hold only in the same temporal dimension.

The standard logical problems of any inductivist view--and this includes second-best positions such as "probabilism" which rely on known ("stationary") probabilities--therefore arise as soon as analysis turns to settings in which the factual knowledge of agents is not complete; this is, of course, the "classical" problem of Inductivism (from Hume; see Agassi (1966) and Popper (1957)), and it is a problem which must emerge in any (intertemporal) setting where in particular future facts have not yet revealed themselves. In such (short-run) circumstances, it is simply not possible to guarantee that agents can successfully infer the truth of any

(intertemporal) theory of PI coordination from the facts alone. For that matter, it is not even possible to explain individual choice between competing  $T_j$ 's as being based upon non-arbitrary criteria that indicate which of the competing theories is "best supported" by the facts. To provide bona fide guarantees, something "beyond the facts" must be added to the problem.

It is important to stress that the above argument is quite compatible with any agent believing that an incomplete set of facts does really verify some theory or another (thus, rendering it preferred to alternatives) or, if not this, that at least he has criteria by which to choose theories on the basis of their (relative) degree of factual support. Thus, any agent may indeed claim that his choice of (initial)  $T_j$ , along with his  $E_j(S^*)$ , is not at all arbitrary and he of course may be right--by accident. Prior to the long-run, however, there is no way that the agent can ensure that any perceived verification is other than accidental and there is no way that he can ensure that any statistical criterion that might be used to choose (relative) degrees of factual support follows from a "true" theory of criteria, as supported by a complete set of facts. If the agent is truly saddled with incomplete factual knowledge, then it follows that he can have no easier a time picking between criteria to judge theories as picking between the original theories which entail  $E_j(S^*)$ .

It is precisely because of the nature of the above problem that the injection of (at least some) a priori true knowledge into such short-run settings appears to be inevitable. Evidently, what is needed to guarantee the inference of theoretical truth from an incomplete set of facts is a meta-theoretical principle to guarantee that the facts not searched out, or the history not yet available, do not contain counterexamples to any agent's posited theory. However, since it follows that the truth of such



a principle itself cannot be inferred from the posited incomplete history, the only road open to guaranteeing this principle can be an a priori one. The need to inject even one a priori true principle--the "inductive principle" --into a setting which otherwise denies Apriorism completely is, of course, the classical failure of Inductivism. It is "the" submission to arbitrariness in the explanation of how true theoretical knowledge can emerge.

There are many ways that the above types of argument can be stated. An alternative is to note that an incomplete set of facts in principle can "fit" many false theories--by accident. Accordingly, to show that any potential verification of a posited theory is really a verification of a true theory and not an accidental corroboration of a false theory, it is necessary to have an additional a priori true principle to distinguish bona fide verifications from their accidental counterparts. In the extreme, this implies the somewhat paradoxical view that the true theory must be known a priori before any factual support can be shown to verify it.

Of course, the above arguments only define the "naive" critique of Inductivism (see Agassi (1966)), since they assume that the problem is the incompleteness of facts and not the truth of the facts themselves. In this light, the "sophisticated" critique posits the view that all factual propositions are theory-laden, so that the independence between a (proven) factual base and the theories which this factual base is supposed to be verifying is broken. Here the problem of Inductivism is simply that any proof of the truth of factual propositions used to verify one theory already must presume the truth of another prior theory on which the facts are based. Since the verification of the prior theory raises the very same justificational problem as the verification of the initial theory, an infinite regress is implied. This regress can only be stopped by specifying

ad hoc criteria for accepting at least one theory as "given" or "true"--even if it is not (Conventionalism), or by the invocation of a priori true knowledge, at some juncture in the argument. It is, of course, only the apriorist strategy which provides the guarantee--albeit spurious--of the truth of at least one theory or meta-theory, since it allows theoretical justification to be seen to take place without any reference to the facts, or the time needed to collect the facts.

### 2.3 The Methodological Problem of Apriorism and Inductivism, and the "Classical Critique" of Theories of Knowledge Procurement

The basic conclusion which follows from the above analysis is straightforward: in any setting where individual decision makers cannot have access to a complete set of known facts, the explanation of the success of their decision making--as following from the guaranteed truth of a theory that they hold--must involve the assumption that individuals possess some a priori true theoretical knowledge. Since, in the context at hand, it is the guarantee of the truth of the individual's theory of  $S^*$  (i.e.,  $T_j$ ) which underwrites the truth of his  $E_j(S^*)$  and which, at the same time, is concomitant with his achievement of informational sufficiency, the more general expression of this argument is that the guarantee of any type of PI coordination requires either that complete factual histories, or some a priori true principle, be accessible to all individual decision makers. In any case where individual agents have access neither to complete factual histories nor to any a priori true knowledge, it follows that  $USK_{PI}$  cannot be reached,  $T_j$  cannot be successfully verified, and PI equilibria cannot be rationalized on anything other than an accidental basis.

2.3.1 It is important to see the above ideas as comprising a "classical critique" (of theories of knowledge procurement), and to note that the

logical form of this critique is identical to the "classical critique" (of non-classical explanation) exposed earlier. Thus, the "classical critique" (of knowledge) may be expressed:

If all theoretical knowledge possessed by individuals must be based on "facts," then either: (a) an infinity of time is granted to permit "sufficient" facts to come forth to successfully verify (universal) theories, or (b) any explanation of successful inference prior to this long-run point must employ arbitrary principles (e.g., a priori true principles).

Alternatively, the "classical critique (of non-classical explanation) may be expressed:

Either (c) a "rational" classical equilibrium prevails, or (d) the explanation of any behaviour which transpires outside of this equilibrium must be arbitrary, relative to the postulates of Individualism.

Given these symmetrical propositions, a crucial methodological point can be seen: if the guarantee of the non-arbitrary success of classical equilibrium explanations (via Classical Global Rationality) in (c) hinges on the non-arbitrariness of the explanation of successful inductive inference in (a), then it follows that classical explanation can only hold non-arbitrarily in the long-run. The important corollary to this proposition is that any attempt by avant-garde classical thinkers to move classical explanation back into the short-run through any specification of an "individual knowledge procurement" mechanism must meet with the charge of arbitrariness implied by (b).

2.3.2 · It is of course precisely for the above reasons that the recent retreat to a priori true knowledge in the context of "rational expectations" models can appear to be such an enigmatic strategy; it secures the supposed non-arbitrariness of classical equilibria only by introducing a full-fledged arbitrariness with respect to the mechanism by which the knowledge required for such equilibria is procured. In this regard, why not just admit departures from classical equilibrium, and explain them arbitrarily right from the

outset--by forfeiting Individualism and rationality altogether? This is what Holists do, and it would take considerable argument to claim that it was less "efficient" to explain observed outcomes by arbitrarily treating S as exogenous, as to deny the exogeneity of S, admit the role for rationality, and then to guarantee the rationality only through the endowment of a priori true knowledge to agents. (I discount the strategy of simply assuming that agents are "rational.")

In any event, given the above arguments, it cannot be logically satisfactory for Classicists to criticize their Holist counterparts on the grounds that assuming the exogeneity of S (e.g., exogenously-fixed prices) is "behaviourally arbitrary" at the same time as Classicists themselves assume the existence of a priori true knowledge: both types of assumptions are equivalently arbitrary. It would also be unwise for avant-garde defenders of "rational" expectations to criticize their earlier "adaptive expectations" counterparts (see Cagan (1956); M. Friedman (1970)) too heavily. After all, the behavioural arbitrariness which accompanies unsuccessful short-run induction--before adaptation is complete--is the "dual" to short-run decision-making success with a priori true knowledge (see B. Friedman (1979)).

More precisely, a logically consistent defence of an adaptive expectations programme--based on Inductivism--will allow some learning dynamics to the long-run state where  $USK_{PI}$  and PI coordination prevails but, in general, will not be able to provide a non-arbitrary explanation of the short-run non-classical behaviour which leads to this state. Alternatively, an Apriorist, rational expectations view will collapse the long-run to the short-run and, in general, give up a learning dynamics completely for an arbitrary assumption about knowledge procurement. The merit of the adaptive viewpoint is that it at least takes the inductivist argument for what it

says: that successful learning to  $USK_{PI}$  and PI coordination requires an infinity of time.

2.3.3 The essential implication of all of the above arguments is that there can be no non-arbitrary theory of the short-run if both the "classical critique" of short-run knowledge sufficiency and the "classical critique" of non-classical explanation hold.

For avant-garde Classicists, in particular, the only conceivable options remaining to illuminate the short-run are: (i) to abandon the "individual knowledge procurement" approach, and to see if an "institutional signalling" approach can do any better; or (ii) to maintain the former strategy, but to deny the "classical critique" of short-run knowledge procurement by denying both Inductivism and Apriorism outright, and constructing a third alternative.

Unfortunately, the basic problem here is that there does not exist any non-arbitrary programme to underwrite the successful knowledge acquisition required by PI explanation except Inductivism; all other non-arbitrary theories of knowledge involve the commitment to the failure to procure demonstrably-true theoretical knowledge. Moreover, since I will argue in the next section that the success of any "institutional signalling" approach to the procurement of  $USK_{PI}$  must either presume the success of the "individual knowledge procurement" approach, or assume Holism outright, it is simply necessary to conclude that PI-structure cannot in principle illuminate short-run aggregate behaviour. Stated somewhat more optimistically, PI structure provides the best possible explanatory yield in the easiest possible theoretical setting--"the long-run." It cannot provide non-arbitrary explanations of even one instance of short-run behaviour.

I now complete my critique of the knowledge foundations of PI structure by showing that any "institutional signalling" approach to the

achievement of  $USK_{PI}$  must logically fail, and then, in conclusion, briefly discuss the implications of the two "classical critiques" presented above for the prospects of a successful short-run GI explanatory structure.

3. The "Institutional Signalling" Approach to the Problem of Knowledge Sufficiency

In the above analysis, Inductivism and Apriorism were viewed as alternative ways of rationalizing how individuals could reach the sufficient knowledge required for PI-equilibria "on their own." In particular, since a realizable  $E_j(S^*)$  can only logically follow from a true theory of the PI coordinated state, inductivist and apriorist arguments were used as alternative means of justifying the truth of any and all individuals' posited  $T_j$ 's. It was seen that, in order to allow such strategies to work, various assumptions of my original  $UIK_{PI}$  setting had to be abandoned in the process. In fact the only assumptions of this original setting which were left untouched were (c) and (d), which concern the provision of FS and other "social" signalling processes. These are my immediate concerns here.

Now, if one argues that neither the apriorist or inductivist arguments constitute unsatisfactory ways of explaining the achievement of  $USK_{PI}$ , then this is tantamount to arguing that there is no way to explain how individuals can achieve any condition of  $USK_{PI}$  "on their own." Rather, individuals must be given external help to reach informational sufficiency and this is where an institutional signalling explanation enters as the last-ditch alternative. In particular, if it is claimed that individuals never can possess "sufficient" a priori true knowledge, and that individuals never can have access to complete factual histories--except in the long-run--then, in any short-run situation, individuals must be saddled with  $UIK_{PI}$  unless some aggregate signalling mechanism comes through to remove the insufficiency of knowledge. It is to be emphasized that the role of a

signalling solution to the problem of  $UIK_{PI}$ , such as that played by the "efficient markets hypothesis" is logically equivalent to those played by rational expectations under Apriorism and adaptive expectations under Inductivism. As far as solving the problem of ensuring that all individuals possess  $USK_{PI}$ , the three solutions are perfect substitutes.

### 3.1 The Hayek Argument

The most important historical exposition of the institutional signalling approach is that contained in Hayek (1945, 1948), and I believe that the essential ideas of this approach are now very well known (see Grossman and Stiglitz (1976)).

Thus, assume a PI-setting under  $UIK_{PI}$ . All individuals possess "specialized" knowledge over their own limited domain but none can know society or nature as a whole. All individuals therefore require additional knowledge to coordinate. Assume furthermore a "naive" setting where the coordinating regime (CR) consists only of one type of coordinating institution--prices--and where the facilitating regime (FR) consists of a single type of facilitating institution--(organized) markets. Then, the Hayek argument is that it is possible for markets to "centralize" the specialized knowledge possessed by all (widely-dispersed) individuals and to disseminate this information in a "signal," which if acted upon by everyone, is sufficient to achieve PI-coordination. The signal is, of course, the competitive equilibrium relative prices of activities (as an embodiment of  $S^*$ ), where markets are seen "to facilitate" the provision of a coordinating price signal.

Consider this argument in Hayek's (1948) own terms:

"...But the 'man on the spot' cannot decide solely on the basis of his limited but intimate knowledge of the facts of his immediate surroundings. There still remains the problem of communicating to him such further information as he needs to fit his decisions into the whole pattern of changes of the larger economic system." (p. 84)

"...in a system in which the knowledge of the relevant facts is dispersed among many people, prices can act to co-ordinate the separate actions of different people in the same way as subjective values help the individual to co-ordinate the parts of his plan." (p. 85)

"...The whole acts as one market, not because any of its members survey the whole field, but because their limited fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all." (p. 86)

"...The same situation exists on the side of consumers or buyers. Again the knowledge they are supposed to possess in a state of competitive equilibrium cannot be legitimately assumed to be at their command before the process of competition starts. Their knowledge of the alternatives before them is the result of what happens on the market...and the whole organization of the market serves mainly the need of spreading the information on which the buyer is to act." (p. 96).

It is readily seen that the essence of the Hayek view is that both prices and markets possess "dual" roles, where the dual role for markets "supports" the dual role for prices. Thus, competitive equilibrium relative prices take on the role of being (i) a sufficient set of "technical" constraints by which to limit individual action to a  $PI-\Pi^*$ , at the same time as they constitute (ii) a set of information signals sufficient for this equilibrium. Similarly, markets take on the role of being (i) a transactions medium which is sufficient for the physical realization of all individual action leading to the coordination consistent with these equilibrium prices, at the same time as they constitute (ii) a sufficient signalling institution by which to transmit all information about the aggregate economy to individuals. It is also apparent that a central implication of such a viewpoint is that (true) "market failure" must inevitably compromise the performance of the (coordinating) prices both technically and informationally. Thus, a basic proposition of the Hayek framework is that the sufficiency of FS provision is a logical precondition for the transmission of the sufficient knowledge (signals) necessary to realize a  $PI-\Pi^*$ , starting from  $UIK_{PI}$ .



Finally, I should stress that, for all Hayek's concern with disequilibrium processes (1948, p. 45), the argument, as he presents it, is best interpreted as an equilibrium argument. Clearly, the crucial questions which immediately arise in this treatment are: "What is to guarantee that markets do in fact come through to communicate the appropriate additional signals to individuals?" and "What is to guarantee that price signals in particular do take on their PI coordinating values?" These questions are indeed the fundamental ones, but they can be seen to go beyond Hayek's objective. The Hayek question is only: Given that PI coordination is observed to prevail, is it possible to explain such coordination in a way which is compatible with some initial state of  $UIK_{PI}$ ? Hence, the argument is best stated in the form: if any  $PI-II^*$  obtains, then both prices and markets must have been sufficient to achieve this coordination, where both prices and markets are mutually compatible with each other, and consistent with the given values of N and I.

### 3.2 The Logical Failure of the Signalling Approach

Given the above exposition, I now provide the stark conclusion: that all institutional signalling solutions to the problem of guaranteeing  $USK_{PI}$  either must presume the success of Inductivism or Apriorism, or sacrifice certain essential postulates of Individualism. Accordingly, there does not exist a (non-accidental) signalling explanation of the achievement of PI coordination which is consistent with Individualism and which also does not employ the Apriorism or Inductivism required by the "individual knowledge procurement approach."

In order to understand the above proposition, it is appropriate to begin from the single perspective that the existence of a ("sufficient") signalling mechanism of the sort required can be interpreted either as an internally-generated product of rational individual choice, or as an

external, "outside" institution. Prima facie, both interpretations have severe problems. If one attempts to explain the existence of the appropriate signalling mechanism internally--as following from the coordinated decisions of individuals in a PI equilibrium--then its successful provision already must presume the successful achievement of some condition of  $USK_{PI}$ , or its existence is rendered only a matter of accident. By the nature of the case, individuals cannot already have reached  $USK_{PI}$ ; hence, successful provision of the signalling mechanism by these individuals can only be construed as accidental. On the other hand, if agents were seen to already possess  $USK_{PI}$ ; then they would not require an informative signalling mechanism at all; they have achieved  $USK_{PI}$  "on their own," presumably through a priori true knowledge or inductive inference. It is because of this argument that the only feasible option is to move to the alternative view that the signalling mechanism is an "outside" institution of sorts. Here, too, we meet the familiar criticism that a logically consistent PI structure cannot invoke "outside" institutions.

If these arguments hardly promise well for the signalling approach, then the situation is only made worse by the recognition that, under Individualism, simply demonstrating the existence of an appropriate signalling mechanism is not good enough; it is necessary to explain why all individuals would rationally endorse the particular signals emitted by the mechanism, given their assumed initial state of  $UIK_{PI}$ . If this issue is handled crudely, Holism must appear. If it is not dealt with at all, then the only option will be to assume PI-equilibrium in the explanation, and to argue that sufficient PI signals must have come through. This last option is not an option.

### 3.2.1 Expectations and the Acceptance of Externally-Given Signals: The Holistic Retreat.

To illustrate the above concerns, consider a hypothetical situation where a supposed "outside" signalling institution succeeds in transmitting to all individuals (at no cost) a set of informational signals which are just sufficient for a PI- $\Pi^*$ -PI equilibrium prices. Here I offer no explanation for why this might occur; I am only interested in whether it is possible to explain individual acceptance of these signals, given their availability. To see how this argument will proceed, I return to the type of structural analysis involving an agent's initial theory and expectations of a coordinated state.

For topicality, presume that the setting under consideration is one where  $S^*$  is signalled. Furthermore, assume, by the nature of the case, that individuals do not know that the signalled  $S^*$  is the "true"  $S^*$ ; they are initially in a setting of  $UIK_{PI}$ . As before, each agent holds some theory of the Global Reducibility position ( $T_j$ ) and some theory of the anticipated coordinated state ( $T'_j$ ), where these theories will be identical if, as is also assumed, the agent anticipates that PI coordination will prevail. Each individual's  $T_j$  defines his  $E_j(S^*)$ .

Now assume that any agent (say,  $j$ ) chooses his (going) theory of the coordinated state only on the presumption that the theory is a true one, even if he has no way of justifying it. Accordingly, he believes that the  $E_j(S^*)$  associated with this theory is also true and constitutes a sufficient basis for  $j$  to undertake "realizable" PI action. Given this, the question becomes: Why would  $j$  accept the externally-transmitted signal,  $S^*$ , unless it happened to be consistent with his original theory and expectations? Evidently, the crucial point is that, unless  $j$  can independently know that the signal he is being given is in fact the PI coordinating one; he has no reason to accept the signal if it conflicts with his posited  $T_j$  and  $E_j(S^*)$ . Clearly, under the assumed circumstances,  $j$  cannot provide any guarantee

of the truth of the coordinating signal (this would require  $USK_{PI}$ ); he can only conjecture about its truth. And if  $j$  was to accept the theory of the  $PI$  coordinated state consistent with the externally-signalled  $S^*$ , then this would conflict with his assumption that his originally posited theory was the true one. There is therefore no way to explain why  $j$  would give up his original  $T_j$  for the one implied by the signal unless he possessed an individual guarantee that the signalled  $S^*$  was closer to the truth. He has no such guarantee.

Once again, this analysis applies to all individuals, so that the basic conclusion which comes forth is that only those individuals whose  $E_j(S^*)$  coincide with the signalled  $S^*$  will have any incentive to endorse the signal (i.e., it is a confirmation of their original theory). If no one holds expectations consistent with the signalled  $S^*$ , then the external signal (institution) will simply be ignored. On the other hand, in the situation where the  $E_j(S)$ 's of all agents happen to coincide with each other and with  $S^*$ , then the signal (institution) will be endorsed with unanimity. This last case, however, is purely accidental.

I have remarked earlier that a basic characteristic of any  $UIK_{PI}$  setting is that there is no reason to believe that all agents will hold the same prior  $T_j$ 's. Thus, in general, there will be a distribution of  $E_j(S^*)$ 's corresponding to the precise distribution of initial theories. Those who happen to hold the same theories will defend (endorse) the same social institutions (prices) and may use their agreement on these institutions to successfully interact among themselves. Those individuals who hold different  $E_j(S^*)$ 's than others, and who wish to preserve their conjectured utility-maximizing position will not, in general, interact with each other. The overriding point, therefore, is that since there is nothing in this  $UIK_{PI}$  setting which guarantees that all individuals will endorse the same

initial theory and  $E_j(S^*)$ , it is not possible, barring accident, to rationalize the existence of other than partially-binding social institutions, based on partial consensus (e.g., commodities would be traded at uniform prices only by accident). Hence, the obvious conclusion: such a setting can explain how individuals might arrive at the aggregate unanimity required of any PI equilibrium state only as a matter of accident. This is not a successful explanation for why a signalling institution must lead agents to PI coordination.

The above argument explains why, even discounting the problems associated with assuming the existence of an "external" signal in the first place, it is so extremely difficult to produce a viable signalling explanation of the achievement of a  $PI-\Pi^*$  out of  $UIK_{PI}$ . Providing individuals with an  $S^*$  "from outside" does not in any way explain why they would accept this signal if it happens to conflict with their prior theories and expectations.

Evidently, there are two assumptions of this scenario which conspire to make the unanimous endorsement of the signalled  $S^*$  quite accidental. The first is, of course, the assumption of  $UIK_{PI}$  itself. The second, however, is the "individualist conception of social institutions:" that the "constraining" properties of any set of social institutions or signals are not autonomous; that such properties exist only by virtue of the fact that (at least some) individuals rationally endorse the institution or signal, given their  $T_j$ 's and  $E_j(S^*)$ 's. It follows immediately that in order to remove the accidental character of PI-equilibria in the above, and thus to produce the guarantee that unanimous endorsement of  $S^*$  must take place, either the assumption of  $UIK_{PI}$  must simply be replaced by  $USK_{PI}$ , or the individualistic conception of institutions must be relinquished for its "holistic" counterpart. Thus, either the unanimous "rational" endorsement of the PI equilibrium  $S^*$  must be ensured by giving agents sufficient knowledge to successfully verify

that the signalled  $S^*$  is the true  $S^*$  (hence  $E_j(S^*) = S^*$ , for all  $j$ ), or individuals must be forced to accept the  $S^*$ , whether they like it or not and, in particular, whether or not anyone's  $E_j(S^*)$ 's coincide with it. The holistic conception of institutions states that all  $E_j(S^*)$ 's of individuals must square with the exogenously-determined  $S^*$ , and not the other way round.

It is apparent that neither of these strategies is at all satisfactory. Explaining the emergence of a  $PI-II^*$  (under  $UIK_{PI}$ ) by way of a holistic conception of institutions may be properly denoted the "Paradox of Individualism," while moving to the assumption of  $USK_{PI}$  simply begs the question, since it implies that individuals already have procured sufficient knowledge for PI coordination through inductive or apriorist means and, therefore, do not require any signalling mechanism at all. Hence, the proposition from which the analysis began: there does not exist a (non-accidental) signalling explanation of the achievement of PI-coordination which is consistent with Individualism and which also does not employ the Apriorism or Inductivism required by the "individual knowledge procurement" approach.

### 3.2.2 The Contemporary Arguments for the Signalling Solution: The Zero Transactions Costs Argument

From the above structural considerations, it becomes apparent that any present-day theorist who advocates a market signalling solution to the problem of PI coordination must have a very difficult time being convincing. If he cannot assume an appropriate concept of  $USK_{PI}$ --since that would involve unacceptable apriorist or inductivist arguments and, besides, would render any signalling solution logically trivial--and if he cannot advocate holistic strategies--since that would be contrary to Individualism--and if he cannot advocate "accidental" equilibria--since that would be too arbitrary from an explanatory point of view, then he faces an unresolvable problem; he cannot achieve all three required objectives. Thus, either he

admits that there is no "acceptable" signalling explanation for PI equilibria possible, or he retreats to "unacceptable" solutions, or he forfeits explanation completely and simply makes the signalling solution a description of the conditions of PI equilibria.

This last strategy is no more than a sophisticated way of arguing that such equilibria are accidental from an explanatory view since it is equivalent to the claim that "if a PI coordinated state is observed, and if agents could never have achieved any state of  $USK_{PI}$  without signals, then an appropriate signalling mechanism must have come through." It is unfortunately this last position which seems to capture the flavour of many modern signalling arguments (e.g., "efficient markets"). Be this as it may, I now turn to one final effort to transcend the poverty to this viewpoint, by arguing from the assumption of zero transactions costs. I should remark that this last effort in principle cannot succeed.

In order to understand the logic of this final viewpoint, assume a familiar classical world where coordinating institutions can only consist of prices and where FS can only consist of markets. Evidently, there are two strategic questions which must be answered in connection with any PI-signalling solution: (a) what is to guarantee that a complete set of markets (including futures markets) exist, so that markets can successfully facilitate the transmission of price signals? and (b) what is to guarantee that the price signals so transmitted are in fact PI-equilibrium ones? In general, these questions must receive distinct answers, although a satisfactory answer to (b) presumes the existence of a satisfactory answer to (a).

Now, what is characteristic of the contemporary viewpoint under discussion is that its prime objective is to answer question (a), question (b) being regarded as largely able to look after itself. The answer to (a) in

turn pays a familiar debt to a proposition of Coase (1960): that in a world of zero transactions costs, a complete set of markets must emerge to facilitate price signals. If zero transactions costs rules out market failure, then the converse proposition is evident: that the existence of market signalling failure follows from the existence of positive (high) transactions costs.

I do not pretend that there is any particular novelty in this viewpoint as developed so far; I have discussed this position in detail in Chapter Eight, and earlier in this chapter. I bring it up again here because this style of argument still flourishes in the contemporary literature in much the same form as Coase originally presented it (see Carlton (1979, p. 1035) and Barro (1979, p. 55)). Even leaving aside the fundamental question of whether the guarantee of (complete) market formation implies the "correctness" of the price signals emitted by markets, the first item to note is that the argument appears to perpetuate an obvious error which I have mentioned before; namely, that it regards the level of transactions costs as an explanatory variable rather than an endogenous outcome of individual decisions regarding the (optimal) conjunction of coordinating and facilitating apparatus. Such a view of transactions costs, I think, simply invites ad hoc explanation (since it begs the question of why transactions costs are permitted to remain so high), but it is seriously defective in another respect if employed in the context of  $UIK_{PI}$ .

To see this, allow me to correct the causality of the zero transactions costs proposition by stating it as a proposition about the costlessness of FS-provision: that, if FS is costlessly available, then there can be no material constraint on the provision of an  $FS^*$  (markets) which is sufficient to support a  $PI-II^*$ , and it would be rational for fully-informed individuals to invest in FS (markets) up until the point where



transactions costs are zero. (It follows by the properties of this optimum that any (incremental) adjustment away from the FS\* consistent with zero transactions costs will cause transaction costs to rise and the total utility (product) of individuals to fall.) Apparently, the important words in the above re-statement are "fully-informed," since the individuals in the setting under consideration cannot be fully informed if they require a signalling solution. However, if they operate from  $UIK_{PI}$ , then an important question must arise: How is it possible to guarantee that individuals can identify and arrive at the FS\* which just produces zero transactions costs (except by accident)?

I raise the above issue only to illustrate how a seemingly obvious proposition can be premised on an internal contradiction between  $UIK$  and  $USK_{PI}$ . The rationale for a signalling solution presumes  $UIK_{PI}$  while the ability for individuals to set and sustain a zero transactions costs world requires  $USK_{PI}$ . It is difficult to know what to do with this argument. If a consistent commitment to  $UIK_{PI}$  is made, then the achievement of a zero transactions costs world is accidental without additional signals being provided. Alternatively, if  $USK_{PI}$  is consistently assumed, then FS (markets) have no informational role.

Fortunately, the basic argument for market-formation can be structured acceptably, even if important qualifications must be considered. Thus, under the assumption that FS-provision is costless and that  $UIK_{PI}$  prevails, it is at least possible to argue convincingly that there will be no underinvestment in markets, even if a zero transactions costs world remains an accidental possibility. This is perhaps all that is really necessary to underwrite the sufficiency of market signalling instruments. Such a viewpoint, however, does entail a commitment to the theory that over-investment in FS (markets) does not imply an insufficiency in FS, say, because elements of

FS now begin to interfere with one another. This in turn implies that potentially sub-optimal forms of FS can still be sufficient signalling apparatus.

The above argument would appear to constitute the maximum that can ever be achieved through the assumption that FS is costless. Some proponents of PI may find it acceptable but any non-classical critic would not. Such a critic would claim that it is not possible to maintain PI-structure if it cannot be guaranteed that all elements of FS are Globally-Reducible, and follow from Classical Global Rationality. Thus, he would claim that the costlessness of FS does not in any way imply the existence of (classically) rational decision making with respect to FS; the latter must presume  $USK_{PI}$ .

### 3.2.2.1 Does the Sufficiency of Markets Guarantee the Determination of PI-Equilibrium Prices?

Let me nonetheless put all of the above qualifications aside and grant that the assumption that FS is costless is sufficient to guarantee the ("rational") formation of a complete set of markets to signal prices. The crucial question now becomes: is the guarantee of the existence of markets sufficient to guarantee the determination of a set of PI-equilibrium prices? Unfortunately, this question is the impasse once again; no matter how the existence of markets is justified, the explanation of the achievement of the "correct," coordinating PI-prices when agents possess only  $UIK_{PI}$  must rest on accident. The reasons are familiar from above: even if it was granted that at least one individual possessed sufficient knowledge to identify and set PI-equilibrium prices (and even this is contrary to the assumption of  $UIK_{PI}$ ), there is no guarantee that all individuals would uniformly endorse this set of prices rather than some other constellation(s). This argument would even hold if it was assumed that an (unspecified) market process always succeeded in transmitting PI-equilibrium signals to individuals.

What rationale would individuals have to uniformly accept the signals if they did not know that they are the PI coordinating signals?

As before, the only way to avoid this problem is to force uniform signal-acceptance on individuals holistically. But this is hardly acceptable. The reliance on a holistic mechanism here is inconsistent with Individualism and only encourages the ad hoc view that the adjustment of prices to PI equilibrium can be explained independently of the achievement of sufficient knowledge by individuals. This is tantamount to assuming that prices always achieve PI equilibrium quite independently of the aims and decisions of individuals and hardly qualifies to be called an explanation.

I stress the deficiencies of a holistic retreat once again simply because some comfort seems to have been taken in proposing that these basic methodological obstacles could be overcome by the recognition that, if markets were "ideally well organized"--as identified with a costless FS--then the classical "tâtonnement" adjustment mechanism could be posited (see Negishi (1962, p. 647) and Korliras (1977, p. 466)). The thrust of this view is that, if the tâtonnement holds, then prices can be seen to move infinitely quickly to equilibrium and PI-disequilibria will never be observed at any point in time. I see little reason to take comfort in this sort of argument. The structure of this explanation already assumes that all individuals must "follow" holistically-given signals, independent of their own knowledge and expectations, and the idea that prices have an infinite price velocity does not illuminate why prices move instantaneously to their appropriate PI positions rather than some other place (e.g., that of a GI-II\*).

Certainly, one might visualize this process as one where an (outside) auctioneer is able to search out and signal the PI-equilibrium prices from the set of all possible prices instantaneously--which is equivalent to

knowledge sufficient for a  $PI-\Pi^*$  on the part of the auctioneer--but even this  $NUSK_{PI}$  specification requires the assumption that the auctioneer is benevolent! To assume holism to ensure that all individuals will accept the auctioneer's signals and then to expect benevolence on the part of the auctioneer himself is simply too much of a load to place on this explanatory structure. Even if the holistic constraint on individuals is granted, where is the constraint on the auctioneer which guarantees his benevolence? Clearly the auctioneer must be constrained to accept another (prior) signal from a meta-auctioneer which can guarantee the initial auctioneer's benevolence, and so on. Such a structure is evidently too severely regressive to ever be able to underwrite the achievement of a  $PI-\Pi^*$ .

In any event, the attempt to graft holistic solutions (which potentially rely on an ad hoc benevolence) to the initial assumption that FS is costless cannot be a successful way of demonstrating that markets must get prices to their  $PI-\Pi^*$  positions. This is just the negative conclusion about the impossibility of rationalizing an acceptable PI signalling solution discussed earlier. To remove the holism associated with all these strategies, traditional PI theory must show that individuals can (somehow) achieve  $USK_{PI}$  "on their own" and that the transformation of  $UIK_{PI}$  into some form of  $USK_{PI}$  is a necessary prelude to the explanation of how any institutions move to equilibrium. This forces the argument back to rationalizing a priori or inductive success on the part of agents and, needless to say, this is not a happy prospect either.

Of course, all of the above arguments hinge on the assumption that FS is costless, which allows a (qualified) guarantee of the absence of market failure. This assumption itself may appear even somewhat extreme, so that, if it is relinquished, then other parts of this argument fall away. If FS is costly and endogenous (as in the avant-garde classical structure),

then FS provision must be coordinated by PI-equilibrium prices, just like all other economic activities. The guarantee of "ideally well organized" markets (a PI-FS\*)--or as Robert Lucas (1976) might term it, the absence of any "informational separation" between markets--now assumes the achievement of a PI-II\*. Accordingly, if a sufficient market signalling structure can only be rationalized at the point of PI-equilibrium, then it follows that reference to such a signalling structure can never illuminate the movement to a PI-II\*. In the light of the above statement from Negishi, this essentially says that the tâtonnement can only be employed in equilibrium, which is indeed paradoxical.

### 3.2.3 The Logical Equivalence of the Signalling Approach and the Individual Knowledge Procurement Approach under Individualism: an Integration

The above analysis reveals that the only thing that a signalling approach can add to an individual's "on their own" approach to knowledge procurement is an unwanted Holism; otherwise, both approaches come to the same thing--a long-run inductivist argument for  $USK_{PI}$  or an arbitrary short-run invocation of a priori true knowledge sufficient for  $USK_{PI}$ . In conclusion, it is useful to prove the formal equivalence of these approaches.

Thus, assume that institutional signalling arguments--as developed in an individualist fashion under  $UIK_{PI}$ --can be interpreted only as arguments for the existence of some aggregate process by which the initial endowments of a "specialized" knowledge possessed by individuals under  $UIK_{PI}$  (e.g., knowledge of their own  $N^j$  and  $I_j$ ) can be mutually-transferred to everyone; thus, achieving  $USK_{PI}$ . More precisely, if information can be viewed as a tradeable "commodity" (see Arrow (1962) and Newman (1976) for the problems of treating information in this fashion), then all market signalling approaches become an embodiment of a process by which competitive

"trades" in information are established, such that the  $PI-\Pi^*$  which emerges is independent of the initial distribution of information. This entails that no informational asymmetries exist in equilibrium.

It follows immediately that the guarantee of "optimal" trades in information at a PI equilibrium price of information (note that this is equivalent to establishing competitive prices for insuring uncertainty) presumes the achievement of  $USK_{PI}$ --which completes the proof, since the (prior) guarantee of  $USK_{PI}$  presumes inductivist or apriorist arguments.

#### 4. The Implications for GI Explanatory Structure

The arguments stated here are clearly very important in isolating what an acceptable GI structure might look like and, in particular, in identifying what it, is not permissible to assume in GI-explanations. Since the object of GI-explanation is precisely to rationalize the emergence of a "non-maximizing"  $GI-\Pi^*$  and  $S^*$  out of  $UIK_{PI}$ , it is immediately apparent that it cannot presume any form of Holism--since that would be logically inconsistent with the viewpoint--or presume any type of inductivist or apriorist arguments for successful knowledge procurement--since these would be sufficient to underwrite the achievement of  $S^*$  (not  $\hat{S}^*$ ). Indeed, the latter arguments would be problematic in any case, since they would saddle GI with the same unfortunate tradeoff between the arbitrariness of Apriorism and the long-run restriction of Inductivism. Such a state of affairs must be an unfortunate one for a view which aims to explain the short-run non-arbitrarily.

My judgment is that the long-standing PI tradition of using only holistic devices for the signalling approach and only inductivist or apriorist arguments for the individual knowledge procurement approach has made it very difficult for theorists to see how to go about constructing successful GI explanations. It is therefore important to acknowledge the

character of these impediments as a prelude to a formal discussion of the requirements of GI structure. I deal with the impediments which have emerged from the heritage of holistic signalling first and then discuss the issues connected with Apriorism and Inductivism.

#### 4.1 The Problem of Holism, "Competitiveness" and the Theory of Institutional Reform

As is perhaps apparent even at this point, the reason that I criticize the "holistic" conception of institutions so heavily is not only because this assumption is logically inconsistent with Individualism but also because it makes it logically difficult to explain how institutions ever change as a consequence of individual reform decisions. Thus, the methodological cost of any view which forces all individuals to treat all existing institutions, including (signalled) prices, parametrically in any state other than one which is guaranteed to be a PI competitive equilibrium is that it will be impossible to explain how individuals can be adjusting institutions (presumably in the direction of a  $PI-\Pi^*$ ) at the same time that they are forced to treat them as given. This is, I think, the basic point of Arrow's classic (1959) paper and it is precisely the inability for traditional theorizing to get around the logical problem implied--and its concomitant inability to deal with individual reform--which has more or less forced explanations of aggregate states "in adjustment" to  $PI-\Pi^*$  to rely on outside institutions, since, by assumption, there was no possibility open for individuals to change any institutions by their own means. Thus, it was only because of the traditional reliance on holistic devices that a "signal-following" or "signal-taking" paradigm could have ever been entertained outside the situation where a  $PI-\Pi^*$  prevailed. Needless to say, this tradition is quite incompatible with successful GI explanation of non-classical states.

It is apparent that the traditional seat of this Holism is the concept of "competitiveness," or what might be termed, the "No Power to Reform" assumption. In any situation other than one where a PI competitive equilibrium prevails under  $USK_{PI}$ --where individuals have no conceivable incentive to reform existing institutions, and where a holistic explanation of this equilibrium (through parametric prices) does not matter, since individuals have sufficient knowledge to rationally endorse the prices anyway--the use of any concept of "competitiveness" must lead to serious methodological problems. The seriousness of these problems is easily seen if it is recognized that had the "holistic" conception of institutions been replaced by its "individualistic" counterpart in traditional characterizations of states of PI disequilibria (in particular, states where  $USK_{PI}$  did not prevail), there would have been no incentive whatsoever for individuals to take all existing institutions (including prices) as uniformly given when writing up their individual decision problems. This claim implies two things: (a) that, in such states, social institutions in general would not be uniformly given; rather, there would exist a distribution of (partially-endorsed) social entities, and (b) that (at least some) individuals in principle would have an incentive to reform, or to not endorse, at least some social constraints, rather than to treat them as binding determinants of their action.

All this analysis says therefore is that, if  $USK_{PI}$  and a  $PI-II^*$  are achieved, then it is not necessary to define a reform process at all, since no beneficial institutional reforms are possible. Accordingly, the question of whether reform is generated internally through the actions of individuals or externally through an outside process becomes a trivial matter. When  $USK_{PI}$  and a  $PI-II^*$  are not achieved, however, the specification of a reform process becomes crucial, since beneficial institutional reforms (to  $S^*$ )



are really possible. In this case, it matters very much whether reforms emerge from an internal or external process. Under Holism cum Competitive-ness, internal reform is rendered impossible and external reform is the only option. External reform, however, is not only ad hoc but also inconsistent with any form of GI. Thus, the only viable GI specification of the reform process is one which sees institutional reform as internally generated through the explicit decisions of individuals.

Of course, I say all of the above with the recognition that it is so ingrained in traditional economic thinking to see agents as "signal-following" that the explanation for why agents endorse and follow any particular set of signals is seldom made explicit. In particular, it is so well entrenched in traditional PI literature to regard an individual's current expectations as being determined from current and past price signals, that the basic individualist idea that an individual's current expectations (following from his going theory) determine his endorsement of current prices is neglected. While I have stressed that the causality difference here does not matter if it is assumed that a PI competitive equilibrium is already achieved, it is simply unthinking to posit fixed and fully-binding classical disequilibrium prices as "the" starting point for the development of a non-classical, individualist (i.e. GI) theory of behaviour, as so much of the non-Walrasian literature starting, say, from Barro and Grossman (1971) does. The perceived problem of the traditional "auctioneer with the aggregate price dynamics equation" approach to disequilibrium behaviour (Samuelson (1947)) is precisely its arbitrary Holism, so that it hardly makes sense to think that the problems of producing a logically consistent and complete non-classical Individualism can be overcome simply by introducing new and more subtle holistic strategies.

#### 4.2 Avoiding the Commitment to Apriorism or Inductivism

I have shown in Section Two of this chapter that almost all of the issues connected with the failure of short-run PI-explanation could be expressed in terms of two "classical critiques"--of knowledge procurement, and of non-classical explanation. In particular, it was argued that, if both of these critiques held, then the only possible explanation of coordination which was non-arbitrary relative to the standards of Individualism and non-arbitrary in its account of knowledge procurement was PI under a long-run Inductivism.

I have also stated in the beginning of this thesis that, while classical structure must fail in its endeavour to produce non-arbitrary short-run explanations--the principal argument of this chapter--GI need not fail in this regard. This last claim is very important and, to see what it means, let me put forth the following theorem: that any explanatory structure which avoids both of the above "classical critiques" must produce a non-arbitrary and logically consistent GI explanation of short-run behaviour. By arguing that GI "need not fail," I therefore mean that it is "logically conceivable" to avoid both critiques without internal contradiction.

In Chapter Six, I have shown that there exists a logically consistent axiom set which denies the "classical critique" of non-classical explanation--which is one step. If it is then possible to argue that there exists a theory of knowledge procurement which is non-arbitrary but which does not require the inductivist or apriorist demand for the demonstrated verification of true theories--it is consistent with decision making failure and the falsity of theories--then the task is complete: a theory of "rational," non-maximizing coordination with limited knowledge and decision-making failure can be in principle constructed.

Happily, non-arbitrary theories of knowledge exist which are

consistent with the failure to procure demonstrated theoretical truth and, hence, do not rely on either inductivist or apriorist principles (e.g., Popper (1957); Agassi (1966)). This is in contradistinction to theories of successful theoretical verification, which permit of no other options besides Inductivism or Apriorism. This is exactly why it is not even logically conceivable to extend classical structure into the short-run.

Since classical theory can be structurally "closed" in a fashion which is consistent with Individualism if and only if it provides some rationalization for the successful verification of theories (entailed by  $USK_{PI}$ ), it can never ultimately break out of the "classical critique" of knowledge. Either it accepts the inductivist arguments--and commits itself to only long-run explanation--or it accepts the invocation of a priori true knowledge--and commits itself to arbitrariness in explaining knowledge procurement in the short-run. Short of guaranteeing  $USK_{PI}$ , classical explanation can rely only on holistic devices to ensure classical equilibria, which introduce a logical contradiction outright, and serve only as a spurious means by which to avoid the arbitrariness of short-run a priori knowledge, since arbitrariness with respect to knowledge is just replaced by "behavioural arbitrariness," relative to Individualism.

I now move on to an explicit consideration of the structure of GI explanation.

## CHAPTER TEN

LIMITED KNOWLEDGE, THE GI EXPLANATORY PROGRAMME,  
AND THE FAILURE OF EXISTING NON-CLASSICAL STRUCTURE

The major conclusion of the last chapter was that, if  $USK_{PI}$  could be guaranteed to hold only in the long-run, then the achievement of a  $PI-S^*$  in any shorter run must be a matter of accident. Accordingly, the only interesting candidates for the explanation of non-accidental coordination in the short-run become GI and Holism, where it is apparent that it is only the former which can meet the standards of Individualism. Such an observation indeed brings to light the ultimate objective of the GI-theorist: to show that a retreat to Holism in the explanation of short-run, classical disequilibrium situations is logically unnecessary and, thus, to demonstrate that Individualism can offer successful explanations at any and all points of observation, even if "classical" explanation cannot.

It may be taken as axiomatic that the GI-theorist wishes to explain classical disequilibria as individualist equilibria where  $\hat{S}^*$  prevails; hence, as states where at least one element of  $S$  is non-reducible, and constitutes a "true" social distortion. Since he admits that  $\hat{S}^*$  (as opposed to  $S^*$ ) should never be observed under  $USK_{PI}$  if classical rationality prevails, and since he will not accept explanations of  $\hat{S}^*$  under  $USK_{PI}$  which deny rationality via Holism, his overriding task becomes one of explaining  $\hat{S}^*$  as a consequence of the fact that agents do not possess  $USK_{PI}$ ; that, in the short-run, they are saddled with  $UIK_{PI}$ . Stated alternatively, since the proponent of GI accepts that  $N$  and  $I$  alone can never be sufficient to explain  $\hat{S}^*$ —as opposed to  $S^*$ —and since he will not allow any element of  $S$  to be exogenous in his explanation of short-run non-classical coordination, he

must accept the state of short-run insufficient knowledge,  $UIK_{PI}$ , as one potential exogenous factor which can be used to complete the determination of  $S^*$ . Any framework which assigns an exogenous role to knowledge is a "stage two" framework and can, in principle, avoid the methodological constraint of any stage one analysis--namely, the "classical critique" of non-classical explanation.

In isolating the GI-theorist's preoccupation with a "stage two" role for (limited) knowledge, it is of course to be emphasized that it is not only GI theorists who are interested in the specification of limited knowledge environments. Indeed, the desire to avoid an explicit commitment to the knowledge assumption of  $USK_{PI}$ , while maintaining an appropriate "determinacy" in economic model construction, represents a fundamental preoccupation of all avant-garde theorizing. The implied dichotomy between the types of knowledge assumptions which might be considered in this context is perfectly illustrated by the following quotation (Lucas (1976), p. 1138):

On the one hand, it is easy to postulate agents and market institutions which ignore or foolishly waste information: the result is a theory which seriously understates agents' abilities to vary their decision rules with changes in the environment.... It is equally easy to postulate "efficient" securities markets which rapidly transmit all information to all traders: the result is a static general equilibrium model. To observe that one must avoid both extremes to understand the business cycle does not take one very far in discovering the correct "centrist" model, but it seems nonetheless an essential point of departure.

As I have shown, the avant-garde classical response to this problem situation is to propose an analytical framework in which knowledge is "imperfect"--because knowledge is costly--yet one in which agents maintain classical rationality in making ("optimal") informational decisions. Unfortunately, as I have also shown, such an approach is not successful since it only ends up transforming a (traditionally) explicit commitment to  $USK_{PI}$  in the long-run into an implicit commitment to  $USK_{PI}$  in the short-run, thus

changing nothing substantial. The GI-theorist's proposal to consider only  $UIK_{PI}$  as an acceptable short-run knowledge assumption can therefore be regarded as a direct response to the failure of an avant-garde Classicism to illuminate questions of limited knowledge from a "stage one" analytical perspective: to argue that the correct "centrist" model that Lucas mentions can never be one which is compatible with short-run classical equilibria, it must be a "stage two" model of non-classical equilibria.

In isolating the obvious role for stage two analysis here, it is not to be thought that the provision of a successful "stage two" treatment of limited and exogenous knowledge is other than extremely difficult. The basic reason is that it is not at all straightforward to produce a limited knowledge specification which: (i) denies  $USK_{PI}$  (and is therefore compatible with  $UIK_{PI}$ ); (ii) can be non-arbitrarily justified to hold in the short-run; yet, at the same time (iii) is sufficient to guarantee that GI equilibria can be non-accidentally determined.

To illustrate, it is straightforward to satisfy (i) and (ii) by a knowledge specification which assigns no knowledge to agents whatsoever. However, such a specification would normally render short-run GI-equilibria as accidental as PI-equilibria and, hence, would be uninteresting, as it denies (iii). Then again, one might try to satisfy (iii)--by giving individuals enough knowledge to correctly perceive social distortions (but not  $S^*$  positions)--yet find that the only non-arbitrary justification for the existence of such knowledge is a long-run one, which denies (ii). Such a strategy would of course obviate the need to deny (i) in the first place--since  $USK_{PI}$  can be justified in the long-run as well.

The basic theorem here is straightforward: if the GI theorist cannot satisfy (i), (ii), and (iii) simultaneously and, if he contends that he can still produce determinate explanations of short-run equilibria, then he

must be using some sorts of holistic devices. Accordingly, he cannot be producing a successful "stage two" GI explanation of  $\hat{S}^*$ ; he has simply retreated to the non-classical side of "stage one" analysis where exogenous social entities are performing the explanatory work which exogenous knowledge is supposed to be doing. Knowledge is rendered endogenous again, and the "classical critique" is binding; N, I, and  $\hat{S}$  alone are explaining  $\hat{S}^*$ .

The above issues are evidently made topical by the fact that no one has ever succeeded in producing a viable "stage two" GI explanation of  $\hat{S}^*$ . Given the central proposition of the last two chapters--that classical structure cannot in principle illuminate the short-run--my contention now is that all existing attempts to construct a non-classical and individualist explanatory framework for the short-run, where knowledge is exogenous and all elements of S are endogenous, have failed; they have all denied the (global) endogeneity of S and the exogeneity of knowledge in some way or another.

In demonstrating this claim, two ideas should be understood by way of orientation. First, the above claim can hardly be regarded as surprising. As I have made clear in Chapter Six, there are only two conceivable theoretical forms which fit between PI and SH. One is the (weak) form of Holism which posits that N, I, and non-reducible and exogenous elements of S are sufficient for the determination of  $\hat{S}^*$ . This position is arbitrary with respect to both PI and SH, and, by definition, denies Individualism. Its competitor is GI, which states that N, I, plus additional exogenous variables besides elements of S (e.g., knowledge) are sufficient to explain  $\hat{S}^*$  as a (non-classical) coordinated state where all elements of S are non-reducible and endogenous. This position denies Holism outright and is non-arbitrarily in accord with Individualism.

Since it is evident however that GI constitutes an infinitely more

subtle "intermediation" of PI and SH than its holistic counterpart, and one which requires a clear-cut understanding of why all holistic formulations are explanatorily incomplete relative to Individualism, I have no other option but to conclude that it is the simple absence of methodological self-consciousness on the part of non-classical theorists (e.g., see Drazen (1980) for a survey of recent approaches) which explains why (weak) forms of Holism are invariably confounded with GI and, thus, why traditional non-classical approaches to the short-run have always ended up perpetuating an unsatisfactory Holism rather than GI. Indeed, it is the singular failure of non-classical theorists to appreciate why Holism is methodologically and explanatorily inferior to Individualism which explains why the subtlety of the GI position is never appreciated in this context.

Even if it is no more than the failure of non-classical theorists to initially distinguish GI from weak forms of Holism (i.e., limited knowledge on their part) which constitutes the central factor in explaining why a successful GI structure has not emerged, the second point to be emphasized—and I believe that this transcends all existing literature—is that, even if a GI-programme to explain  $\hat{S}^*$  by way of N, I, and the exogenous limitations of knowledge was consistently carried through, it would still not offer a logically-complete and non-arbitrary account of observed  $\hat{S}^*$ -coordination. Something else besides exogenous knowledge must be added to the explanation—and this is the ultimate conclusion of this thesis.

Given the above, there are thus two basic critical themes which will permeate all of the analysis to follow: (a) the failure of any (purported) GI approach to explaining  $\hat{S}^*$  which (perhaps unwittingly) relies on (some) holistic assumptions; and (b) the failure of any GI approach which, while avoiding holistic assumptions, relies on only N, I, and exogenous knowledge to explain  $\hat{S}^*$ . The former explains the failure of extant non-classical



theorizing, while the latter clarifies the minimum conditions for the provision of a successful GI structure.

### 1. The Specification of the Analytical Setting

In order to bring out the above arguments clearly, it is mandatory to specify an analytical setting which emphasizes the similarities between GI and (weak forms of) Holism at the same time it exposes the differences between these positions. In the tradition of the arguments of Chapter Six, I therefore assume an environment in which an observed  $\hat{S}^*$  is associated with the existence of a distorting ("non-reducible") value of one and only one element of  $S$ , denoted  $\hat{s}$ . This specification is used because it starkly illustrates the point that, if  $\hat{s}$  was not "stuck" at a non-reducible value, then it could be derived from  $N$  and  $I$ , and a  $PI-S^*$  could be rationalized outright. This case therefore represents sort of a "minimum" departure from  $PI$  conditions: Since it is a departure, however, the consequent  $\hat{S}^*$  can only be explained as a  $GI$ -equilibrium or as a holistic one.

Assume, more precisely, that, if a (weak) holistic explanation of  $\hat{S}^*$  was to be produced, then it would be one in which  $\hat{S}^*$  could be completely explained by reference to  $N$ ,  $I$  and  $\hat{s}$ , where  $\hat{s}$  is here treated as non-reducible and exogenous. It follows that the values of all social institutions other than  $\hat{s}$ , are explained as non-reducible and endogenous consequences of the values of  $N$ ,  $I$  and  $\hat{s}$  at the (holistically-determined)  $\hat{S}^*$ . The issue of critical concern to the  $GI$  theorist therefore can be narrowed to one basic issue: the Holist's willingness to treat the one social institution,  $\hat{s}$ , as a given. Since the  $GI$  theorist demands that  $\hat{s}$  itself be explained at the same time  $S^*$  is explained, he must attempt to explain  $\hat{s}$  as a consequence of  $N$ ,  $I$ , and exogenous knowledge, since neither  $\hat{s}$  nor  $\hat{S}^*$  can be logically deduced from  $N$  and  $I$  alone when the exogeneity of  $\hat{s}$  is foregone. The basic character of the critical debates between these two positions can

then be summarized in the recognition that if  $\hat{S}$  is treated as exogenous in the explanation of  $\hat{S}^*$ , then knowledge cannot be--and vice versa.

In presenting the above case, I emphasize that there is no difficulty in preserving all its essential analytical attributes under the assumption that the scope of initial social distortions ( $\hat{S}$ 's) extends to more than one social institution, so long as it does not extend to all of them (e.g., so long as (weak) Holism does not turn into Sophisticated Holism (SH)). As discussed in Chapter Six, the reason for this is that the "straitjacket" case where all elements of S are non-reducible and exogenous is the one where the explanatory role for I is compromised, and GI and Holism can no longer be regarded as competitors in the explanatory arena which "intermediates" SH and PI.

## 2. The "Intermediating" Knowledge Specifications

It is easily seen that, while agents are (endogenously) constrained to possess minimally-sufficient knowledge of N and I (which entails  $\hat{S}^*$ ) under PI, and to possess minimally-sufficient knowledge of N and S (which entails  $\hat{I}^*$ ) under SH, the fundamental characteristic of any "intermediating" theory of coordination is that agents must be seen to have access to knowledge which reflects all three of N, I and  $\hat{S}$ . This is simply because information about S is not derivable from N and I, and information about I is not derivable from N and S, in the implied circumstances where I plays an explanatory role and S contains non-reducible elements.

Any knowledge specification which: (a) involves all three of N, I, and  $\hat{S}$ ; and (b) denies the existence of  $USK_{PI}$ , will be denoted a specification of "GI-form." Whether use of knowledge specifications of a GI-form are actually consistent with GI explanation--where knowledge is exogenous--or simply result in variants of ("weak") Holism--where knowledge is endogenous--is, of course, the principal issue to be examined.

It should also be remarked that the knowledge specifications to be presented here are developed in strict analogy to those presented in Chapter Seven in connection with PI. This makes the knowledge requirements of PI the reference point for this analysis, so that the logic of the posited (minimum) departure from this reference point is made absolutely clear.

Thus, consider the following alternative knowledge specifications:

- UPK<sub>GI</sub>: All individuals possess complete and perfect knowledge of N, I and  $\hat{S}$ ;
- USK<sub>GI</sub>: All individuals possess complete and perfect knowledge of their "personal givens," plus only a rule or signal,  $\hat{S}^*$ , which faithfully reflects N, I, and  $\hat{S}$ ;
- NUPK<sub>GI</sub>: At least one, but not all individuals possess complete and perfect knowledge of N, I, and  $\hat{S}$ ; the remainder possess knowledge insufficient to identify the "true"  $S^*$  but which is nonetheless sufficient to identify a "true"  $\hat{S}^*$  and the "true" values of their personal givens;
- NUSK<sub>GI</sub>: At least one, but not all, individual possesses sufficient knowledge to identify a "true"  $\hat{S}^*$  and the "true" values of their personal givens; the remainder possess insufficient knowledge to identify either a "true"  $S^*$  or  $\hat{S}^*$ ;
- UIK<sub>GI</sub>: USK<sub>GI</sub> does not prevail (i.e. no one possesses knowledge of a true  $S^*$  or  $\hat{S}^*$ ).

The first item to note here is that, while UPK<sub>GI</sub> is a knowledge specification which does involve all three of N, I, and  $\hat{S}$ , it is not a specification which denies USK<sub>PI</sub> or UPK<sub>PI</sub>; accordingly, UPK<sub>GI</sub> is not in accord with the requirements of "GI-form." In fact, UPK<sub>GI</sub> entails both USK<sub>PI</sub> and UPK<sub>PI</sub>, and is therefore sufficient knowledge to calculate  $S^*$ . This just says that, under Individualism, UPK<sub>GI</sub> will be able to explain only  $S^*$  (and not  $\hat{S}^*$ ), the alternative expression of which is that  $\hat{S}^*$  and UPK<sub>GI</sub> can be logically compatible only under holism.

On the other hand, all of the remaining specifications qualify as in accord with "GI-form" insofar as at least some individuals cannot identify the true (PI)  $S^*$  position; USK<sub>PI</sub> is denied. Moreover, in all cases other

than  $UIK_{GI}$ , at least some individuals can know  $\hat{S}^*$ , derived from  $N$ ,  $I$ , and  $\hat{s}$ , even though they cannot extract the values of the  $N$  and  $I$  components out of  $\hat{S}^*$ . The principal features of this "signal extraction" problem may be summarized by the proposition that  $USK_{GI}$  does not entail  $USK_{PI}$ . (Note that this result contrasts with the proposition that  $UPK_{GI}$  entails both  $UPK_{PI}$  and  $USK_{PI}$ .) Finally, the  $NUPK_{GI}$  and  $NUSK_{GI}$  assumptions may be regarded as the stronghold of any (non-classical) position which aims to rationalize the compatibility of sustained informational asymmetries cum exploitation with the existence of general equilibria (see Grossman and Stiglitz (1976)).

### 3. "Conventional" References for Knowledge Assumptions of a GI-Form: The Theory of Monopoly and the Theory of Non-Walrasian Equilibrium

#### 3.1 The Theory of Monopoly and $NUPK_{GI}$

For all the textbook treatments which appear to just "assume" the existence of a "distorting" monopoly (say, where  $\hat{s}$  is defined as a "barrier to entry" which cannot be derived from  $N$  and  $I$ ), the traditional theory of monopoly is an almost perfect example of an explanatory structure which relies on the specification of a knowledge assumption of the GI-form. It is for this reason that the individualist is always very careful to make sure that the knowledge foundations of any explanation of the existence of a monopolistic  $\hat{S}^*$  are logically consistent with the equilibria being explained, and not something else.

In this respect, the individualist would contend that it is singularly impossible to ground the sustainability of monopolistic distortions on an assumption such as  $USK_{PI}$ , since this is sufficient knowledge for individuals to rationally remove any and all distorting monopolies, and to endorse only those which are compatible with  $S^*$ . Under these circumstances, it would be impossible to explain distorting monopolistic  $\hat{S}^*$ 's at all unless Holism was invoked outright which is unacceptable. A basic commitment to

UIK<sub>PI</sub> is thus required, but to specify UIK<sub>PI</sub> as USK<sub>GI</sub> need not work either --since USK<sub>GI</sub> does not specify the type of informational asymmetries necessary to underwrite monopolistic "exploitation." Accordingly, the mantle must fall to NUPK<sub>GI</sub> or NUSK<sub>GI</sub> (although it might be noted that the latter specification is problematic and is seldom used).

### 3.1.1 The "Standard" Monopoly Decision Problem

To see these issues in a more concrete way, consider the traditional textbook account of successful monopoly decision making in a simplified setting where the economy has only one monopolistically supplied output and where the consumption environment is competitive. It is evident that the basic conclusion which comes forth from this analysis is that if: (a) the monopolist knows his own  $N^j$  and  $I_j$ , and the non-reducible social "barriers" which protect his decision-making power (i.e., in general, his degree of monopoly power); and (b) the monopolist has perfect knowledge of the  $N^j$ 's and  $I_j$ 's of all other individuals--as represented in an aggregate demand curve for the output--then the monopolist is in a position to successfully set monopoly equilibrium prices and quantities on the basis of this information.

It is then normally remarked that the monopolistic equilibrium prices and quantities must be inferior from a welfare standpoint to those which would have been achieved by a comparable competitive firm whose position was not protected by a non-reducible social institution. In particular, if the locus of prices and quantities which faithfully reflect all the tastes and endowments of other individuals is no more than the aggregate demand curve for the monopolist's product, then the thrust of the argument is that, except by accident, the monopolist would never use the aggregate demand curve as a criterion by which to set the coordinating prices and quantities. As is well-known, it is most in the monopolist's own interests to employ the

aggregate marginal revenue curve for this purpose. The accidental case is no more than the one where the monopolist is "benevolent" and either transfers sufficient information to others so as to satisfy  $USK_{PI}$ , or makes the "barrier to entry" optimal, or sets the  $PI-S^*$  position himself on the basis of his knowledge of  $N$  and  $I$ .

It is not a particularly obscure interpretation of these standard arguments to see them as fitting the  $NUPK_{GI}$  mould. The monopolist has independent access to perfect and complete knowledge of the  $N$ ,  $I$ , and  $\hat{S}$ ; all individuals on the demand side do not have access to information regarding the (true)  $S^*$ . Thus, under  $NUSK_{GI}$  and non-benevolence, the intended, maximizing decision of the monopolist is to set an aggregate state which is simultaneously a (non-classical) coordinated state, and one which is most in his own interest. Under conventional interpretations, this implies  $\hat{S}^*$ , where all elements of  $S$  other than  $\hat{S}$  are set at endogenous maximizing positions, and where  $\hat{S}^*$  is taken to be derived from  $N$ ,  $I$ , and  $\hat{S}$ . Thus, a "maximizing" monopoly price (and output) is derived from tastes, technology, and the barrier to entry.

Leaving aside the crucial methodological question associated with this formulation--namely, whether  $\hat{S}$  is really a "given" or not--the virtues of the  $NUPK_{GI}$  specification in underwriting monopoly  $\hat{S}^*$ 's are obvious. If all individuals possessed knowledge sufficient for a  $PI-II^*$  (i.e.,  $USK_{PI}$ ), then it would not be possible to explain the perpetuation of any social distortions whatsoever (if Individualism was maintained). Alternatively, if individuals were uniformly saddled with, say,  $UIK_{GI}$ , then it would be extremely easy to rationalize the existence of social distortions, but extremely difficult to explain how any monopolist in this environment could undertake the type of successful, exploitative decision-making necessary to realize his maximizing  $\hat{S}^*$ --except by accident. It is because  $NUPK_{GI}$  simultaneously gives the monopolist sufficient knowledge to successfully exploit

social distortions and denies other individuals the possibility of establishing that distorting institutions are in fact "distorting," which makes it work so well in the setting under examination.

### 3.1.2 Monopolistic Price Adjustment

Let me now critically reinterpret this "simple" case presented here so that it can be seen to yield something more substantial and topical. Thus, consider the following proposal: if one could produce a non-arbitrary guarantee for the existence of  $NUPK_{GI}$  in a temporal dimension which was shorter than the long-run, then it would be possible to explain, in individualist terms, how short-run ( $\hat{S}^*$ ) prices are set, and ultimately move to their long-run competitive  $S^*$  values (as  $NUPK_{GI}$  is transformed into  $USK_{PI}$ ).

Such a proposal, I think, reflects the basic inspiration (in the literature following from Arrow (1959)) to see "monopolistic price adjustment" as at least a tempting strategy for constructing a non-classical and individualistic "price dynamics"--one, in particular, which avoids the obvious Holism of earlier "auctioneer" approaches, following from Samuelson (1947). If one consults Arrow and Hahn (1971), Fisher (1976b), or Hahn (1978), the precise issue in fact concerns how to remove Holism in the explanation of non-competitive behaviour; of how to ensure that price adjustment can be explained as a consequence of decision making "by individuals" and not seen ad hoc to be a consequence of the "forces of the market," etc. (see Barro (1972)). Indeed, this is the issue to be considered.

My reading of the general situation is as follows: All treatments of (distorting) monopoly behaviour which have denied  $USK_{PI}$ , and which have grounded analysis in an assumption like  $NUPK_{GI}$ , have at least established the logical possibility of monopoly explanation in accord with Individualism (i.e., GI). However, any explanation of a monopoly  $\hat{S}^*$  which assumes both  $NUPK_{GI}$  and the exogeneity of  $\hat{s}$  (i.e., barriers to entry) cannot be a

successful GI explanation; it must be a weak form of Holism. Accordingly, the only successful GI account of the  $\hat{S}^*$  in question is one which explains both  $\hat{S}$  and  $\hat{S}^*$  as a consequence of N, I, and  $NUPK_{GI}$ , since all elements of S must be endogenous, yet non-reducible rational choices of individuals in a GI equilibrium. Once again, the critical GI question is: 'Are N, I, and the exogenous knowledge of  $NUPK_{GI}$  in fact sufficient to explain  $\hat{S}$  and  $\hat{S}^*$ ? The significance of the role for exogenous knowledge here can easily be seen: if N, I, and  $\hat{S}$  were in fact deemed to be sufficient to determine  $\hat{S}^*$  (i.e., weak Holism), then the explanation of  $\hat{S}^*$  must be of "stage one" form, and knowledge ( $NUPK_{GI}$ ) can possess no explanatory autonomy. The overall conclusion for monopolistic price adjustment: it is one thing to purge outrageous forms of Holism by moving to weaken versions of Holism (which free the  $\hat{S}^*$  prices but maintain  $\hat{S}$  as a given); it is quite another to explain both  $\hat{S}$  and  $\hat{S}^*$  as a rational choice of individuals--and it is only this last option which preserves individualist character.

The "standard" reading in the literature cited above goes as follows: If Competitiveness (i.e., parametric treatment of prices) is assumed outside of a competitive equilibrium, then it is logically impossible to explain how prices change except by reference to an external institution, which is ad hoc and Holistic in the extreme. What individual is left to change the prices if everyone treats prices as given? Since however, monopoly theory specifies the ability for an agent to make his own decisions with respect to both prices and quantities, any theory of (non-classical) price adjustment must involve the assumption of monopoly power.

Now, one might criticize this standard reading on the grounds that it equates monopoly theory with GI theory (which is a false identification), or that it implicitly presumes that the existence of monopolies cannot be consistent with classical optimality. Alternatively, one might criticize



this reading on the grounds that it regards Competitiveness as a property of (actual) decision-making environments rather than as just a pedagogical device for exposing the individual's "quantity" decisions which make up a PI-equilibrium (given that the unanimous endorsement of  $S^*$  is already established). However, leave all this aside. The only essential critical point is that the demonstration that prices can be set and changed by (rational) individuals outside of a competitive equilibrium is a fortiori not the demonstration that there is anyone specified in the explanation who can make a (rational) decision on the  $\hat{s}$  which led to the existence of the monopoly environment in the first place.

The upshot of this argument is therefore that for Individualism to be maintained (and for behavioural arbitrariness to be avoided) in the explanation of a monopoly price dynamics, both  $\hat{s}$  and  $S^*$  must be construed as a matter of individual choice; to "assume" a monopoly who changes prices--without further explaining the monopoly--can only constitute a commitment to (weak) Holism, not GI. It is this last point which is not made in the standard literature.

### 3.1.3. "Efficient Markets" and Informationally-Asymmetric Equilibria: Do Prices Convey "All" Information?

The final illustration of informationally-asymmetric settings (like those of  $NUPK_{GI}$  and  $NUSK_{GI}$ ) that it is worthwhile to consider involves the "efficient markets" literature. As is well established in Grossman and Stiglitz (1976), Ross (1977), and others, a central proposition of this literature is as follows: if markets are (globally) efficient, then "market prices must convey all information" (necessary to achieve a  $PI-II^*$ ). This claim is of course true by definition, since the achievement of  $FS^*$  must be simultaneous with the achievement of  $S^*$  and  $Sc^*$ . However, its importance in the context at hand lies in its implied equation of the idea that "prices

convey all information" with the idea that all informational asymmetries and all "distorting" social institutions which might be associated with these asymmetries must be removed in the neighbourhood of a PI-equilibrium (i.e., where  $USK_{PI}$  prevails).

Given the above, now consider a standard theorem of "efficient markets" analysis: that, if any "inside" trader attempted to act on his (initially-assumed) superior information, and markets were globally efficient, then he would immediately reveal his superior information to all others; since all his information would be completely assimilated and transferred in market price signals. Prima facie, this theorem seems to be little more than an application of the ideas presented above--that no one can have superior information if  $USK_{PI}$  prevails--yet Grossman and Stiglitz are nonetheless bothered by this result. In particular, they take this theorem to imply that, at a  $PI-\Pi^*$ , there can be no gains from the activities of speculation or arbitrage--activities which are invariably regarded as being central to the explanation for why market efficiency exists. By this argument, if (beneficial) speculation and arbitrage are observed--as they are--then market efficiency, by definition, could not be realized while these activities are still ongoing; prices could not be conveying "all" information if and when the marginal benefits of arbitrage are still positive. (Note the resemblance of this argument to one which states that there can be no gains from price adjustment unless one is outside of a PI-equilibrium.)

The authors are evidently worried both about the paradoxical aspects of the above argument and whether any model in which prices do not convey all information, and arbitrage is observably ongoing, can be called a true equilibrium. However, the solution to these riddles is straightforward, given the interpretative framework of earlier sections.

The equilibrium that the authors are aiming at--where arbitrage is

ongoing rather than complete--can only be based on the non-reducibility of  $\hat{s}$ --a true social distortion--which entails  $\hat{S}^*$ , and not  $S^*$ .  $\hat{S}^*$  prices do convey all information relative to  $N$ ,  $I$  and  $\hat{s}$ , but do not convey all information, in the sense that an  $S^*$ , derived from  $N$  and  $I$  alone, is signalled.  $\hat{S}^*$  prices are classical disequilibrium prices. Under (weak) Holism, these prices could be construed as a consequence of the distortion,  $\hat{s}$ , but the individualist will not accept  $\hat{s}$  as explanatory. Under GI, therefore,  $\hat{S}^*$  and  $\hat{s}$  must be explained by reference to  $N$ ,  $I$ , and the (exogenous) conditions of knowledge.  $NUPK_{GI}$  could be used to potentially explain  $S^*$  as a consequence of an explicit informational asymmetry, but it is not necessary to rely on this asymmetry-- $USK_{GI}$  could get the result. Under  $USK_{GI}$ , everyone would be equally uninformed about  $S^*$ ; hence, no one has (relatively) superior information.

This last idea of course refutes the presumption that just because there can be no informational asymmetries in the neighbourhood of a PI equilibrium, there must be informational asymmetries involved in the determination of any non-classical  $\hat{S}^*$ . Once again, the essential feature of an  $S^*$  equilibrium built on  $USK_{GI}$  (not  $NUPK_{GI}$ ) is that everyone is equally informed about  $S^*$  but equally uninformed about the  $S^*$  which would follow from  $USK_{PI}$ .

### 3.2 Non-Walrasian ("Quantity Constrained") Equilibria and $USK_{GI}$

Perhaps the most important contemporary attempt to explain  $\hat{S}^*$  equilibria is the Theory of Non-Walrasian Equilibrium, following originally from Clower (1965); see also Drazen (1980); Hahn (1978), Muellbauer and Portes (1978); and Fisher (1976, 1981). Here the dominant assumption is that  $UIK_{PI}$  is to be specified as  $USK_{GI}$ : everyone has sufficient knowledge to identify  $\hat{S}^*$ , but no one can identify the true  $S^*$ . It should be stressed that the use of  $USK_{GI}$  in lieu of  $NUPK_{GI}$  is not arbitrary. It is grounded on the idea that

it is methodologically presumptuous in short-run models to presume that anyone (e.g., a monopolist) can identify the true  $S^*$  position. Does not the monopolist's knowledge under  $NUPK_{GI}$  have to be rationalized by a long-run argument?

In any case, the standard characterization of a Non-Walrasian (quantity constrained)  $\hat{S}^*$  under  $USK_{GI}$  is one in which an endogenous set of quantity rationing constraints is generated from  $N$ ,  $I$ , and  $\hat{s}$ , where  $\hat{s}$  is normally identified with the existence of "non-market clearing" prices or wages--which entail "quantity constraints" on the notional plans of individuals. As is evident, under  $GI$ ,  $\hat{s}$  cannot be taken as a given--it must be explained by  $N$ ,  $I$ , and  $USK_{GI}$ --so that existing versions of this programme which assume exogenously-fixed prices can never transcend (weak) Holism from the outset. Moreover, those structures which attempt to avoid assumptions about the exogeneity of prices--by appending monopolistic price adjustment to otherwise fixed price models (Hahn (1978); Benassy (1976))--create a difficult methodological dilemma.

In this respect, since it is possible to find a "monopoly equivalent" (with flexible prices) to any given quantity-constrained  $\hat{S}^*$  (with fixed prices), the resort to monopolistic price adjustment arguments in the context of the latter only really suggests that one should give up the "quantity constrained" approach altogether and return to developing a consistent monopoly approach; why fuse two bad models when one is sufficient?

What I mean by a reference to two "bad" models is evident: the monopoly model may procure a flexible price characterization of  $\hat{S}^*$  but it in no way guarantees that the  $\hat{s}$  which underwrites the existence of monopoly in the first place can be successfully construed as an endogenous variable. If "barriers to entry" or their equivalent may be regarded as part of  $FS(\neq FS^*)$ , then all the monopoly model may succeed in doing is to flex the prices of

a quantity constrained structure by fixing a (distorting) FS. In such a circumstance, one form of holistic explanation just replaces another..

On the other hand, however, the methodological cost of moving to a monopoly approach overall is that the evident virtues of the assumption of  $USK_{PI}$  must be foregone. This assumption in principle cannot underwrite the type of informational asymmetry needed to rationalize monopolistic exploitation.

In any event, the basic problem situation is clear: if the move back to monopoly models is foregone, and a "quantity constrained," Non-Walrasian explanatory programme based on  $USK_{GI}$  is maintained, then it can meet the standards of GI explanation if and only if it can explain both  $\hat{S}$  and  $\hat{S}^*$  as an endogenous consequence of rational choice. Classical critics are indeed correct when they contend that the only way this programme can avoid behavioural arbitrariness is if it shows that the sustained existence of price distortions can be explained as a consequence of rationality. (See my earlier discussion of the "contracts" literature in Chapter Four.)

The above completes my survey of "conventional" references to  $\hat{S}^*$  equilibrium. I now examine the general "expectational" features of this type of equilibria.

#### 4. Expectations and $\hat{S}^*$ -Equilibria

##### 4.1 The Expectational Conditions for $\hat{S}^*$ -Equilibria

If it is contended that the type of  $\hat{S}^*$  equilibria described here can be regarded as a bona fide general equilibria if and only if everyone's expectations of  $\hat{S}^*$  are realized, then a direct commitment is made to guaranteeing the fulfillment of the same three types of expectational conditions specified in connection with PI (in Chapter Seven). Thus, it is required that everyone's  $E_j(\hat{S}^*)$ 's are identical, that everyone mutually expects each other to expect the same  $\hat{S}^*$  as they do (i.e., second-order

expectations are realized) and, finally, that the overall condition:

$$E_j(\hat{S}^*) = \hat{S}^* \text{ for all } j,$$

is satisfied. The three conditions are identical to those stated for PI-equilibria, except that  $\hat{S}^*$  has replaced  $S^*$ .

Given the constraint of these expectational conditions, and given the requirements of Individualism, it then follows that any  $\hat{S}^*$  must be explained as a state of aggregate unanimity, where the unanimous endorsement of  $\hat{S}^*$  must be seen to follow from the unanimity on expectations. The unanimity on expectations must then in turn be reduced to the universal agreement of agents on a "theory" of aggregate coordination which just generates the expectational unanimity.

#### 4.2. The "GI-Specification" and $T_j'$

In my discussion of PI, I distinguished very clearly between  $T_j$ --j's theory of the (Globally-Reducible)  $S^*$  position, and  $T_j'$ --j's theory of the coordinated state which will actually come to fruition. Since  $USK_{PI}$  was deemed to be sufficient knowledge for any agent to know  $S^*$ , and to know that everyone else, likewise endowed with  $USK_{PI}$ , did not anticipate PI disequilibria,  $T_j$  could be guaranteed to be a true theory of  $S^*$ , and  $T_j$  and  $T_j'$  were rendered identical. The equivalence of  $T_j$  and  $T_j'$  was taken to indicate moreover, that all agents were using a "PI-specification" of their individual choice problem: in short, that agents viewed only elements of  $N$  and  $I$  (and, in particular,  $N^j$  and  $I^j$ ) as the true determinants of their behaviour, since they acted on the presumption that all elements of  $S$  could be derived from, and chosen, given  $N$  and  $I$ . It was further implied that the PI-condition,  $E_j(S^*) = S^*$  (for all  $j$ ), could obtain if and only if all agents employed this PI-specification.

In the case at hand, however, where  $E_j(\hat{S}^*) = \hat{S}^*$  holds, it follows that no agent can be using a PI specification of his choice problem. Agents'

expectations must be generated from  $T_j'$  and not  $T_j$ , since the expectations of all agents are realized on an aggregate state,  $\hat{S}^*$ , which is a distortion of the Global Reducibility implied by  $S^*$ .

Any specification of an individual's choice problem in which the agent anticipates at least one "non-reducible" element of  $S$  to actually transpire--thus, where  $T_j$  and  $T_j'$  are not taken to be identical--may be denoted a "GI-specification." This situation may be conveniently characterized by Fisher's (1976b) notion that all agents are "conscious of (PI) disequilibria." It follows that  $E_j(\hat{S}^*) = \hat{S}^*$  (for all  $j$ ) can obtain if and only if all agents hold a "GI-specification" of their choice problem (hence, no one holds a PI-specification), and everyone's  $T_j'$  is identical.

#### 4.3 NUPK<sub>GI</sub>, USK<sub>GI</sub>, and the Realization of Expectations

The singularly important point about the knowledge assumptions of a "GI-form" which have been discussed so far is that they specify sufficient knowledge for all agents to guarantee the truth of  $T_j'$  but insufficient knowledge for all agents to guarantee the truth of  $T_j$ .

In the monopoly example under NUPK<sub>GI</sub>, the monopolist can guarantee the truth of both  $T_j$  and  $T_j'$  but others can only guarantee the truth of  $T_j'$ . This is what gives the monopolist the power to set  $\hat{S}^*$  as a consequence of maximization, relative to  $N$ ,  $I$ , and  $\hat{s}$ , since all others have insufficient knowledge to identify "non-distorted" states except by accident (i.e., they cannot establish whether  $\hat{s}$  is a "true" distortion), yet they still have sufficient knowledge to correctly anticipate (and thus realize) the monopolist's intentions in setting  $\hat{S}^*$  prices. (Note, of course, that PI equilibria are accidental under NUPK<sub>GI</sub> not because the monopolist cannot identify  $S^*$  but only because the monopolistic "benevolence", required for  $S^*$  to be set, cannot be guaranteed.)

Under USK<sub>GI</sub>, the basic character of the formulation is much the same--

except that no one can establish the truth of  $T_j$ . Here the realization of expectations on  $S^*$  depends only on the fact that everyone can verify  $T_j'$ ;  $USK_{GI}$  is insufficient knowledge for any guarantees beyond this (e.g., of PI equilibria).

It was emphasized in the discussion of PI structure that, if  $S^*$  was unique (at least up to a non-infinite set), then the guarantee of the truth of everyone's theory of  $S^*$ , given  $USK_{PI}$ , must entail that they held identical  $T_j$ 's and  $E_j(S^*)$ 's. In the non-classical setting under discussion, however, there can be no presumption other than that there are an infinity of possible  $\hat{S}^*$  which might transpire, all of which are potentially realizable distortions of the  $S^*$  position.

Now, it follows, by definition that, if some  $\hat{S}^*$  is realized, say, under  $USK_{GI}$ , then all agents must be generating their (realized)  $E_j(\hat{S}^*)$ 's from the same  $T_j'$ . If this was not the case, and different individuals held different theories of the  $\hat{S}^*$  to transpire, then the  $T_j'$ 's of at least some individuals must be demonstrably falsified by the aggregate state which actually emerges. This would violate the initial assumption of  $USK_{GI}$ . Thus, the unanimity on  $T_j'$  must obtain no matter which  $\hat{S}^*$  really transpires.

The ultimate question of explanatory importance in the context of GI structure, however, is as follows: Are the givens,  $N$ ,  $I$ , and  $USK_{GI}$  sufficient to determine which particular  $\hat{S}^*$  will obtain (even if it is granted that  $N$ ,  $I$ , and  $USK_{GI}$  are sufficient to guarantee that some non-accidental  $\hat{S}^*$  equilibria must obtain)? This is not a problem for the weak Holist, since he can allow exogenous  $\hat{s}$  to pin down the particular  $\hat{S}^*$ --and the  $T_j'$ 's of agents are simply constrained to produce the  $E_j(\hat{S}^*) = \hat{S}^*$ , determined by  $N$ ,  $I$ , and the posited  $\hat{s}$ . In the latter case, knowledge is not explanatory (since  $N$ ,  $I$ , and exogenous  $\hat{s}$  complete the determination of  $\hat{S}^*$ ) whereas, under GI, knowledge must be explanatory. Once again, the strategic



GI issue concerns whether the "givens"  $N$ ,  $I$ , and  $USK_{GI}$  can offer a complete determination of  $\hat{S}^*$  (and  $\hat{s}$ ), or only an underdetermination.

#### 4.4 The Stability and Reformability of $\hat{S}^*$ -Equilibria

The characteristics of  $\hat{S}^*$ -equilibria described so far are relatively subtle. They are also somewhat enigmatic, since individuals are seen to perfectly anticipate an aggregate state that contains social distortions which are not in their best interest. Consider individual  $j$ . He has a theory of  $S^*$  (in his  $T_j$ )--but he cannot show  $T_j$  to be true. He also has a theory of  $\hat{S}^*$  (in his  $T'_j$ )--which he can show to be true. Suppose that he operates with  $T'_j$  and realizes  $\hat{S}^*$ .  $\hat{S}^*$  is not the  $S^*$  which is implied by his  $T_j$ , and in fact he dislikes the state intensely. The question is: What forces explain why  $j$  endorses  $\hat{S}^*$ , rather than trying to immediately upset (reform) the state in the light of his  $T_j$ -conjectured  $\hat{S}^*$ ? More precisely, if no explanation can be given for why immediate reform of any  $\hat{S}^*$  is impossible, how can  $\hat{S}^*$  equilibria be "stable" or even observable?

Now, one might invoke the assumption that everyone thinks that the anticipated  $\hat{S}^*$  is really the  $PI-S^*$ , that  $\hat{S}^*$  does not therefore conflict with  $T_j$ --but there is no justification for this when there are an infinity of  $\hat{S}^*$ 's available. Alternatively, one might argue that Competitiveness holds--that agents have no power to upset the determined  $\hat{S}^*$  whatsoever--but this would completely undermine the existence of the individual power necessary to set the state in the first place (i.e., if they wanted it), and would be an outright submission to  $SH$ , where  $I$  does not "count."

The above argument then explains why neither the weak Holist nor the proponent of GI will accept the use of the concept of Competitiveness in the setting under discussion--where beneficial reforms of any  $\hat{S}^*$  are really possible. In particular, the weak Holist will claim that the very achievement of  $\hat{S}^*$  already involves the successful and beneficial individual reform

of all elements of  $S$  other than  $\hat{s}$ --to maximizing positions relative to  $N$ ,  $I$ , and  $\hat{s}$ . Characteristically, however, this argument is still not acceptable to the GI theorist.

The latter will contend that being able to explain the (rational) endorsement of all institutions other than  $\hat{s}$  as a consequence of maximizing behaviour, where all agents treat  $\hat{s}$  parametrically, is simply not sufficient to explain why  $\hat{s}$  was rationally endorsed and, thus, not reformed. Accordingly, the GI-theorist will accept only a stability argument which explains the decision not to reform  $\hat{s}$  as a rational choice of individuals; the non-reformability of  $\hat{s}$  cannot be taken as a "given" in the analysis. The GI-theorist will contend, moreover, that if the non-reformability of  $\hat{s}$  is not construed as a rational choice, then the stability of any  $S^*$  that the weak Holist cites can be only regarded as accidental.

It is precisely for the above reasons that the GI theorist contends that it is possible to guarantee the "stability" of non-classical equilibria, and to maintain Individualism, if and only if both  $\hat{s}$  and  $S^*$  are explained as a rational consequence of  $N$ ,  $I$  and exogenous knowledge. An alternative statement of this "stage two" viewpoint is as follows: that the guarantee of Globally-Rational decision making when Global Reducibility does not prevail requires the guarantee of Global Reformability of  $S$ , which requires that knowledge not be an endogenous variable in the explanation of transpired coordination.

Evidently, all of this discussion reduces to the question of whether the GI theorist has sufficient explanatory power to explain the rational choice between  $\hat{s}$ 's. Obviously, Classical Global Rationality (based on  $USK_{PI}$ ) cannot perform this explanatory exercise--since the only choice explainable as rational is  $S^*$ . This explains why the ultimate objective of any GI programme is to specify a concept of Non-Classical Global Rationality

which makes the retreat to the (partial) rationality (and behavioural arbitrariness) of a weak Holism unnecessary.

To conclude this section, allow me to illustrate the above issues by a rather simple example. Thus, consider a Non-Walrasian structure which initially assumes a distortion in the form of fixed, existing PI-disequilibrium prices. Clearly, if individuals conjecture that these prices are not in their own best interest (even if they cannot identify PI equilibrium prices as such), then prima facie they will not endorse them or trade at them. Thus, why are prices fixed here? The SH explanation is simply that everyone must take existing prices as given (say by "the market") even though some individuals, and possibly no one, wants to accept them, given their respective  $T_j$ 's. This does not make sense in any would-be individualist theory. The only viable explanation possible here must refer to the "expectations" of individuals that they could never reform the going prices, and it is not clear that this even makes sense as applied to existing social distortions.

Evidently, a better and more general way to handle this type of problem--and one moves in the direction of GI, not Holism--is to interpret all anticipated social distortions as post-reform, rather than pre-reform. Thus, individuals can very well anticipate a change in all existing social distortions (e.g., the given PI disequilibrium price vector), actually effect the anticipated change through reform, without nonetheless expecting to reach, or actually reaching, a position of Global Reducibility, except by accident. Under  $USK_{GI}$ , this viewpoint is consistent with the realization of successful institutional reform, the correct anticipation of the post-reform positions of all social institutions, and potentially provides a framework in which the stability of  $S^*$  equilibria can be grounded in the realization of "reform expectations" with respect to all elements of S. I will return to a discussion of the "reform process" later, and from a

rather different perspective.

#### 4.5 Expectations and $UIK_{GI}$

The one knowledge specification of the "GI-form" that I have neglected so far is  $UIK_{GI}$ . Such a specification is clearly problematic for any  $\hat{S}^*$  theory which demands that  $E_j(\hat{S}^*) = \hat{S}^*$  (for all  $j$ )--since  $UIK_{GI}$  does not specify sufficient knowledge for agents to guarantee the truth of either  $T_j$  or  $T'_j$ , and, thus, cannot ensure the unanimous endorsement of any  $E_j(\hat{S}^*)$ . Since it is recognized that  $UIK_{GI}$  is to  $USK_{GI}$  as  $UIK_{PI}$  is to  $USK_{PI}$ , it is apparent that this knowledge specification can only be accidentally compatible with the uniform realization of expectations necessary for explaining  $\hat{S}^*$  equilibria.

If "traditional" individualist theory demands that any "true equilibrium" explanation of  $\hat{S}^*$  (or  $S^*$ ) satisfy the condition that the expectations of all agents be realized (which presumes "expectational unanimity"), it is simply necessary to conclude that the knowledge specification of  $USK_{GI}$  is logically incompatible with the construction of any successful individualist account of observed aggregate coordination. Stated alternatively, it is in principle possible to produce successful individualist explanations of  $\hat{S}^*$  equilibria if and only if it can be shown that there exists a non-arbitrary rationale for the existence of at least one type of non-accidental equilibria in which individual expectations are systematically not realized, yet Global Rationality prevails. This cannot be a theory which relies on aggregate unanimity.

#### 5. The "Stage Two" Failure of GI Explanation and the Failure of Existing Non-Classical Programmes: An Overview

A dominant theme of the above analysis is that existing non-classical research has (possibly unwittingly) made a commitment to weak or strong forms of holistic explanation rather than to GI explanation. If this is in fact the

case, then the failure of non-classical research is straightforward to understand. Since all forms of Holism are "stage one" explanations, they can never avoid the central contention of the classical critique: that any explanation which assumes (rather than explains) even one  $\delta$  must be "behaviourally arbitrary." Accordingly non-classical theorizing must fail in the eyes of any individualist until "stage one" analysis is transcended, and a non-arbitrary and logically complete GI structure is produced.

For all the stark clarity of this account of the failure of existing non-classical theorizing, I believe that it misses important subtleties. Thus, while it may be true that some non-classical theorists have really felt that the test of the viability of any theory of the short-run lies in its predictive success and not in its structural consistency with the postulates of Individualism, and while still others may have truly believed that observed institutions really do have a constraining force "beyond individuals," I doubt that these are really predominant foci. Thus, the recent literature on Non-Walrasian equilibria may "appear" to start from an initial commitment to Holism--because the analysis normally starts from the (purportedly "realistic") short-run assumption that some prices or wages, plus a "rationing scheme," are truly exogenous "givens" in the setting to be examined--but a methodological reconstruction of Non-Walrasian theory would reveal that these exogenous givens are really being invoked only to "close the system," in lieu of any other interesting explanatory apparatus.

In this light, I believe that it is fair to say that both the monopolistic price adjustment literature and Non-Walrasian theory--for all their superficial differences--are really bona fide attempts to construct a non-arbitrary GI structure which simply run out of steam, and therefore invoke some type of Holism to ensure an appropriate structural determinacy. These two approaches appear to be radically different (e.g., with respect to price

adjustment because the  $\bar{s}$  needed to close these systems happens to be located in output prices in one case--which is blatant--and in "barriers to entry" which fix the extent of monopoly power in the other--which is less obvious.

Unfortunately, the failure to provide a successful GI at a "stage two" level can be proved straightforwardly, so that the "real" failure of existing non-classical theory is its implicit decision to retreat to a stage one Holism rather than pushing on to consider a stage three treatment of GI. The traditional reluctance to move to a stage three GI--where N, I, exogenous knowledge, plus something else are regarded as explanatory--is, I think, no more than a matter of "appearances." A stage one weak Holism looks (at least technically) much closer to "accepted" classical theory (i.e., except for the  $\hat{s}$ , which denies Individualism outright), while a "stage three" GI looks like a ludicrous flight of fancy (even though it is a genuine attempt to preserve Individualism). The precise reason that a weak Holism can preserve most of the structural attributes of classical analysis is because it is only an ad hoc departure from classical theory; the reason that a stage three GI cannot preserve these attributes is because it is a genuine departure from classical theory while not being a departure at all from Individualism.

In any event, given this perspective, I now wish to outline briefly the logical failure of a "stage two" GI; these arguments will be amplified in the next chapter. It may be added that the reason why it is so important to understand the failure of a "stage two" GI is that it can both clarify exactly why the traditional retreat to a "stage one" weak Holism takes place and, perhaps even more important, isolate the minimum conditions necessary to avoid this retreat altogether.

#### 5.1 The Logic of the Failure of a "Stage Two" GI for the Short-Run

For expository purposes, I consider the GI-USK<sub>GI</sub> fusion discussed

above, although the same arguments apply to the  $\text{NUPK}_{\text{GI}}$ , "monopoly" specification. The reason for this focus is that  $\text{USK}_{\text{GI}}$  is a better and more general specification of  $\text{UIK}_{\text{PI}}$ .

### 5.1.1 The Problem of Structural Underdetermination

Consider the basic attributes of the setting to be analyzed.  $\text{USK}_{\text{GI}}$  constitutes sufficient knowledge to guarantee the truth of each and every individual's posited  $T'_j$ .  $\text{USK}_{\text{GI}}$  can therefore successfully explain why  $E_j(\hat{S}^*) = \hat{S}^*$  (for all  $j$ ) transpires--in short, why social distortions can be perfectly anticipated with unanimity.

As I have mentioned above, however, there is a problem connected with the non-uniqueness of  $\hat{S}^*$ . The fulfillment of  $E_j(\hat{S}^*) = \hat{S}^*$  is compatible with potentially an infinity of different  $\hat{S}^*$ 's, so that additional explanatory power is needed to complete the determination of  $\hat{S}^*$  (i.e., to identify which particular  $\hat{S}^*$  transpires).

By logic, one can attack this problem in either of two ways: either one can lock in the particular theory of transpired coordination which agents hold (i.e.,  $T'_j$ )--which in turn renders  $E_j(\hat{S}^*)$  unique--and then explain the uniqueness of  $\hat{S}^*$  as a logical consequence of the uniqueness of  $E_j(\hat{S}^*)$ , or one can operate from the other direction and pin down  $\hat{S}^*$  independently, and then show  $E_j(\hat{S}^*)$  must fit the posited  $\hat{S}^*$ .

Evidently, the latter strategy employs the "holistic conception of institutions"--since  $\hat{S}^*$  is determined independently of individual expectations--and perfectly illustrates the move to weak Holism. Thus, once  $\hat{S}$  is specified as a given, then maximization, relative to  $N$ ,  $I$ , and  $\hat{S}$ , can lead to a unique  $\hat{S}^*$ , where  $\text{USK}_{\text{GI}}$  is just the (endogenous) knowledge necessary to realize this  $\hat{S}^*$ .

For the individualist, it is apparent that he must avoid this move to weak Holism at all costs. Thus, he must demonstrate that he can pin down

$E_j(\hat{S}^*)$  in some non-arbitrary fashion. If he cannot, then any complete explanation of  $\hat{S}^*$  must be holistic in form.

As is evident from the above, the general problem confronting the GI-theorist is one of underdetermination. The conjunction of N, I, and exogenous knowledge can explain why agents are not at  $S^*$  (i.e., because of autonomous knowledge constraints), it can explain why they are at some  $\hat{S}^*$  (i.e.  $\hat{S}^*$  "exists"), but it cannot explain which  $\hat{S}^*$  prevails. Thus, this GI explanation is not complete, and the basic question is: Can an "arbitrary" completion of this structure be avoided?

Consider, therefore, the two possible GI options open to deal with this problem. If  $E_j(\hat{S}^*)$  must be pinned down, then this can be done by either (a) treating  $T'_j$  or  $E_j(\hat{S}^*)$  as exogenous outright; or (b) explaining (determining)  $E_j(\hat{S}^*)$  as a logical consequence of a "theory" of non-arbitrary  $T'_j$ -choice by agents.

Option (a) is all too easy, and is not satisfactory. The cost of (a) is that it becomes logically impossible to explain why  $T'_j$  ever changes--except as a matter of individual caprice. Thus, consider a once-for-all change in N. Presumably the change in N entails a new  $\hat{S}^*$ --if the required institution reforms can take place. If  $T'_j$  is exogenously fixed, however, why will  $E_j(\hat{S}^*)$  ever move to realize the new  $\hat{S}^*$ ? The fixity of  $T'_j$  therefore shuts off reform much in the spirit of Holism. Since the essence of any genuine GI framework is to allow changes in N and I, and even the conflict between  $T_j$  and (the going  $T'_j$ ) to produce anticipated reforms of the going  $\hat{S}^*$ , it is simply not possible to take  $T'_j$  as a given. In short, if successful reform of any  $\hat{S}^*$  is to be possible within this framework--which it must be to avoid an implicit commitment to Competitiveness and the like, and which it can be, since  $USK_{GI}$  is ensured--then the realized post-reform  $\hat{S}^*$  must be seen as a consequence of a changed  $T'_j$ .



If the strategy to treat  $T'_j$  as a given is therefore not a success, then it follows that the individual choice of  $T'_j$  must be endogenously explained such that the endogenous determination of  $T'_j$ , with  $E_j(\hat{S}^*)$ , can complete the determination of  $\hat{S}^*$ . Consider the problem in this way. The (weak) Holist states that he does not have to worry about pinning down  $T'_j$  independently since he can assume  $\hat{s}$  and let individuals produce  $\hat{S}^*$  as a maximizing outcome relative to  $N$ ,  $I$ , and  $\hat{s}$ , given  $USK_{GI}$ . The individualist, however, refuses to take  $\hat{s}$  as a given and proposes to explain  $\hat{s}$  as a consequence of a given  $T'_j$ . The Holist responds by asserting that there is no methodological difference between these two strategies; they are different only in name. Thus, the only significant move that the individualist can make is to explain the individual choice of  $T'_j$  as a non-arbitrary, endogenous "rational" choice.

Unfortunately, the problem of any "stage two" GI programme is that it cannot handle this task. Since the knowledge assumption of  $USK_{GI}$  is logically insufficient to explain why any agent picks the particular  $T'_j$  that he does, and since the application of a "classical" rationality criterion would only be able to explain the choice of  $T'_j$  as  $T_j$ , a "stage two" GI can only leave the determination of  $T'_j$  as arbitrary, and this is where the behavioural arbitrariness of this structure must lie. In lieu of adding further explanatory power, and constructing a "stage three" GI structure," this system can yield "determinate" equilibrium outcomes only if  $T'_j$  is treated as a given--which is a travesty of the logic of the explanation--or if  $\hat{s}$  can be invoked to pin down an  $\hat{S}^*$  independently of  $T'_j$  and  $E_j(\hat{S}^*)$ --which is the retreat to Holism (e.g., exogenously-fixed prices).

#### 5.1.2 The Problem of Short-Run Knowledge Sufficiency: $USK_{GI}$ As a Long-Run Concept of Knowledge

If the above problem of underdetermination in a "stage two" GI, based

on  $USK_{GI}$ , is severe enough, then the situation simply becomes intractable once the problems of assuming  $USK_{PI}$  itself are considered. In this light, since the structure under discussion commits itself to universally-realized expectations and the concomitant guarantee of the truth of  $T'_j$ , it must provide a non-arbitrary explanation for how such sufficient knowledge is procured by agents. As will be argued in more detail in the next chapter, the problems of guaranteeing the successful prediction of social distortions (under  $USK_{PI}$ ) cannot be that different from those connected with the successful prediction of social optima (under  $USK_{PI}$ ). In fact, the problem of guaranteeing theoretical "truth" is identical in both cases.

The above observation has a most serious implication: that the only non-arbitrary explanation for the successful procurement of  $USK_{GI}$  by agents (as with  $USK_{PI}$ ) is one based on Inductivism. Since I have already made clear in the last chapter that successful induction requires the long-run, all that can be concluded here is that  $USK_{GI}$  can be non-arbitrarily justified to hold only in the long-run. Thus, even if all the problems of underdetermination discussed above were discounted, the structure under discussion is still not capable of illuminating even one instance of short-run behaviour in a non-arbitrary fashion. (This situation is, of course, only made worse by the substitution of  $NUPK_{GI}$  for  $USK_{PI}$ , since  $NUPK_{GI}$  is an even more stringent knowledge assumption.)

In saying the above, I am not suggesting that, say, a non-Walrasian or monopoly theory could not move its domain of explanation back into the short-run--by the introduction of a priori true knowledge, or by the invocation of an auctioneer who instantaneously signals  $S^*$ . What I am saying, however, is that the arbitrariness of recourse to a priori true knowledge would just add to the behavioural arbitrariness implied by the underdetermination of the structure already, and that the Holism involved in enforced acceptance

of external signals (i.e., independently of agents'  $T_j'$  and  $E_j(\hat{S}^*)$ ) would just consolidate the Holism which would be in the structure anyway if its underdetermination was removed by assuming  $\hat{s}$ .

What all this means therefore is that a badly-handled "stage two" GI can lead only to the worst type of short-run theorizing. Assuming a concept of  $USK_{GI}$ , which can only work successfully in a long-run context, to back up (purportedly) short-run arguments is simply unconvincing. Moreover, attempting to use  $USK_{GI}$  to underpin long-run results is beside the point, since the long-run is sufficient to guarantee the procurement of  $USK_{PI}$  or, for that matter,  $UPK_{PI}$  ( $UPK_{GI}$ ). (Note that, since these arguments apply with equal force to the monopoly- $NUPK_{GI}$  case, the paradox is implied that the monopolist can possess sufficient knowledge to guarantee successful exploitative monopoly pricing only at that point in time where all agents possess just the sufficient knowledge to (knowingly) remove all distorting monopolies.)

5.1.3 While I will amplify aspects of the above critical arguments directly in the next chapter, it is now becoming apparent what the constraints on any "stage three" GI must look like. In particular, since GI can avoid triviality only if it is explanatory in the short-run, and since it can be non-arbitrary with respect to short-run knowledge procurement only if it avoids working from any knowledge assumption which presumes long-run inductive success, this structure is forced to work from the assumption of  $UIK_{GI}$ ; there is no other option left.

As soon as both  $USK_{GI}$  and  $USK_{PI}$  are exorcised from the setting, it is immediately apparent that the non-accidental fulfillment of the condition of realized expectations,  $E_j(\hat{S}^*) = \hat{S}^*$ , goes with it, as does expectational unanimity. Now, if it is claimed that there exists no non-arbitrary notion of "coordination" compatible with the failure to realize expectations and which avoids holistic determination of  $\hat{S}^*$ —as traditional theorizing might

suggest--then a commitment to  $UIK_{GI}$  prima facie can be seen to only lead to an "indeterminate" dead-end; determinate theorizing about the short-run therefore must involve at least one arbitrary assumption about "sufficient" knowledge procurement.

For all this, I do not hold that a commitment to  $UIK_{GI}$  is the end of serious theorizing. Certainly, the endorsement of this assumption by itself, leaving the remainder of the structure of traditional theory intact, cannot produce anything. However, this is precisely why I have focussed on questions of "the reform process" and the non-arbitrariness of  $T_j'$ --as the other constituent ingredients of any short-run "stage three" GI structure built on  $UIK_{GI}$ . I will sketch further aspects of this "stage three" proposal in the concluding chapter.

## CHAPTER ELEVEN

INDIVIDUALISM AND THE PROBLEM OF KNOWLEDGE DYNAMICS:  
A METHODOLOGICAL INTEGRATION

In the above chapters, I have kept implicit many "intertemporal" and "dynamic" aspects of the theoretical structures under discussion. I now wish to integrate earlier critical arguments in the context of such "real time" concerns.

The setting defined is one which contains  $T$  discrete time periods, where  $t$  denotes any arbitrary time period in  $T$ . A  $\Pi^0 = Z^0$  is observed at every point in time, and the explanatory objective of any theory of aggregate coordination is to explain each and every  $Z^0$  as a  $Z^*$ .  $N$ ,  $I$ , and  $S$  are now defined as a time profile of values (from  $1, \dots, T$ ), where the values of these variables in the  $t^{\text{th}}$  period are, respectively,  $N_t$ ,  $I_t$ , and  $S_t$ . In general,  $Z_t^0$  can be explained only by reference to the values of posited exogenous variables (drawn, at least in part, from  $N$ ,  $I$ , and  $S$ ) as defined over all points in time. Thus, the successful explanation of  $Z_t^0$  as a PI-equilibrium where  $S_t^*$  prevails relies on the specification of  $I_t$  and  $N_t$  for all  $t$ , as a "sufficient" set of exogenous variables. A complete intertemporal explanation of coordination must be able to explain all  $Z_t^0$  ( $t = 1, \dots, T$ ) by reference to the posited time-profiles of the exogenous variables. Thus, a complete PI intertemporal explanation of coordination must be able to generate the full time profile of  $S$  (as  $S^*$ ) from the full time profiles of  $N$  and  $I$ .

The knowledge specifications,  $UPK_{PI}$ ,  $UPK_{GI}$ ,  $USK_{PI}$ ,  $USK_{GI}$ , and the like, are now also implicitly defined so as to refer to "perfect"/  
"sufficient" knowledge over all  $T$  time periods. Defining these concepts of sufficient and perfect knowledge in such a way brings out the obvious point that the assumption that agents possess sufficient or perfect knowledge in

any one time period is not sufficient to satisfy intertemporal concepts of UPK or USK, except, if  $T = 1$ . If  $T > 1$ , sufficient (or perfect) knowledge at a point in time does not entail sufficient (or perfect) knowledge over time.

Such an interpretation also brings out the fact that the theories of agents'  $T_j$  and/or  $T_j'$ , now must be seen to apply to all time periods. Thus, each agent must conjecture the (potential) Global-Reducibility action and/or the (potential) conditions of aggregate coordination which can transpire in each and every period. This in turn implies that each agent's  $E_j(S)$  is defined over the same temporal dimension.

There is of course very little formal difference between the (implicitly) "static" problem of knowledge sufficiency presented earlier and its intertemporal counterpart outlined immediately above. If there is anything which distinguishes the latter formulation, however, it is that it involves the future properties of nature, individuals and society in a strategic way. Since any individualist explanation of intertemporal coordination which requires the uniform realization of expectations on all future states of the economy must depend on the fulfillment of an intertemporal concept of  $USK_{PI}$  or  $USK_{GI}$ , it becomes essential to explain how individuals gain access to sufficient knowledge of those relevant future properties in the present.

This "problem of knowledge of the future" must be appreciated in the context of the "problem of knowledge of the present" discussed earlier. Thus, thinkers such as Hayek would deny that individuals could know all the properties of nature, individuals, or society even at a point in time, so that raising additional questions about the sufficiency of individual knowledge over time would be seen to make the original methodological problem even more intractable. In this sense, the problem of knowledge of

the future would still exist even if all agents were endowed with sufficient (or perfect) knowledge of all past and current N's, I's and S's or, alternatively, a complete factual history of the characteristics of states of the aggregate economy up to the present.

This recognition, of course, is central to the methodological positions of Keynes (1936, 1937) and Shackle (see the latter's (1972) as exemplary and my (1974) discussion of this viewpoint): that no matter how much knowledge of past and current conditions agents possess it is not possible to rationalize the transformation of knowledge to any concept of USK in an intertemporal context unless agents can successfully solve the problem of achieving knowledge of the future. More precisely, it is only if such future knowledge can be procured that it is possible to guarantee that all individuals can coordinate their interactions today, in the light of the future, and coordinate with each other when the future actually arrives.

I now examine the "dynamic" issues connected with any explanation of the movement from  $UIK_{GI}$ , to  $USK_{GI}$ , to  $USK_{PI}$ , where, of course,  $USK_{GI}$  and  $UIK_{GI}$  are two possible specifications of  $UIK_{PI}$ .

1. The Temporal Relationship between the Transformation of UIK into USK and Individual Action: The General "Dynamic" Structure of Individualism

I have emphasized the "traditional" necessity of underwriting  $PI$  ( $GI$ ) explanations of aggregate coordination by  $USK_{PI}$  ( $USK_{GI}$ ) in previous chapters. The idea is as fundamental a part of the "statics" of traditional Individualism as it is to its intertemporal counterpart. What makes the interpretation of this structural requirement so interesting in the latter context, however, is the question of just when the transformation of  $UIK_{PI}$  into  $USK_{PI}$  (or  $UIK_{GI}$  into  $USK_{GI}$ ) takes place in real time, and the relationship of this transformation in time to individual decision-making in time.

It is appropriate to initiate a discussion of these issues by

consolidating an obvious point of reference: by a "dynamic" process, I mean a process which takes place over time and by a "temporal relation between dynamic processes," I am referring to a relation where it is essential to specify whether the events in one process transpire before, simultaneously with, or after the events in another process. I now turn to the basic temporal restrictions of any successful account of PI or GI inter-coordination, where, unless otherwise stated, the GI-programme will be identified with the "stage two" programme under  $USK_{GI}$  where  $E_j(\hat{S}^*) = \hat{S}^*$  can obtain.

### 1.1 The Requirements for PI Intertemporal Equilibrium

Even a superficial reading of the above definitions reveals a basic requirement of any explanation of PI intertemporal equilibrium: if the guarantee of a  $PI - \Pi^*$  requires that agents possess  $USK_{PI}$ , then it is necessary that the transformation of  $UIK_{PI}$  into  $USK_{PI}$  be seen as taking place prior to, or simultaneous with, the earliest point in time that any agent attempts action or interaction with others. The corollary to this proposition is also evident: that if individual action does take place before the transformation of  $UIK_{PI}$  into  $USK_{PI}$  is complete (e.g., when only prevail), then it will be only accidental that such action is consistent with the conditions of an intertemporal  $PI - \Pi^*$ . (I emphasize again that the situation where all agents have knowledge of the  $N$  and  $I$  which will prevail in some, but not all, of the  $T$  periods does not satisfy the intertemporal concept of  $USK_{PI}$ ; in general, this setting is one of  $UIK_{PI}$  and can only imply an accidental  $PI - \Pi^*$ .)

It is apparent the above propositions only indicate a necessary condition for the achievement of a successful PI intertemporal programme. Not only must agents possess  $USK_{PI}$  before they ever act but, furthermore,



all action is constrained to take place at the ("correct") PI institutions. What this means is that all social institutions (including prices) must also be at their anticipated  $S^*$ -positions prior to, or simultaneous with, the earliest point in time that any agent attempts action or interaction with others. This condition guarantees that  $E_j(S^*) = S^*$  for all  $j$ , prior to or simultaneous with the point in time at which any individual action based on  $E_j(S^*)$  transpires.

The above conditions are clearly very stringent. What they say is that, in order to guarantee the success of any PI intertemporal programme, no agent is permitted to make non-reversible errors in action at any point in time. The reference to "non-reversible" errors indicates the possibility that a successful PI intertemporal programme might be maintained even if agents made errors in action (say, during the time that they were saddled with  $UIK_{PI}$ ), so long as past errors could be corrected or perfectly compensated for at some future date (say, when they reached  $USK_{PI}$ ). Needless to say, the reversibility of historical action implied here is not acceptable and, if there is therefore no rationale for the reversibility of errors, then a successful PI intertemporal programme cannot allow any errors in action at all.

## 1.2 The Requirements of GI Intertemporal Structure

The essential implication of the above analysis is that if any agent ever makes a (non-reversible) error at any point in time, then the conditions for a successful PI intertemporal explanation must be sacrificed. Specifically, since any individual action which takes place when  $USK_{PI}$  and  $S^*$  have not transpired will entail (barring accident) individual endorsement of social institutions which are not in the aggregate best interest of all individuals (i.e., not derivable from  $N$  and  $I$ ), it is only a GI-structure which can ever be potentially entertained here. In short, the existence of

individual ~~errors~~ in action at any point in time must be manifested in the existence of "non-reducible" social artifacts at that point in time, and these "social distortions" must independently constrain all further decision-making.

It is, of course, one thing to state that errors in action can only be examined within a GI-structure and quite another to argue that such errors can be successfully explained as part of an intertemporal GI -  $\Pi^*$ . Discounting the possibility of a GI structure under  $UIK_{GI}$  (which I will briefly examine in the final chapter) "traditional" theory would be constrained to argue that any successful GI explanation of intertemporal coordination (i.e., PI coordination with errors in action) must require that the transformation of  $UIK_{GI}$  into (at least)  $USK_{GI}$  take place prior to, or simultaneous with, the earliest point in time that any agent undertakes action or interaction with others. This will guarantee that  $E_j(\hat{S}^*) = \hat{S}^*$ , for all  $j$ , where the difference between  $\hat{S}^*$  and  $S^*$  represents no more than errors in institutional choice that everyone endorses with unanimity, since they cannot infer  $USK_{PI}$  from  $USK_{GI}$ .

I should remark that the conditions on this type of explanation are still rather severe: agents must possess  $USK_{GI}$  (without possessing  $USK_{PI}$ ) in order to meet the condition that they can successfully anticipate all errors (including future ones). If agents cannot do this--and, indeed, it is a lot to ask--then  $UIK_{GI}$  must prevail and, given the traditional commitment to universally-realized expectations intertemporal coordination can be construed as only accidental.

For completeness and in light of some of my earlier expositions of GI-structure, I might also remark that the  $NUPK_{GI}$  specification associated with the existence of monopoly in principle can produce the same results as the (general)  $USK_{GI}$  specification does. Here the condition for an

intertemporal  $GI - \Pi^*$  is that action cannot take place before monopolist "learns" and sets  $\hat{S}^*$ .

### 1.3 A General Structure for Examining the Dynamic Relationship Between Knowledge, Institutions and Action

Any consideration of the temporal relationship between individual action, the achievement of  $USK_{PI}$  or  $USK_{GI}$ , and the movement of  $PI$  or  $GI$  institutions to their intertemporal  $S^*$  or  $\hat{S}^*$  positions must reveal some more general structural properties of the dynamic processes underlying Individualism. Thus, at the greatest level of generality, it follows that any "dynamics of Individualism" must involve an examination of the temporal relationships between the following dynamic processes:

- (i) the movement of  $UIK_{PI}$  to  $USK_{PI}$ ,
- (ii) the movement of  $UIK_{GI}$  to  $USK_{GI}$ ,
- (iii) the movement of (any)  $\hat{S}^*$  to  $S^*$ ,
- (iv) the movement of one  $\hat{S}^*$  to another  $\hat{S}^*$ .

Noting that it is implicitly assumed here that one can only observe "coordinated" states--that at least  $\hat{S}^*$  always observably prevails--and that  $UIK_{PI}$  can be represented by  $USK_{GI}$  and  $UIK_{GI}$ , it then can be recognized that, at any specified point in time, it would in principle be possible to observe one of six possible cases in which action is transpiring, defined by the coincidence of:

- (a)  $USK_{PI}$  and  $S^*$
- (b)  $USK_{PI}$  and  $\hat{S}^*$
- (c)  $USK_{GI}$  and  $S^*$
- (d)  $USK_{GI}$  and  $\hat{S}^*$
- (e)  $UIK_{GI}$  and  $S^*$
- (f)  $UIK_{GI}$  and  $\hat{S}^*$

It can immediately be seen that only case (a) can be explained as a

non-accidental PI-equilibrium; (c) and (e) must be "accidental" occurrences—since knowledge is insufficient. On the other hand, case (d) is the "core" case of GI theories which are based upon perfectly-anticipated social distortions and the achievement of  $E_j(\hat{S}^*) = \hat{S}^*$  (e.g., Non-Walrasian Theory). However, case (b) overrides rationality and can be explained only holistically, while (f) can be construed only as an "accidental" GI-equilibrium if it is insisted that "true" GI equilibria must satisfy  $E_j(\hat{S}^*) = \hat{S}^*$ . The immediate conclusion, therefore, is that, given the "traditional" requirements for the successful explanation of observed coordination, only (a) and (d) offer cases which are explainable as non-accidental equilibria and are explainable in accord with Individualism.

Even if these initial explanatory constraints are somewhat severe, let us add another one in any case. This is that case (d) does not constitute a structurally-complete explanation of  $\hat{S}^*$ —that, as stressed in the last chapter, this "stage two" GI formulation is irretrievably underdetermined unless it moves to (weak) Holism. Given this, it therefore follows that it is only case (a)—classical theory—which qualifies to be a non-accidental and individualist explanation of observed coordination. Are the avant-garde classical arguments surprising?

But these are not all the methodological constraints to consider—there is no reference as of yet to the relationship between real time and knowledge. Presume that case (a) happened to be observed at a point in time defined "in the long-run." Then inductively-successful procurement of  $USK_{PI}$  could in fact be non-arbitrarily rationalized and the PI explanation of this state would be non-arbitrary and logically complete. However, presume that case (a) was observed at a point in time prior to this "long run" point; i.e., in the short-run. Then, given the critical issues connected with Inductivism in the short-run, there could be no non-arbitrary explanation

for how agents procured  $USK_{PI}$  in the short-run, and even case (a) could not be explained completely (i.e., without arbitrary assumptions about short-run knowledge procurement).

### 1.3.1 The Dilemma of Short-Run Explanation

Ruling out the successful explanation of all of the above cases in this way allows an appreciation of the ultimate points being put forth in this thesis. Thus, stating the arguments about knowledge and time in a somewhat different fashion, the central proposition proposed here is that the achievement of either  $USK_{PI}$  or  $USK_{GI}$  can be non-arbitrarily explained only at long-run points. Thus, even discounting the other problems which might be connected with cases (a)-(d), a complete and non-arbitrary explanation of the states implied by these cases could only be put forth if they were observed at long-run points in time; there is no successful account of their observed existence in the short-run.

On the other hand, it is contended that the last two cases, (e) and (f), are non-arbitrarily consistent with the knowledge agents possess at short-run points of observation, since they assume  $UIK_{GI}$ . It is therefore only these last two cases which can ever hope to produce a theory of short-run behaviour which is not arbitrary with respect to knowledge procurement. Since "traditional" theory, however, would rule out these two cases on the grounds that they can produce no more than "accidental" explanation of observed short-run coordination (i.e., they are underdetermined, since expectations are not realized), it follows that the only interesting research strategy for explaining the short-run is to turn either (e) or (f) into non-accidental cases. Case (e) is intractable, so that my objective is to work with (f).

The purpose of a "stage three" GI is therefore to remove the underdetermination in (f) as well as, implicitly, the underdetermination in (d).

The chief "dynamic" concern here is to explain non-arbitrarily the short-run transformation of one  $\hat{S}^*$  into another  $\hat{S}^*$ , while leaving the achievement of  $S^*$  as an accidental occurrence.

Given this orientation, I now critically turn to the examination of more traditional issues in dynamic explanation.

#### 1.4 The Traditional PI Strategies to Avoid Explaining PI-Disequilibria

In the light of the foregoing, I think that there can be little doubt that the traditional assumption of the "tatonnement" process--that there can be no trading at false prices--and the traditional restriction of the Arrow-Debreu models--that agents know all PI-equilibrium prices for all times from the very first market day--were designed simply to make the existence of settings other than (a) above impossible to observe. Under these circumstances, the successful achievement of a PI intertemporal equilibrium could hardly be avoided. Reference to individual knowledge of (all) "true" PI-prices in both of these formulations also reveals another unifying viewpoint of this traditional analysis; namely, that a complete set of markets and/or an outside "auctioneer" would always come through to signal agents to  $USK_{PI}$  before any action took place.

None of these traditional assumptions are very palatable, but it is perhaps the nature of the signalling solution implied which is most worrisome. As I have implied earlier, traditional auctioneer signalling approaches were largely an attempt to avoid facing up to the problems of explaining the transformation of  $UIK_{PI}$  into  $USK_{PI}$  -- by essentially replacing  $UIK_{PI}$  with  $NUSK_{GI}$  (under "auctioneer benevolence"), and then showing how  $NUSK_{GI}$  could be transformed into  $USK_{PI}$ . This in turn created the problem that a "holistic" conception of institutions had to be employed to guarantee unanimous endorsement of the auctioneer's signals before  $USK_{PI}$  (and a PI -  $\Pi^*$ ) was achieved, which furthermore rendered the price dynamics to a PI -  $\Pi^*$  "beyond

individuals."

Such critical matters constitute familiar terrain. In the context of the dynamic questions under consideration, however, the chief point to be made is that a traditional signalling solution also implies a somewhat enigmatic restriction on the temporal structure of any PI structure. This is that the determination, and signalling of, the "correct" PI intertemporal prices must be seen to be prior to, or simultaneous with, the achievement of  $USK_{PI}$  by individuals. I refer to this restriction as enigmatic primarily because any intuitive reading of the temporal restrictions on PI would suggest that  $USK_{PI}$  could not be reached after  $S_C^*$ , since the guarantee of the unanimous endorsement of  $S_C^*$  would seem to require that all individuals have sufficient knowledge of N and I.

It is for the above reasons that it becomes important to emphasize that the only logically consistent temporal specification of a PI signalling structure is one where it is assumed that the determination of a PI -  $S_C^*$  is simultaneous with, and cannot be before, the determination of  $USK_{PI}$ . The guarantee of simultaneous determination of these items, of course, still need not be good enough to secure PI-results--after all, the determination of a PI -  $S_C^*$  and  $USK_{PI}$  could be simultaneous, but still require an infinity of time--and I think this explains why the special case of simultaneous adjustment so often chosen by traditional proponents of PI was that of instantaneous adjustment. Such a view, of course, is equivalent to the idea that both knowledge and social institutions move to their required PI-positions via (iterative or search) processes defined "outside" of real time.

#### 1.5 The Case of Instantaneous Adjustment Under PI

The analysis up to this point implies two conditions that any successful PI intertemporal programme must meet:

- (a) both  $USK_{PI}$  and  $S_C^*$  must be achieved before individual action ever

takes place, and

(b) ~~if~~ if the achievement of  $S_c^*$  (and  $S^*$ ) is to explain the achievement of  $USK_{PI}$  (as a signalling solution), then the achievement of  $S_c^*$  (and  $S^*$ ) must be simultaneous in time with the achievement of  $USK_{PI}$ .

It is apparent that there may be a problem with satisfying both (a) and (b) since, in general, (a) can be satisfied without (b), and vice versa. The significance of the special case of instantaneous adjustment therefore lies in the fact that it avoids this problem: both (a) and (b) must be satisfied together.

A further characteristic of this case is that it now makes no essential difference whether the movement from  $UIK_{PI}$  to  $USK_{PI}$  is seen to follow from an assumed movement of PI-prices (and all other elements of  $S$ ) to their PI equilibrium values or, alternatively, from the (albeit arbitrary) assumption that all individuals directly possess true and sufficient a priori knowledge from the beginning of time. This is because instantaneous adjustment of  $UIK_{PI}$  into  $USK_{PI}$  is equivalent to the assumption that all individuals possess sufficient and true a priori knowledge from the outset. Accordingly, to any observer of this type of instantaneous adjustment setting, it becomes impossible for him to differentiate whether the achievement of  $USK_{PI}$  follows from the achievement of a (signalled)  $S^*$  or whether the achievement of  $S^*$  follows as a consequence of individual decisions based upon the (independent) achievement of  $USK_{PI}$ . The only observation which can be made is that, in this setting, no agent ever gets a chance to make a decision without sufficient information and the existence of the appropriate PI social institutions. This in turn guarantees that no individual decision-making errors can ever arise and that PI disequilibria can never transpire.



1.6 The "Dynamic" Properties of a Successful PI Intertemporal Programme: A Classification

In the light of the above analysis, it is now useful to consider the properties of any successful PI intertemporal programme in terms of a few simple structural attributes of dynamic explanations. I will state the coordinating focus from the outset; namely, that any theory of coordination which involves time in a strategic way may be seen to involve two different types of dynamic processes: (i) a "dynamics when action actually takes place" (henceforth, a "dynamics of action"), and (ii) a "dynamics before action takes place" (henceforth, a "predynamics"). The "predynamics" of the PI structure examined above involves the movement over time to  $USK_{PI}$  and  $S^*$ , whereas the corresponding PI "dynamics of action" involves the actual working out of individual decisions over T time periods, given the termination of the predynamic process.

It is apparent, moreover, that there are two different types of "dynamics of action" possible, depending strategically on whether or not the predynamic process is completed before (or simultaneous with) the point in time when action begins. If the predynamic process is completed before (or simultaneous with) the point in time when action is undertaken (meaning, in the context of PI, that  $USK_{PI}$  and  $S^*$ , are, in principle, already achieved), then there can only be a PI equilibrium "dynamics of action." On the other hand, if the predynamic process is not finished at the time action begins (i.e.,  $USK_{PI}$  and  $S^*$  have not yet been reached), then a PI disequilibrium "dynamics of action" must prevail (at least up until the point in time when the predynamic process is complete), and this can be explained only by a non-PI theory.

Given these definitions, it follows directly that any successful PI intertemporal programme must possess an equilibrium "dynamics of action"

may possess a "predynamics," and cannot logically entail a disequilibrium "dynamics of action."

### 1.7 Does PI Structure Possess a "Real" Dynamics?

It is evident that almost all of the relevant characteristics of a successful PI intertemporal programme can be summarized in the fact that such a programme can never permit any errors in transpired action. It is this recognition which has also doubtlessly led some thinkers to critically assert that there can be no "real" dynamics in this framework, that it is "intertemporal and static," since all individual decisions necessary to achieve the intertemporal PI -  $\Pi^*$  can be successfully predetermined on the first market day. While such criticisms may simply testify to the fact that the traditional PI arguments simply covered up the problems of short-run knowledge sufficiency by ad hoc devices, and ruled out classical disequilibrium by fiat, there is indeed a thrust to this criticism if it is argued that successful induction to  $USK_{PI}$  requires an infinity of time.

In such a case, the guarantee of PI intertemporal coordination a fortiori requires that all individual action take place at only one point in time—the point where the future ends. (Note that this involves an "asymptotic" argument if the future is regarded as unbounded.) Here an infinitely-long predynamics is implied and there is no effective "dynamics of action"—action only takes place at the (static) point in time where the future ends. In this sense, a "true" dynamics of action can transpire if and only if it does not (explanatorily) presume an infinite-time predynamics.

### 2. The Move to a GI Intertemporal Programme and The Idea of Explaining Potential PI-Disequilibria as GI-Equilibria

The essential conclusion of the above analysis is that if a pre-dynamics in accord with PI is not completed before (or simultaneous with) the point in time when a "dynamics of action" begins, then (except by

accident) individual decision-making errors will transpire and a PI intertemporal structure cannot be maintained. It is of course logically conceivable that a PI predynamics can be completed before a "dynamics of action" ends (at  $T$ ); the only problem is providing a non-arbitrary explanation for why this might occur. Thus, if a PI predynamics is (for any reason) completed before  $T$ , then the time profile of  $t = 1, 2, \dots, T$  can be seen to be split into two qualitatively-different parts: one where decision making errors are made and social distortions are endorsed, and another where no further errors are made and only socially-optimal institutions are endorsed, relative to past errors. The latter part of this history might be seen as a truncated PI intertemporal equilibrium, but close observation reveals that the best this case can be is a GI intertemporal equilibrium, since the error-free decisions at the end of the programme are based on  $N^j$ 's which are a direct function of the errors (and, thus, sub-optimal social institutions endorsed) at the beginning of the programme. This is the characteristic of all non-tatonnement settings and poses some substantive problems of "path dependency" which I will discuss in a moment.

In the light of earlier arguments concerning Inductivism, it is of course also convincing to argue that any (explainable) PI-predynamics requires an infinity of time to complete. Here the PI predynamics can only be completed at  $T$ , where  $T \rightarrow \infty$ , and decision-making errors prevail up until this final point in time. At this "long-run" position, a (final-period) PI-equilibrium can be rationalized (relative to past errors), where individuals in principle have enough knowledge to endorse only those social institutions which are derivable from the (final-period)  $N$  and  $I$  alone and to reject all "distorting" social arrangements of the past.

### 2.1 The Role of $USK_{GI}$

If neither of the above cases satisfy the conditions for PI

intertemporal equilibrium, then it is evident the best that the defender of Individualism can hope for is that observed instances where  $USK_{PI}$  and  $S^*$  do not prevail, and action takes place, can still be explained as consistent with the overall conditions for GI intertemporal coordination; hence, PI-disequilibria can be explained as GI-equilibria. Given the analytical structure of "traditional" economic theory, the requirements for the success of this strategy are evident; namely: in any circumstance where a PI-predynamics (to  $USK_{PI}$  and  $S^*$ ) is not complete at the time that individual action begins, the guarantee of GI intertemporal coordination still requires that a GI-predynamics to  $USK_{GI}$  and  $\hat{S}^*$  is completed before (or simultaneous with) the point in time when this action takes place.

If these conditions can be met, then intertemporal coordination with correctly-anticipated errors can be guaranteed, irrespective of the fact that at some point after action has begun (e.g., in the long-run), decision-making errors might be removed entirely (when  $USK_{GI}$  approaches  $USK_{PI}$  and  $\hat{S}^*$  approaches  $S^*$ ). This just says that it is possible to guarantee that any and all observed points along the time path from 1, 2, ..., T can be at least GI-equilibria, even if some points (say, toward the end of the path) actually satisfy the conditions for (static) PI coordination. The basic problem case here, of course, is one where it is not possible to guarantee that (at least)  $USK_{GI}$  prevails at all points in time when action takes place since, if  $UIK_{GI}$  actually prevailed at any point in time when individual decisions were made, then traditional analysis must produce the conclusion that GI intertemporal coordination can be only accidental.

Let me postpone consideration of the crucial questions of whether or not there exist logical justifications for the assumptions: (1) that a GI-predynamics must necessarily be complete (with  $USK_{GI}$  achieved) before (or simultaneous with) the point at which a GI "dynamics of action" begins, and,

in particular, (ii) that the achievement of  $USK_{GI}$  in principle can be rationalized in a temporal dimension which is shorter than that which is necessary to underwrite the achievement of  $USK_{PI}$  itself, and examine some properties of a successful GI-structure which rely on the truth of the above assumptions. Here, it is perhaps most compelling expositionally to start from the assumption that agents can achieve both  $USK_{GI}$  and the required GI-equilibrium social institutions instantaneously--via a GI signalling route or through an assumption of a priori true knowledge--even if it is also assumed that the achievement of  $USK_{PI}$  and a Globally Reducible  $S^*$  potentially may require an infinity of time.

Under such a specification--and I stress that it is only an ad hoc one--it is straightforward to adapt the essential attributes of the recent (GI) theories of Non-Walrasian equilibrium to an intertemporal context. Whereas the basic condition for a successful PI intertemporal equilibrium can be captured in the proposition that all agents can know their (intertemporally-specified)  $T_j$ 's to be true before they ever attempt action, the analogous proposition for a successful intertemporal GI -  $\Pi^*$  is that all agents can know that their (intertemporally-specified)  $T_j'$ 's are true before any action begins. As is evident, both of these specifications are compatible with the idea that all agents can realize their relevant  $E_j(S^*)$ 's or  $E_j(\hat{S}^*)$ 's in any and all time-periods; the GI formulation differs from its PI counterpart only insofar as the existence of  $USK_{GI}$ , which guarantees the truth of  $T_j'$ , is not sufficient to guarantee the truth of  $T_j$ --an individual's theory of the Global Reducibility position. The truth of  $T_j'$  therefore is not sufficient to guarantee  $E_j(S^*) = S^*$ .

As I have stressed above, a basic property of the GI structure under examination is that, given  $T_j' \neq T_j$ , agents anticipate and realize non-reducible social constraints (decision-making "errors") in all periods.

(Note in this context that the anticipation of exogenous social constraints may mean the expectation of the failure to ever reform existing distortions to their  $S^*$  positions, and that the case of a point in time where agents correctly anticipate that there will be no social distortions at all can only be realized by accident, given  $USK_{GI}$ .) Thus, this structure is one where, except by accident, social distortions (and, in particular, institutional endorsement errors) will appear in all future periods, yet be correctly anticipated by all agents in advance of any action. It is precisely the guarantee of uniformly correct anticipation of institutional errors for all times which permits this type of intertemporal GI to be explanatory. It is also this guarantee which makes the fusion of GI and  $USK_{GI}$  so enigmatic.

## 2.2 The "Underdetermination" of A GI- $USK_{GI}$ Structure:

### The Philosophical Underpinnings

It is apparent that the problematic feature of any GI- $USK_{GI}$  structure is that while it allows ample room for the correct anticipation of errors, it leaves very little room for agents to rationally respond to the existence of, or anticipation of error, as part of an effort to get closer to a (conjectured) PI-equilibrium position (e.g., by attempting to stop future social distortions from emerging, or by changing their  $T_j'$  and, thus,  $E_j(\hat{S}^*)$  in the light of a potential exploitation of reform possibilities). In fact, the determinacy and stability of this sort of structure rather depends on the absence of at least any unanticipated institutional reforms after action has begun and, certainly, leaves little room for  $T_j'$ -revision which consistently changes the time-profile of expectations in  $E_j(\hat{S}^*)$ . The reason for the latter is perhaps evident: since there can be no non-arbitrary explanation for changes in  $T_j'$  except if  $T_j'$  moves in the direction of the true theory of the "error-free" coordinated state--which cannot be guaranteed, given only

USK<sub>GI</sub> → the admission of arbitrary and, in particular, non-uniform changes in  $T_j'$  once action has begun must render this type of structure underdetermined. Here, some GI -  $\Pi^*$  may be ultimately guaranteed, but which particular GI -  $\Pi^*$  will transpire depends on the particular  $T_j'$ 's and  $E_j(\hat{S}^*)$ 's which arbitrarily come into play. (Recall that, except by accident, all agents must hold the same  $T_j'$  and  $E_j(\hat{S}^*)$  at the point of GI-equilibrium.)

Of course, all this issue really isolates is a crucial failing of most recent Non-Walrasian models: that they neither provide much insight into why any agent holds the (initial)  $T_j'$  that he does (i.e., why he initially expects the particular social distortions that he does to transpire), nor illuminate any non-arbitrary process by which theory (expectation) change can transpire.

These models have all the "static" qualities of classical models of PI intertemporal coordination, except that by admitting only the possibility that a GI (but not a PI) predynamics is complete before action begins, they can explain a PI disequilibrium "dynamics of action" as a GI equilibrium "dynamics of action."

It is not to be denied that such a paradigm appears to constitute an (explanatory) step forward over classical PI-structures based on USK<sub>PI</sub> but, since the process of accounting for some first-order disequilibrium as a second-order equilibrium is really part of an infinite regress, what is to guarantee that stepping back to USK<sub>GI</sub> is good enough? Thus, unless it can be guaranteed that USK<sub>GI</sub> must prevail at all points of observation, the cost of stopping the regress at a type of GI-structure which assumes USK<sub>GI</sub> is that it will be extremely difficult to account in turn for observed GI disequilibrium situations and this must limit the possibility of ever obtaining a complete GI-structure.

Another way of looking at this regress is through the recognition

that any successful GI -  $USK_{GI}$  explanation must commit itself to the (potentially paradoxical) view that all agents can anticipate without error all the institutional endorsement "errors" which transpire at a GI -  $\Pi^*$ . It takes little reading between the lines to recognize that this viewpoint can really only succeed in raising the question of whether there is any rationale for assuming the absence of second-order errors in a structure which relies on the existence of first-order errors (i.e., social distortions). Evidently, the logical character of the regress remains unaltered no matter at what level the (nonremovable) error is defined: the only way of stopping the regress non-arbitrarily is to rule out the possibility of ever observing a world in which "truth" is entirely absent--such as one which emerges from  $UIK_{GI}$ .

3. A More Sophisticated GI Structure: The Possibility of a PI Equilibrium at a Point in Time in a GI Intertemporal Coordination Context: Error Correction and Path Dependency

Let me forego for the moment any further discussion of the general methodological problems raised above, and also postpone consideration of the (ultimately) crucial issue raised throughout this discussion; namely, whether there is any logical rationale for presuming that a GI-predynamics to  $USK_{GI}$  can be completed before (short-run) observed action transpires. Even under these circumstances, it is still reasonable to ask whether it is possible to successfully explain the achievement of an (error-free) PI equilibrium out of an assumed GI equilibrium dynamics, say, at the point in time where the GI intertemporal programme terminates.

This question is especially important to any "traditional" proponent of the PI viewpoint, since his explanation of why any particular (static) PI coordinated state might prevail "in the long run" depends on his being able to show how  $USK_{GI}$  ultimately changes in such a way so that individual knowledge is sufficient to avoid all errors (social distortions) at the long-run



(terminal) PI equilibrium position. Stated alternatively, he must show how the guarantee of the truth of  $T_j$  is supplanted by the guarantee of the truth of a theory of the (final period) Global Reducibility position, conditional on the existence of all past errors. This is furthermore equivalent to the demonstration that the general GI -  $\Pi^*$  condition,  $E_j(\hat{S}^*) = \hat{S}^*$ , must satisfy  $\bar{E}_j(S^*) = S^*$  in the final period alone.

Such a problem situation is familiar from all classical "error correction" scenarios, particularly those connected with adaptive expectations. If the long-run is really assumed, it is of course no problem to push through an inductivist argument to guarantee that some final period PI position must obtain out of the otherwise error-laden GI-path. This is equivalent to the guarantee of successful error-correction; all individuals in principle have sufficient knowledge to endorse and to anticipate only those social institutions which are derivable from the final period N and I alone, and to reject all sub-optimal social arrangements of the past.

Unfortunately, the demonstration of the existence of some long-run "point in time" PI equilibrium in the context of a GI intertemporal programme is the easy part of this exercise. Moreover, it is possible to put forth the theorems that: (i) any point on the GI -  $\Pi^*$  path to a final-period PI equilibrium must be welfare inferior to any point on a prototype PI -  $\Pi^*$  path, where  $USK_{PI}$  always prevails; and (ii) that any final period PI equilibrium which is generated from any GI -  $\Pi^*$  path must be welfare-inferior to the final-period PI equilibrium generated from the prototype PI-path, without using much more equipment than the observations noted above. However, the fundamental problems here arise in explaining which particular GI -  $\Pi^*$  path will be followed since the determination of the final period PI equilibrium must depend on the GI -  $\Pi^*$  path

followed.

### 3.1 The Problem of "Path Dependency" and "Expectational Dependency"

I do not pretend that the recognition of the "path dependency" feature of any explanation of the achievement of a long-run, static PI equilibrium here is particularly novel (see Fisher (1976b) and Korliras (1977) for surveys); it is, by and large, equivalent to the recognition that any non-tatonnement process generates (non-reversible) income effects. This just says that the action undertaken in any one period on the basis of some set of non-reducible social institutions, and the N and I prevailing in that period, will affect the N (and, in particular, the "distribution" of N over individuals) prevailing in the next period. As such, to explain the N which prevails in the last period and, thus to determine the final period PI equilibrium associated with it, it is necessary to pin down the exact time profile of distorting social institutions which determines this final-period N. This requires a formal determination of a "unique" GI-path to PI coordination, since, without such an explanation, the account of the long-run PI coordinated state is underdetermined--a different final period PI-equilibrium emerges from every different GI -  $\Pi^*$  path.

If the success in pinning down a long-run PI position hinges on the successful determination of which GI -  $\Pi^*$  path actually prevails, then it would be comforting to think that the fulfillment of the latter task was an easy one. Unfortunately, it is not.

What is required here is the determination of the decision-making errors that each individual makes at each and every point in time. This is in principle equivalent to the explanation of the precise social distortions (and the precise income effects) which prevail, and are anticipated to prevail, at each and every point in time. Moreover, as I have stressed earlier, a critical characteristic of any such path of "coordination with errors" is

that it is "expectationally dependent," unlike a prototype PI-path. What this means is that any determination of the decision-making errors and social distortions prevailing at any point in time ultimately must be explained by reference to the characteristics of the expectations of individuals,  $E_j(\hat{S}^*)$ , and, in turn, back to their theories,  $T_j'$ . (It is recalled that this proposition follows from the fact that there are in principle an infinity of non- $S^*$  regimes, where  $E_j(\hat{S}^*) = \hat{S}^*$  (for all  $j$ ), so that  $E_j(\hat{S}^*)$  must be pinned down to determine which  $\hat{S}^*$  prevails. A PI-path is not expectationally dependent precisely because there is in principle only one  $S^*$  position, determined from  $N$  and  $I$  alone, so that  $E_j(S^*)$  does not have, and is not required to have, any explanatory power.)

3.1.1 It is the conjunction of the path-dependency of any final-period PI equilibrium with the expectational dependency of any GI -  $\Pi^*$  path itself which creates the theoretical problems. Once again, it might be tempting initially for a theorist to approach the problem of pinning down the GI-path simply by declaring  $E_j(\hat{S}^*)$  exogenous, which is tantamount to viewing some initial  $T_j'$  as exogenous. However, such a strategy would be fatal. Since the guarantee of the truth of this initial  $T_j'$  (given  $USK_{GI}$ ) is not sufficient to explain how agents ever consciously arrive at the final period PI equilibrium (except by accident), any guarantee of the ultimate arrival at this PI position must involve some process by which the initial  $T_j'$  is changed and ultimately refuted in favour of a theory which just produces the  $E_j(S^*)$  required for final-period equilibrium.

More explicitly, denote  $T_j'(*)$  as any agent's (intertemporal) theory of the final period Global-Reducibility position, conditional on all past errors, and maintain  $T_j'$  as his initial theory of the actual (GI) coordinated states which are anticipated to transpire over time. The basic point then is that the truth of  $T_j'$  can be guaranteed, given  $USK_{GI}$ , whereas the verification

of  $T_j^{(*)}$  can be only accidental under this state of knowledge. Thus, in general, it is implied that at any point in time when knowledge beyond  $USK_{GI}$  arrives,  $T_j'$  must be in transition, ultimately to  $T_j^{(*)}$  at the period of final period PI equilibrium. (Note that, if agents act on a theory other than their initial  $T_j'$ , then, in general, they must refute the predictions of this initial theory, even though they would have confirmed its predictions had they held onto it.) This leads to the essential point; namely, that if the initial  $T_j'$  is changed, then in general  $E_j(\hat{S}^*)$  must change with it. It follows directly that, if a theorist really wants to explain the "dynamics" of the movement to the final period PI position, then he cannot treat individual expectations as exogenous variables. At all points in time where knowledge beyond  $USK_{GI}$  arrives on the scene and the initial  $T_j'$  is dispensed with, to the final point in time where knowledge becomes sufficient to guarantee the truth of  $T_j^{(*)}$ , there must be a theory cum expectational dynamics transpiring and, accordingly, the GI-path must be altering.

(The special case of this transformation is one where the initial  $T_j'$  is maintained right up until the final point in time and then is instantaneously changed to  $T_j^{(*)}$ ; here there is no non-trivial dynamics.)

3.1.2 If the above strategy of viewing expectations as exogenous variables succeeds only removing the required dynamic explanation, then, as seen in the last chapter, a move to the alternative viewpoint that expectations are really endogenous variables can hardly avoid basic problems either. If the expectations of all individuals are not locked in, then an appropriate "knowledge dynamics" is possible but there are far too many GI-paths available; the situation is underdetermined. Thus, the request for a further set of (truly) exogenous variables to explain how expectations change en route to the final period PI equilibrium. This is equivalent to an intertemporal theory of "theory change" or an intertemporal theory of

error adjustment.

As Boland and Newman (1979) have argued, it is possible to make some headway on this explanatory objective if "epistemological" or meta-theoretical variables are used to pin down (non-arbitrary) responses to error, and I will argue another case in the final chapter. The point, however, is that, as far as "traditional" analysis goes, there is no possibility of a non-arbitrary account of expectation (theory) change. In particular, since standard analysis would have no criteria to limit the infinity of potential  $T_j'$ 's agents could arrive upon after the initial  $T_j'$  was rejected and before the long-run point where  $T_j^{(*)}$  could be guaranteed to be true, it would be impossible to determine the particular path of errors cum social distortions which define the particular GI-path to the final period PI equilibrium. Thus, traditional analysis with the assumption of endogenous expectations would simply give vent to the conclusion stated earlier: that if, for every different GI-path there is a different "path dependent" PI equilibrium, then there can be no "determinate" explanation for why any particular final period PI equilibrium prevails.

Moreover, it is precisely the failure of both of the above strategies to produce a successful account of the movement to a terminal PI position which explains the characteristic retreat to holistic determination at this stage of the argument. Thus, as is evidenced by recent proposals in both the Theory of Non-Walrasian and Temporary Competitive Equilibrium (see references above), if it is possible to argue that the institutional constraints which prevail at any point in time are generated (and enforced by) some outside process, then it is possible to underwrite the determinacy of institutional errors which transpire en route to the terminal PI position without facing the expectational problems mentioned above. This is simply because the holistically-given path of institutional constraints (combined with those

implied by N and I) leave no room for individual expectations to play an explanatory role. I have of course stressed repeatedly that it is a travesty of Individualism to complete this doctrine by moving to a weak Holism and the "holistic" conception of institutions.

3.1.3 It is useful to summarize the above arguments more systematically. The obvious starting point for this task is the observation that, in the extreme circumstance that a PI-predynamics is complete before action ever begins, both the problem of path dependency and the problem of expectational dependency can be entirely avoided. The existence of both of these problems thus depends upon the condition of an unfinished PI-predynamics at the time of action. In the case at hand, the assumed situation is one where a GI-predynamics is seen as complete, but where a PI-predynamics is not. While this specification constitutes a rather weak case--since it does not guarantee that, even if a GI-predynamics is complete at a point where a PI-predynamics is not, no (observed) action can transpire prior to the completion of GI-predynamics--it is still strong enough to allow all the problems of path cum expectational dependency to be appreciated.

It has been shown that the problem of expectational dependency initially can be attacked either by assuming that individual expectations are exogenously-given, or by assuming that they are endogenous products of a (prior) exogenous process. As I have argued, neither of these expectational assumptions can succeed, at least in the context of "traditional" theoretical apparatus. The former strategy purges essential features of the required dynamics and makes it a matter of accident that individual expectations will adjust to their  $E_j(S^*)$  positions at the terminal PI position. The latter strategy simply produces underdetermination if it is employed in the (traditional) context where there is no non-arbitrary theory of expectation

change, or response to error, formalized.

If the problem of expectational dependency cannot successfully be handled in either of these ways, then the temptation to assume away this problem altogether can be understood. This objective can be accomplished only by assuming that a PI-predynamics is really complete before action begins, or by assuming Holism, where institutions can be regarded as determining variables even if they are not consistent with individual expectations. The former assumption is ad hoc; the latter strategy, where expectational determination is overruled by institutional determination, evidently solves the difficult problem of explaining the expectational dynamics to the terminal PI position only at the cost of giving up a complete individualist explanation of the institutional reform dynamics to this position.

Accordingly, the basic conclusion which comes forth is that the GI-USK<sub>GI</sub> structure offers no way of successfully explaining how any particular type of PI coordination can ever prevail at even one point in time, given the existence of decision making "error" at any point in time. Of course, some form of PI coordination must "exist" in the long run, but this is a trivial point; the issue here involves the possibility of a successful explanation of which PI -  $\Pi^*$  will prevail, and the particular dynamic route to this position. If such an explanation cannot be provided, then all we are left with is the static, long-run equilibrium proposition of the form: if a particular long-run PI -  $\Pi^*$  is ever observed, then individual knowledge, expectations, and elements of S all must have adjusted to make it so--or its existence is accidental.

### 3.2 Knowledge Sufficiency under Path Dependency

In the above analysis, I have self-consciously left it obscure exactly what knowledge agents must have in order to guarantee the realization of a terminal PI -  $\Pi^*$ . Of course, it follows by definition that all agents

must uniformly possess sufficient knowledge to guarantee the truth of a "theory of the final period Global Reducibility position, conditional on a complete history of prior errors" (i.e.,  $T_j'(*)$ ), and must uniformly act on this theory. However, the question is whether  $USK_{PI}$  is sufficient to do this job. The analytical subtlety which should be recognized here is that  $USK_{PI}$  is not sufficient knowledge to guarantee the verification of  $T_j'(*)$ ; hence, the following proposition about knowledge sufficiency under path dependency:

If the determination of any terminal PI -  $\Pi^*$  is path dependent (i.e., depends on the complete past history of errors/social distortions), then neither the achievement of  $USK_{GI}$  or  $USK_{PI}$  constitute sufficient individual knowledge for the non-accidental determination of this position.

The idea that  $USK_{GI}$  is not sufficient knowledge to underwrite the terminal PI position is the truistic part of this proposition. Obviously, any GI-equilibrium signal (e.g., GI-prices or GI quantity rationing constraints), or the equivalent in independent individual knowledge, does not convey separable and direct information about N, I, and S (even if it constitutes an aggregative informational summary derived from N, I, and S together). Accordingly,  $USK_{GI}$  can never be sufficient to isolate out the precise information about the final-period N and I (or a signal based on N and I alone) necessary for the achievement of a non-accidental terminal PI -  $\Pi^*$ .

The idea that  $USK_{PI}$  is also not sufficient in this context is the important part of the proposition. The basis for this claim may be easily understood if it is recognized that  $USK_{PI}$  would always be sufficient for a PI -  $\Pi^*$  if errors cum social distortions never emerged (i.e., in a successful PI intertemporal programme, where a PI-predynamics is complete before action begins). If no decision-making errors were ever made, then the Globally-Reducible time-path of S could, by definition, never affect the value of the final period N. On the other hand, if even one error is made



at any point in history, then (except by accident) this will constitute an exogenous variable which enters into the determination of the final-period  $N$ --and this is all that path dependency really amounts to. Given these ideas, it becomes directly apparent that, for agents to successfully reach the terminal  $PI - \Pi^*$ , even perfect knowledge of the values of  $N$  and  $I$  for all times, as unconstrained by transpired errors will not be sufficient knowledge to reach a path dependent  $PI - \Pi^*$ . Rather, agents must know the complete history of the unconstrained values of  $N$  and  $I$ , plus the complete history of social distortions cum errors, plus the precise way in which the time path of errors affects the final period  $N$ .

Thus, to guarantee the truth of  $T_j^*$  (\*), agents need information about  $N$ ,  $I$  and  $S$ , but where the information about  $N$  and  $I$  is related to, but separable from, that about  $S$ . This requires a condition of knowledge sufficiency which must go beyond  $USK_{PI}$  (i.e.,  $UPK_{GI}$  would satisfy it).

4. The Crux of the Argument: Can the Transformation of  $UIK_{GI}$  into  $USK_{GI}$  Be Rationalized Short of the Long-Run?

Thus far in the argument, I have carefully avoided the crucial question of whether there exists any non-arbitrary explanation of the transformation of  $UIK_{GI}$  into  $USK_{GI}$  short of the long-run only to highlight the methodological problems which exist in a  $GI-USK_{GI}$  structure even if it is assumed that a  $GI$ -predynamics is complete before any action takes place. As is evident, the central critical proposition in this context is that the existence of decision-making errors at even one point in time--which must imply a departure from a dynamic  $PI - \Pi^*$  path--will make it logically difficult to explain how agents can ever move from a non- $PI$  path (e.g., a  $GI - \Pi^*$  path) back to any particular static state of  $PI$ -coordination, even in the long-run. This is no more than a general statement of a proposition of Leijonhufvud (1973): that if an economy ever gets off the  $PI - \Pi^*$

intertemporal "corridor," then there may be no adjustment mechanism available to get it back to any form of PI-coordination. Accordingly, the only really convincing explanation for the achievement of PI coordination again becomes the one which uses classical assumptions; namely, that a PI-predynamics is complete before action takes place and, thus, decision-making errors and social distortions can never transpire.

In any event, the major concern at this point is not with the existence of PI-equilibria but with whether or not a time path of PI disequilibria can always be explained as a GI-equilibria path, given  $USK_{GI}$ . As I have implied throughout the discussion, the success of this type of explanatory objective must hinge on two critical assumptions: (i) that a GI-predynamics in fact can be complete (with  $USK_{GI}$  achieved) not later than the point in time at which a "dynamics of action" observably begins, and (ii) that the achievement of  $USK_{GI}$  in principle requires an amount of time which is shorter than that which is necessary to rationalize the achievement of  $USK_{PI}$  or  $UPK_{PI}$ . I now argue formally that there exists no convincing reason to accept these assumptions. In particular, I claim that there exists no non-arbitrary (non-accidental) explanation for why the transformation of  $UIK_{GI}$  into  $USK_{GI}$  should require any less than the infinity of time required to transform  $UIK_{PI}$  into  $UPK_{PI}$  (or, for that matter, to transform  $USK_{GI}$  into  $UPK_{GI}$ , as in the above exercise). If this argument is correct, then the successful completion of a GI-predynamics must take just as long as the successful completion of a PI-predynamics. Accordingly, it would never be possible to observe a situation where  $USK_{GI}$  obtains, and  $USK_{PI}$  (and  $UPK_{PI}$ ) do not, and, thus, it would not be possible to explain the existence of PI-disequilibria at a point in time (based on the denial of  $USK_{PI}$ ) as GI-equilibria (based on the fulfillment of  $USK_{GI}$ ). Here observed points which are PI disequilibria must also be GI disequilibria.

#### 4.1 The Problem of Inductivism Generalized

The basis for the above methodological argument is a straightforward appreciation of the requirements for successful inductive inference discussed in Chapter Nine. In particular, if the existence of sufficient a priori true knowledge in the hands of agents is denied, then the guarantee of the factual verification of  $T_j$  (for a PI -  $\Pi^*$ ), or  $T_j'$  (for a GI -  $\Pi^*$ ), or  $T_j'^{(*)}$  (for a path-dependent PI -  $\Pi^*$ ) all uniformly require that agents have access to a complete and accurate factual history. Such a history is only available at  $T$ , where  $T \rightarrow \infty$ . The essential point, therefore, is that all of the explanations of coordination considered require the guarantee of the truth of some universal theory; accordingly, all of them face the same basic philosophical problems of inductive inference.

The reason for this state of affairs is obvious: the guarantee of coordination in any of these forms requires that all agents base their action on the same true theory, which guarantees the coordination and realization of expectations. Thus, the difference between a PI -  $\Pi^*$  and a GI -  $\Pi^*$  is only a difference between the theories of the coordinated state that agents hold; there is no structural difference in the basic conditions of the non-accidental verification of these theories from factual history; they all require an infinity of time to successfully verify.

In the context of a GI intertemporal dynamics, in particular, all the above argument states is that a GI-predynamics can be complete only at the point where historical time ends. Accordingly, successful GI action is constrained to take place only at this long-run terminal point. This observation leads to two further implications: (i) there now can be no explanation of the dynamic movement to this terminal GI -  $\Pi^*$  position which is in accord with GI -  $\Pi^*$  structure, and (ii) since the length of time allowed to complete the GI-predynamics should also be sufficient in principle to complete a

PI-predynamics, a PI -  $\Pi^*$ , not a GI -  $\Pi^*$ , should be observed at this terminal position.

If these implications of Inductivism are pushed to their logical conclusion, then the ultimate methodological problems of Individualism surface directly. In the setting at hand, there is only room for (static) PI explanations of coordination "in the long-run" (i.e., long-run GI is trivial), and there is no dynamic explanation possible. More precisely, since, under the assumed conditions, neither a PI or a GI predynamics can be completed before the terminal point in history, there can be no explanation in accord with Individualism which can illuminate coordinated behaviour (as opposed to chaos) before this terminal position is reached. This is equivalent to the claim that there is no possible individualist explanation of the movement to this terminal position, if any action ever takes place before the end of time; the only feasible explanations of coordinated behaviour available are Holism or Naturalism.

The central problem of all Individualism is to handle exactly what cannot be handled in this setting: to show that there exists a form of GI dynamic explanation which can be non-arbitrarily successful in short-run observed settings where only  $UIK_{GI}$  prevails. This is "the" problem addressed by a "stage three" GI.

##### 5. A Note on $UIK_{GI}$ and the Keynesian Tradition

Given the matters discussed above, it is appropriate, in conclusion, to record that, if the "essence" of Keynes' own writings--as opposed to the "Keynesian Tradition"--can be seen to be imbedded in the view that agents cannot overcome the "problem of knowledge of the future"--either because they have insufficient a priori true knowledge, or because the short-run is insufficient time for them to inductively learn what the future will bring, or, as the most popular story goes, because markets fail to communicate

sufficient ("correct") information for agents to exploit and exhaust all available gains from trade—then it is not surprising that a Keynesian intertemporal structure must be of a GI-form and, thus, inconsistent with PI (see especially Keynes (1937)). Moreover, the basic implications of this GI-UIK<sub>GI</sub> viewpoint, as consistently developed, can only be that, in general: (i) individual expectations of the future will not be realized; and (ii) all future plans will contain errors. It is also consistent with this framework that government policy in principle can affect real variables (e.g., output), although the determination of this effect need not transcend accidental status under the conditions posited.

Now, if such a GI-UIK<sub>GI</sub> fusion does in fact capture the fundamental flavour of the Keynesian viewpoint, then this is a major insight on Keynes' part. However, to even speak of the existence of non-accidental Keynesian equilibria qua equilibria is somewhat misleading, unless it could be shown that a GI -  $\Pi^*$  can be produced from the conditions of UIK<sub>GI</sub> alone and did not require the fulfillment of USK<sub>GI</sub>. It would also be somewhat of a travesty of this viewpoint to see any framework which posits "rational expectations" with short-run institutional distortions as being "Keynesian" in character, as some recent research is prone to do (e.g., see Blanchard (1979)). Since "rational expectations" must guarantee the fulfillment of expectations of the future, it simply cannot fit consistently with any "Keynesian" view which assumes UIK<sub>GI</sub> and, therefore, claims that there can be no guarantee whatsoever for the realization of individual expectations of the future.

While there can be little doubt that it is Keynes' focus on decision-making under UIK<sub>GI</sub> which attracts thinkers like Shackle (1972) and Lachmann (1976), I conjecture, as a matter of historiography, that Keynes himself found it difficult to live with the GI-UIK<sub>GI</sub> fusion. After all, since Keynes did not directly face the problem of guaranteeing that GI-equilibria could

exist under such limited knowledge, he would have been theoretically left only with accidental individualist coordination under  $UIK_{GI}$ , and that is not very much to work with, especially since he was apparently not prepared to give up Individualism. This viewpoint also would have made it only a matter of accident that the hand of government policy, in particular, could ever come through to ensure aggregate coordination in states of PI-disequilibrium.

Accordingly, I suggest that it was Keynes' failure to show that a  $GI - \Pi^*$  could be consistent with  $UIK_{GI}$  which led him to espouse a variety of ad hoc explanations of the existence of GI-coordination--a coordination which he could have never explained if he had kept to  $UIK_{GI}$  alone. Thus, it is not surprising that knowledge specifications such as  $NUSK_{GI}$  (with benevolence)--where government had the sufficient knowledge to ensure policy success--could be traditionally affiliated with "the" Keynesian viewpoint (note how ironic it is that  $NUSK_{GI}$  (with benevolence) is also the specification required for the classical PI auctioneer, and that  $NUSK_{GI}$  (without benevolence) is the specification for monopoly) and, later, that  $USK_{GI}$  could be seen to provide the formal basis for explanations of Keynesian equilibria with unemployment--in the hands of Non-Walrasian theorists.

It is clear that the  $GI-UIK_{GI}$  viewpoint is not the same as the  $GI-NUSK_{GI}$  or  $GI-USK_{GI}$  positions. As is evident from the modern Non-Walrasian literature, the Keynesian viewpoint is no longer remotely identified with the view that individual expectations of the future can be realized only by accident. In fact, a Non-Walrasian equilibrium requires the guarantee that all future expectations are realized; thus, the substantive "Keynesian" claim now becomes that individual expectations may be realized on an  $\hat{S}^*$ , not a Globally-Reducible  $S^*$ . This is, of course, how price and wage vectors which are not consistent with a  $PI - \Pi^*$  can be compatible with a  $GI$

coordinated state--and all of this follows from the basic informational constraint that  $USK_{PI}$  cannot be inferred from  $USK_{GI}$ . In any event, the demonstration that Keynesian equilibria can prevail non-accidentally under  $USK_{GI}$  in the long-run is a long way from an appropriate demonstration of short-run equilibria under  $UIK_{GI}$ , but it is at least comforting to think that it was Keynes' own ambivalence over how to deal with the problem of conjoining GI and  $UIK_{GI}$ --and not the inabilities of the profession--which has produced the vast proliferation of views on "what Keynes really meant."

## CHAPTER TWELVE

CONCLUSION: THE ROAD TO A SUCCESSFUL  
GENERALIZED INDIVIDUALISM

This thesis has attempted to show that neither avant-garde classical theorizing nor avant-garde non-classical theorizing can provide logically complete and non-arbitrary accounts of observed short-run behaviour. In this respect, it has been argued that the avant-garde classical programme does not possess sufficient explanatory power to successfully account for all observed instances of short-run behaviour as only "apparent" departures from classical equilibrium, while existing non-classical programmes do not possess sufficient explanatory power to successfully account for such distortions as "real." While it is accepted that classical explanations are beyond criticism for long-run observed states--and that non-classical alternatives are of trivial concern in such a temporal dimension--the only conclusion which can be reached concerning present debates over the short run is that they are debates over (relative) arbitrariness in theorizing. All extant theories of the short-run are either arbitrary with respect to short-run knowledge procurement, or "behaviourally arbitrary," relative to the standards of Individualism, or both.

In saying the above, I do not pretend that the idea that "we do not have a decent theory of the short-run" is particularly novel. Clearly, this idea is as well known as criticisms of the research strategies of both non-classical and classical camps are pervasive; there is indeed a certain fashionability about arguing for the failure of economic theory. The purpose of this thesis, however, is not to belabour obvious critical points; its sole purpose is to isolate the logic of the arguments which produce such critical conclusions, and to present this logic in an integrated and methodo-



logically self-conscious fashion. Its principal inspiration is that it is only if we can understand why we do not have a decent theory of the short-run that we are ever going to be in a position to do anything about it.

Some might question whether performing such an exercise is really necessary. Is the logic of economic theory construction not well understood? Is it not the empirical side of the discipline which needs the most work? I would not deny that the logic of economic theory construction, as such, is very well understood; what I do deny, however, is that the logic of theory construction is understood in a methodologically self-conscious way. Thus, the fact that the problems of explaining unemployment, externalities monopoly, contracts, and non-neutral money are not seen as problems of an identical logical form, the fact that "prices" can be viewed as somehow distinct from other instruments of institutional coordination, the fact that Coase's Theorem never receives mention when institutional signalling approaches are developed, or the fact that the assumption that "agents are rational" can be invoked even when the existence of sufficient knowledge for rationality is not ensured--all seem to indicate that there are more basic gaps in current thinking about theoretical foundations (and especially in the area of informational assumptions and institutional assumptions) than might otherwise be thought.

The existence of such theoretical gaps--and the observable theoretical fragmentation which goes with it--comes down to one thing, I believe. This is that most of the crucial theoretical problems of contemporary times (to cite the obvious, explaining inflation/unemployment) cannot be handled successfully with "stage one" research strategies. It is therefore the long-standing commitment of theorists to the "stage one" dichotomy between classical Individualism and Holism, and their seeming attempt to force current observed phenomena into this mould, which explains why so many

avant-garde attempts to penetrate the "facts" of the present day appear to be so remarkably ad hoc and unsatisfactory. In this respect, the short-run price, unemployment, and monetary phenomena of the present day are "anomolous" only because the explanatory options offered by a classical Individualism and a Holism are too circumscribed to handle it.

What makes the current methodological situation even more precarious however, is that the two halves of this stage one dichotomy are still viewed as real competitors in the short-run arena--that, if just this or that degree of extra sophistication could be injected into one or the other of the views, then it could truly emerge as victorious. I claim, by logic alone, that this will not occur--but this is not the important point. The overriding thrust of the arguments presented above is that there is no essential methodological difference between classical Individualism and Holism; they both must satisfy the ultimate constraints of "stage one" explanation. Thus, the attempt to explain all observed short-run distortions of classical equilibrium interaction as only "apparent" distortions is methodologically identical to the strategy of explaining all such distortions (as "real") via Holism. The attempt to "close" a short-run classical structure by invoking rational expectations, or efficient market signalling, is methodologically identical to the non-classical strategy to procure structural closure through assumptions about the short-run exogeneity of social institutions (e.g., fixed disequilibrium prices). Yet, once again, even a superficial glance at the literature would lead one to believe that the differences between closing a short-run system through "efficient markets" on one hand, or through "fixed prices" on the other were immense, and of importance from a broad doctrinal perspective.

To emphasize, from a methodological perspective, there is no difference between the two halves of the "stage one" dichotomy; current

debates between the respective proponents of these two sides are just (artificial) debates over who is really more arbitrary in procuring short-run closure.

The moral of the story is therefore that one can be non-arbitrary about short-run closure if and only if stage one analysis is transcended. I have not seen a terse statement of this viewpoint in the literature, and things do not look promising. The reasons are two-fold: first, the attempt at a "stage two" GI-USK<sub>GI</sub> programme in the hands of Non-Walrasian theorists has proven to be no more than a very sophisticated retreat to (weak) Holism, and thus has succeeded only in perpetuating the arbitrariness of stage one options for the short-run, rather than removing it; second, there would appear to be an up-and-coming view to the effect that the only way to break the dichotomy inherent in stage one analysis is to simply fuse ad hoc closure conditions of a classical type with ad hoc closure conditions of a non-classical type (Blanchard (1979); Taylor (1980); Weiss (1981)). I need only remark that this latter view is incongruous; there exists no ad hoc fusion of stage one strategies which can ever remove the deficiencies of "stage one" theorizing as such.

#### 1. What Goes Wrong With a Stage Two GI Structure?

In previous chapters, I have spent considerable time analyzing the GI-USK<sub>GI</sub> structure--built on N, I, and exogenous knowledge--for three reasons: (i) to differentiate it in principle from the types of weak Holism with which it is often confused; (ii) to show it to be the explanatory analogue to the PI-USK<sub>PI</sub> structure "in classical disequilibrium"; and most important (iii) to allow its clear-cut "failure" to produce successful GI explanations (i.e., its retreat to arbitrary holistic devices to ensure structural closure) to cast light upon what a successful "stage three" GI structure must look like. It goes without saying that a

successful GI explanatory programme must avoid a commitment to the assumptions of PI at the same time as it categorically avoid Holism.

As I have emphasized in the chapters immediately preceding, the overriding methodological problem of the GI-USK<sub>GI</sub> fusion (e.g., Non-Walrasian theory) is that, by duplicating so many of the structural properties of PI theory, it ends up by being a long-run model; hence, a long-run model which is appropriate neither to the short-run nor to the long-run. Such an outcome only testifies to a serious misreading of the objectives of any short-run GI structure; namely, to remove those structural characteristics of PI theory which make the latter so unsuccessful is a short-run explanation. The critical condition here is that of the realization of  $E_j(S^*) = S^*$ , for all  $j$ , since the guarantee of this unanimity condition can only be covered non-arbitrarily by a long-run inductivist argument, which guarantees the existence of theoretical "truth." Since the GI-USK<sub>GI</sub> fusion aims to keep this very attribute of PI theory--except in the "distorted" form of  $E_j(S^*) = S^*$ --it gets off on the wrong foot right away. It inherits all the "stationarity" properties of classical structure--and, hence, foregoes the provision of a "real" dynamics--in a setting which is entirely inappropriate.

What I mean by this last claim is that it is quite acceptable to argue for a (stable) stationary state if all individuals are in fact knowingly maximizing, since in principle no one will rationally attempt to upset or reform the known (PI) maximum. It is singularly unsatisfactory to attempt to keep the same characteristics when agents are presumed to be not knowingly maximizing, since what is to rule out the possibility of rational attempts by individuals to undermine the stability of any GI-equilibria in their quest to maximize?

This observation explains why the recent efforts to ensure the "stability" of Non-Walrasian equilibria have found it so difficult to avoid

Holism: the existence of rational reform efforts by individuals in non-maximizing states where  $USK_{PI}$  does not prevail is incompatible with the stability (and even the unanimity) implied by Non-Walrasian equilibria. Hence, the only option open for these structures is to secure stability and unanimity through the denial of rationality, and rational reform, altogether. It is apparent that, as soon as an  $s$  (or stronger still, Competitiveness) is invoked in these structures, the role for exogenous knowledge is finished; only  $N$ ,  $I$  and  $s$  are doing the explaining, and the return to "stage one" analysis is complete.

The above exposition just reinforces the basic point that the recent Non-Walrasian structures, built on  $USK_{GI}$ , stand as contrary to the entire inspiration for GI-explanation. The objectives of any bona fide GI structure can be only:

- (i) to deny "stationarity," and thus make a commitment to the provision of a "real" dynamics;
- (ii) to provide an explanatory structure which is appropriate to the short-run--where only  $UIK_{GI}$  can be non-arbitrarily justified to hold and where, except by accident, individual expectations are not realized; and
- (iii) to give a prime role to "the process of rational institutional reform"--as constrained by exogenously-limited knowledge--as the chief ingredient of any short-run real-time dynamics.

It is (iii) which is extremely important, since the proponent of this sort of GI recognizes that it is fruitless to attempt to establish the "stability" of "point in time" non-maximizing positions except by reference to a demonstrated (prior) "stability" in the reform process itself. This is part-and-parcel of the GI-theorist's refusal to identify rationality and stability with the "end points" of dynamic processes. He sees the dilemma clearly: if he concentrates on end-points independently of the dynamic process which generated them, then he will be forced to argue that the only stable points are ones of rational maximization, and he will never be able

to construe non-maximizing positions as both stable and explainable by individual rationality. This is exactly the problem of Non-Walrasian theory.

It is precisely the above state of affairs which explains why the GI theorist always contends that any account of the observed "stability" of short-run non-maximizing positions must be grounded in a notion of Non-Classical Global Rationality, which involves the rationality of changing short-run non-maximizing points, given the constraints (e.g.,  $UIK_{GI}$ ) of doing so. Thus, he contends that agents can be "rational," relative to the (dynamic) constraints on institutional change--i.e.  $\hat{S}^*$  and  $\hat{S}$  may be explained as a "rational" consequence of  $N$ ,  $I$ , exogenously-limiting knowledge, and "the logic of constrained reform"--even if a "rational  $S^*$  end-point is never knowingly reached.

## 2. The Ingredients of a Successful GI- $UIK_{GI}$ Structure

### 2.1 The Rationality of Institutional Endorsement and the Rationality of Institutional Reform

The crucial inroad into understanding the GI theorist's preoccupation with placing considerations of institutional reform into theories of the short run is to consider an obvious methodological dilemma confronted by "traditional" theorizing: namely, how to model situations in which institutional endorsement is observed to transpire at the same point in time that institutional reform is taking place. Apparently, the problem here is no more than one of logic: if all individuals are seen to be rationally endorsing (reforming) all institutions at a point in time, then how is it possible for them simultaneously to be reforming (endorsing) these institutions? The fact that this statement is a generalization of a claim by Arrow (1959) is obvious. The more important point, however, lies in the recognition that "traditional" theorizing has always attempted to cement home the rational endorsement side of the problem, rather than its reform

counterpart. This is, of course, why the traditional propensity to define states of general equilibrium only as states in which universal and unanimous endorsement of institutions transpires creates such a theoretical impediment to placing reform into models of behaviour; who can be reforming and endorsing institutions at the same time if "reforming" means "not endorsing"?

This traditional viewpoint was of course quite compatible with the explanation of states of competitive (PI) equilibrium--since, here, the process by which all gains from institutional reform were exploited could be seen to be already completed. Moreover, if it was also claimed that (rational) reforms to a PI maximum must proceed at an infinite speed, then it would be impossible a fortiori to ever observe situations where reform was ongoing; all one could observe is the unanimous institutional endorsement which defined the end point of the reform path. Even granting in this context that institutional reform was in fact constrained by  $N$  and, thus, entailed non-infinite adjustment speeds, could hardly remove the basic problem. Since such a theory of "rational" reform was constrained to presume the achievement of  $USK_{PI}$ , it could still only illuminate reform--and, indeed only unanimous reform--at the end point in time (the "long run"). It was therefore singularly incapable of both illuminating the short run disequilibrium movement to the long-run equilibrium reform path, and explaining how any short-run reform behaviour in principle could be consistent with "rationality."

The fact that such a PI approach could only explain situations where reform was trivial, non-observable, or defined in the long-run, clarifies the essence of the GI theorist's proposal. He contends that, in any short-run setting where  $USK_{PI}$  does not hold, a genuine classical disequilibrium reform dynamics must be transpiring (where beneficial reforms are possible), that this reform dynamics evolves at a non-infinite speed,

and that it is explainable in accord with rationality. At the same time, however, he refuses to give up the (static) endorsement part of the problem. He contends that the "stability" and "determinacy" of short-run, "point in time" non-maximizing positions still requires that they be explained as a consequence of the rational endorsement decisions of individuals.

The reason that the GI theorist accepts the (seemingly paradoxical) conjunction of simultaneous short-run rational reform and rational endorsement is that he sees that it is only if he walks this "tightrope" that the basic problems of traditional theorizing can be overcome. Thus, if he commits himself to the view that everyone is an "endorser" of institutions, then he cannot explain the reform which produces the short-run dynamics; if he commits himself to the view that everyone is a "reformer," he loses the apparatus by which to pin down non-arbitrarily the stability of "point in time" non-maximizing positions.

In this context, the GI theorist emphasizes that the central problem of traditional individualist theorizing was that it dichotomized the reform and endorsement processes in real time--by allowing universal, rational endorsement of institutions only in the long-run, and nothing but reform in the short-run. Of course, it was the traditional failure to be non-arbitrary and individualistic about the reform part of the problem which created the intractable dilemma: that, if the move to Holism was invoked so as to procure a "determinate" short-run disequilibrium dynamics (see Samuelson (1947)), then rational reform by individuals would be rendered logically incompatible with the assumed "holistic conception of institutions." Here the only choice would be between giving up "determinacy" or giving up "individualist" reform, and it is no surprise that this situation produced the view that Holism must be used in the short-run, even if PI can be employed to explain the rational unanimity of the long-run. The upshot of the GI-theorist's



argument is therefore that this long-standing dichotomy can be broken by positing that reform and endorsement go on together in real time.

The above analysis also clarifies exactly why the GI theorist accepts  $UIK_{GI}$  as the only non-arbitrary knowledge specification for the short-run, and is not tempted to move to  $USK_{GI}$ --as Non-Walrasian theorists have been. The GI theorist claims that the desire to move to  $USK_{GI}$  to "close" a GI structure is simply a manifestation of the traditional desire to procure a universal endorsement condition, which shuts off reform altogether, and one which can only perpetuate the (false) view that the stability of equilibria is inconsistent with the existence of even one reformer. Thus, he notes that one can grant that the stability (and non-arbitrariness) of short-run individualist equilibria would be sacrificed if everyone was a reformer, without arguing that such stability is possible if and only if everyone is an endorser. The fact that a Non-Walrasian structure built on  $USK_{GI}$  also commits itself to a long-run concept of knowledge procurement only makes the situation traumatic. There is no reform in this model, and even the universal endorsement condition does not make sense without Holism --since the long-run is sufficient to guarantee the endorsement of PI institutions.

## 2.2 The GI "Intermediation"

As the GI theorist sees it, the problem of making institutional endorsement and reform simultaneous at a point in time is not problematic if one dispenses with the methodologically-constraining features of a traditional long-run/short-run dichotomy. The central GI idea is that the short-run environment of  $UIK_{GI}$  is not one where everyone uniformly endorses, or uniformly reforms (let alone unanimously endorses/reforms) all institutions. In general, any one individual will be attempting to reform (endorse) some, but not all, institutions, and endorsing (reforming) the remainder.

This view does not preclude the possibility that some one individual may wish to reform all institutions, while another may wish to endorse them all; what is precluded are the extreme cases in which, on one hand, all institutions are subject to reform by everyone and, on the other, all institutions are endorsed by everyone.

The specification of such an environment is clearly consistent with the presumption that  $UIK_{GI}$  prevails. In such a setting, it can be only accidental that the  $T'_j$ 's of agents coincide and, thus, that they will all wish to endorse the same institutional conditions of coordination. By the same token, there is nothing ruling out a conflict between anyone's specified  $T_j$  and  $T'_j$ , so that individuals can conjecture that beneficial reforms are possible and worth undertaking. The question now is: How can such a setting be seen to lead to "rational" action?

### 2.3 The "Reform Technology"

The essential integrating idea proposed by the GI theorist is that the process by which institutions are changed in time is not independent of the process by which institutions are endorsed in time. The basis for this view is the idea that the process of reforming a defined short-run point cannot be explained except in terms of the "resources" available to individuals to change the given point at the time when reform is planned--and where the principal "inputs" of institutional change are not only the going natural "givens," but also the prevailing institutions themselves. The implication of such a view is therefore that one principal explanation for why some institutions are observably endorsed in a short-run setting is because they are being used as (fixed) "inputs" in a dynamic process of reforming other institutional entities. This explanation is in addition to the view which states that such institutions are endorsed because they are thought to be (statically) "optimal."

The importance of the above idea to discussions of rationality is not to be underestimated. This idea is directed precisely at the one situation where traditional theory offers nothing. This is the situation in which some institution (e.g., a long-term contract) is endorsed by an individual, yet the institution is apparently sub-optimal from the standpoint of static optimization. The Classicist will charge that rationality--relative to the end points of a dynamic process--does not prevail here, the Holist will claim that rationality does not prevail anyway because autonomous institutions dominate individuals, while the "stage two" GI theorist will explain this situation by reference to exogenous knowledge limitations. The last of these viewpoints will not succeed in explaining why the particular sub-optimal institution was endorsed (out of the infinity available), and is under-determined. This is exactly why a "stage three" GI is necessary. Thus, the "stage three" GI theorist will also refer to knowledge limitations--since they will be central to his explanation for why reform is non-trivial--but he will further explain the endorsement of the sub-optimal institution as a rational choice, given the (dynamic) objective of reforming other institutions in an environment where  $UIK_{GI}$  prevails.

Here therefore is the explanatory programme to reconcile the existence of rationality with the endorsement of (statically) sub-optimal institutions; the secret of it is to define rationality not in terms of end points, but in terms of the (forward-looking) dynamic process by which any short-run state can be transformed by individuals, towards end points.

The idea that an individual uses some institutions as inputs into a process of changing others is a relatively straightforward idea, if considered on its own. Thus, it is even implied by standard theory that a monopolist attempts to set monopoly equilibrium prices, given a fixed institution which protects his monopoly power (e.g., a barrier to entry),

and presumably other elements of FS which ensure his ability to legally appropriate the proceeds of exchange at those prices. Similarly, it would not be totally unfamiliar to see the institution of (existing) government as an input into a process of changing, say, petroleum exploration rights, just as easily as one might see a "given" price of petroleum as the basis for effecting government policy adjustments (see Stigler (1971)).

These examples may be multiplied indefinitely, but the only important point about these illustrations concerns the word, "given." Thus, while it is straightforward to employ this type of idea about "partial" reform in the context of (weak) Holism, such a usage altogether misses the point of GI structure. This is that such "givens" are rationally chosen as part of the individual's dynamic reform problem and thus, can possess no autonomy in the explanation of the aggregate short-run action which transpires. In this light, the essential point is that the GI theorist demands that all institutional variables be endogenous variables in the explanation, even if he will permit the reconstruction of the individual decision problems which lead to aggregate outcomes to leave room for individuals to choose to treat some institutions "parametrically" when writing up their reform problems.

#### 2.4 The "Logic" of Constrained Reform Under $UIK_{GI}$

It is apparent that the above "input-output" view of "producing" institutional change is only of interest in a situation in which  $USK_{PI}$  does not prevail and thus where "non-reducible" elements of S appear. If  $USK_{PI}$  did prevail, then reform would be trivial and all elements of S could be explained as an  $S^*$ , derivable from N and I alone; there would be no need to refer to a reform technology at all in the explanation of observed coordination. The significance of the reform technology posited

here is therefore that its explanatory power derives from the absence of USK<sub>PI</sub>.

Consider the short-run UIK<sub>GI</sub> setting relevant to the context under discussion. Beneficial institutional reforms are really possible, but no one can guarantee the successful realization (coordination) of reform efforts; successful reform and the realization of reform expectations can be only accidental. To a traditional theorist, this setting would appear to be intractable, and he would be tempted immediately to remove the implied "indeterminacy" of this scenario by invoking a concept of USK, or by invoking Holism. The point, however, is that such a strategy a fortiori would remove the relevance of, or individualist character of, explanations of reform altogether—so that a return to "stage one" strategies here must be an admission of methodological defeat.

My plan for dealing with this setting is to make the apparent unsatisfactoriness of this explanatory setting into a virtue. Thus, my leading question is: How would agents rationally respond to a world where successful reform cannot be guaranteed, yet where beneficial reforms are possible? My conjectural answer is as follows: Individuals would attempt to use "institutional" devices to make the success of interaction and potential reform less accidental and more predictable. The problem of how to do this non-arbitrarily confronts every individual in the environment.

The "trade-off" which comprises the "logic of the situation" for any individual under UIK<sub>GI</sub> is as follows: that the greater (lesser) the extent to which an individual stops the reform of institutions to gain predictability cum stability, the more (less) he gives up total potential gains from trade, but the more (less) he can guarantee the realization of the gains from that (truncated) set of insitutional reforms which he in fact does undertake. In this context, individual attempts to change all

institutions simultaneously to their conjectured  $S^*$  positions--a "complete adjustment" specification--in principle maximizes the total potential gains from reform, but will leave individuals neither with any "stabilized" institutions to use to effect the reform, nor with any guarantee of the realization of the gains from reform beyond the "accidental." (This is, of course, the standard case of "accidental" equilibria under  $UIK_{GI}$ .) Alternatively, a "no adjustment" specification, where all institutions are "stabilized" by everyone, and none are up for reform in principle allows the full guarantee of the realization of the gains from non-existent reforms.

It is the "given" logic of this trade-off which is therefore seen to explain rational, individual endorsement of fixed, sub-optimal institutions as a device for reforming other sub-optimal institutions. The "input" institutions are seen as "resources" to limit the possibility of unanticipated (unintended) effects of a reform effort--a benefit which is gained at the cost of giving up the potentially beneficial effects of reforming the "input" institutions themselves. It is also this exogenous "logic" which explains why agents, in general, use a GI-specification of their choice problem (i.e, employ  $T'_j$ , rather than  $T_j$ ): individuals, by design, do not want the (potentially sub-optimal) "input" institutions to be changing (presumably towards  $S^*$ ) at the same time as the items which are up for reform.

Consider a simple example of this point. A mining entrepreneur conjectures that he is likely to be successful in removing a legal restriction on a mining output--and, thus, gain--so long as the present government stays in power and so long as the price of this output retains its existing level. Clearly, the entrepreneur may dislike the current government intensely, and also feel that the price of output is "wrong." However, if he lobbied for a change in government and tried to alter the price of output at the same time as he attempted to effect the legal reform, then he would have too many

unknowns in his problem to allow him to forecast the effects of the removal of the legal restriction alone other than arbitrarily. Moreover, he would not be able to use the reform resources offered by the government. Thus, his objective is to use devices to "slow down" any change in government and the price of output (even though he may view both as sub-optimal) so as to increase the probability of a successful and quick change in the mining regulation alone.

No one would deny that there is rationality in the mining entrepreneur's strategy (given his constraints on successful reform under  $UIK_{GI}$ ), even though he refrains from reforming a current government and output price which he nonetheless regards as sub-optimal. (Next year, perhaps, he attempts to change the government, treating the changed mining regulation of this year as parametric.) Rather, the point is that it is simply irrational under the posited circumstances for the entrepreneur to attempt to reform all elements of  $S$  to the "rational" end-point,  $S^*$ , right away.

I have dealt with the relationship between institutional stability and "piecemeal" reform in Newman (1976, 1979), so that it is not worthwhile to discuss it in much further detail here. A final point which should be stressed, however, is that the trade-off specified in this setting looks like it can be illuminated by optimization techniques--but cannot be. Any success that an agent might have in picking an optimum probability of estimate and optimum degree of input institution stabilization can be only accidental under  $UIK_{GI}$ . Successful guaranteed optimization in this context must presume  $USK_{PI}$ --which denies the existence of the trade-off in the first place, since there is no informational reason to stabilize any institution unless it is at its  $S^*$  position. Rationality here is therefore relative to a theory of anticipated aggregate outcomes, given the logic of a reform "trade-off" (i.e.,  $T_j'$ )--a theory which cannot be non-arbitrarily verified in

the short-run by the existence of successful reforms but which can be non-arbitrarily refuted by the existence of unsuccessful reforms.

The proposed concept of rationality is therefore quite different from that implied by the avant-garde Classicist's notion of "rationality" with respect to information procurement costs. This is in spite of the fact that the basic trade-off involved, and the explanation of the truncation of the set of potential gains from trade open to individuals as a rational choice, given "cost," may appear to be similar. The Classicist's concept of informational rationality is totally arbitrary without presuming the (long-run) knowledge sufficient to verify theories ( $USK_{PI}$ ), while the proposed concept of rationality gains non-arbitrariness only because  $USK_{PI}$  is denied and institutional reform is non-trivial. The concept of rationality defended here is the rationality of the failure to reach  $S^*$ , not the rationality of the successful achievement of  $S^*$ .

## 2.5 The "Coordination" Problem

Thus far, I have been concerned with the logic of reform under  $UIK_{GI}$  as seen through the eyes of any one individual. Evidently, this is not good enough to make the case for a  $GI-UIK_{GI}$  structure. It must be shown that it is possible for all individuals to non-accidentally "coordinate" their actions in this short run setting, even though only  $UIK_{GI}$  prevails. If such a demonstration can be procured, then  $GI$  can be seen to explain observed coordination at all points in time, and both the dichotomies which have plagued traditional theorizing--between Individualism and Holism, and between short-run and long-run explanation--can be avoided.

Since the notion of "coordination" which must be employed here cannot depend on the uniform realization of expectations or on the guarantee of aggregate unanimity, it is immediately apparent that the only (explainable) concept of aggregate coordination available is one which involves the



existence of stable, "partial" agreements between individuals in institutional settings, where the character of, and changes in, such agreements must be explained as a non-arbitrary consequence of an underlying stability in the reform process.

To briefly consider the problems involved here, let me construct the simplest possible example of the short-run dynamics of coordination that I have in mind. Assume only two existing institutions,  $S_1$  and  $S_2$ . There are three individuals in the environment, A, B, and C, each of whom holds an initial conjecture concerning the  $S^*$  positions of  $S_1$  and  $S_2$ , and where all can know (the values of) existing  $S_1$  and  $S_2$ . These conjectures are defined respectively as  $A^{T_j}$ ,  $B^{T_j}$ ,  $C^{T_j}$ . Under  $UIK_{GI}$ , there can be no presumption that the  $T_j$ 's coincide (i.e., this is a matter of accident). Thus, for generality and realism, it is appropriate to assume that Individual A holds that existing  $S_1$  and  $S_2$  are both consistent with  $S^*$ , Individual B holds that neither  $S_1$  and  $S_2$  are so consistent, while Individual C holds that  $S_1$  is sub-optimal but  $S_2$  is optimal.

The evident characteristics of this setting are that, given  $A^{T_j}$ , Individual A will not be a reformer; he will attempt to stop all reforms of the going  $S_1$  and  $S_2$ . Given  $B^{T_j}$ , Individual B in principle would like to be able to reform both  $S_1$  and  $S_2$  in light of his  $T_j$ , while Individual C wishes to reform  $S_1$ , but stop changes in  $S_2$ . It is understood that, by conventional definitions, there can be no "coordination" defined within the posited setting, since neither  $S_1$  nor  $S_2$  is endorsed by everyone.

Given the exposition of previous sections, it is clear that Individual C ideally would like to write up his reform problem so that he stabilizes  $S_2$  in order to predictably achieve the change in  $S_1$ , and Individual B would like to be able to stabilize one of  $S_1$  and  $S_2$  (even though he dislikes both) in order to limit the variance on the change in the other. Individual A

would like to stop all changes in  $S_1$  and  $S_2$ .

Now consider naively what is possible in this setting. Suppose that B conjectures that it is better to stabilize  $S_2$  (to change  $S_1$ ) than vice versa. Hence, he agrees (unknowingly) that  $S_1$  is the crucial institution to reform, and all three unanimously endorse  $S_2$ . Thus, B and C effectively use the coordination on  $S_2$  as the "input" by which to change  $S_1$ . Suppose that B and C do manage to effect a predictable change in  $S_1$ ; that A cannot stop the change. Then, it is possible that A will find that the newly observed value of  $S_1$  refutes his theory ( $T_1$ ) that the original values of both  $S_1$  and  $S_2$  were in fact "optimal," and he is now in a position to endorse the new value of  $S_1$  in order to reform  $S_2$ . Individual B will now side with A, and be opposed by C, even though everyone will defend the new value of  $S_1$ . If A and B effect the change in  $S_2$ , then C's theory of transpired coordination will be refuted, and the same type of process will continue.

This scenario of course defines no more than one possible case of what is logically conceivable in this environment, but it is sufficient to capture the essential flavour of the short-run theory I have in mind. The fundamental feature of this theory is that it allows the possibility of non-arbitrary explanations of the existence of some (coordinated) endorsement of social institutions, at the same time as reform is proceeding, and where at least one individual's theory of transpired action is being falsified. In this light, a central pivot of this explanatory programme lies in its contention that the "reasons" for the endorsement of any given institution at a short-run point in time are two-fold: (i) because individuals think the institution is optimal; and (ii) because individuals want to use the stability of the institution (whether they see it as statically optimal or not) as the fulcrum from which to change other institutions. Clearly, traditional theorizing relies on the former alone

and is forced into the position of being able to explain aggregate coordination non-arbitrarily if and only if a mechanism is specified to ensure that everyone thinks that all institutions are optimal. The cost of this (long-run) strategy is that the reform process is trivialized.

The other central idea is that individuals can unanimously endorse some institutions--for different reasons--even though the consequence of this endorsement is that at least someone's intended reforms will succeed and thereby, refute the theories held by others. This will in turn change the conditions of institutional endorsement and the "logic of reform" confronting individuals in the next period. In this sense, all observations of short-run, "point in time" institutional endorsement can be seen to conceal the potential reform which changes these points, and all observations of short-run institutional reform can be seen to conceal the institutional endorsements which gave rise to these changes.

### 3. Conclusion

I do not pretend that the brief discussion of short-run dynamics presented here constitutes other than an introduction to the topic (see also Boland (1978, 1979); Boland and Newman (1979); Newman (1976; 1979)). The basic inspiration which lies behind the above discussion, however, is that it is logically conceivable that a GI-UIK<sub>GI</sub> structure can illuminate the short-run non-arbitrarily, while it is not even logically conceivable that existing PI-USK<sub>PI</sub> or GI-USK<sub>GI</sub> programmes can do this job.

There are two specific methodological reasons why I think that there is promise in the GI-UIK<sub>GI</sub> fusion presented here. The first is that such a structure can potentially explain short-run institutional endorsement as a rational, non-arbitrary response to the constraints of reforming short-run points--without committing itself to the exogeneity of institutions or to their (known) optimality. Second, this structure can permit

changes in the  $T_j$ 's and  $T_j'$ 's held by agents, which are non-arbitrary relative to the existence of refuting short-run facts, even if such theory changes can only be seen as arbitrary relative to a process of short-run theoretical verification from the facts. I can visualize no successful theory of the short-run which does not possess at least these attributes.

Of course, whether this plea for non-arbitrariness in short-run theorizing really matters depends upon one's theory about what is significant in Samuelson's Foundations. Does the crucial contribution of this work lie in its development of "classical" maximization proofs and optimization techniques, or in its mathematical specification of a holistic "price dynamics," or only in its concern with the philosophical issues connected with the "Correspondence Principle"? I can only hope to have endorsed enough of the apparatus of classical maximization theories in my present exposition to reform current thinking to see both the overriding importance of the methodological issues connected with the "Correspondence Principle," and the explanatory poverty of holistic approaches to the short-run.

BIBLIOGRAPHY

- Agassi, J. (1960), "Methodological Individualism," British Journal of Sociology, 11, September, 244-270.
- \_\_\_\_\_ (1966), "Sensationalism," Mind, 66, January, 1-24.
- \_\_\_\_\_ (1975), "Institutional Individualism," British Journal of Sociology, 26, June, 144-155.
- Alchian, A. (1969), "Information Costs, Pricing and Resource Unemployment," Western Economic Journal, 7, June, 109-128.
- \_\_\_\_\_, A.A. and H. Demsetz (1972), "Production, Information Costs, and Economic Organization," American Economic Review, 62, December, 777-795.
- Arrow, K.J. (1951), Social Choice and Individual Values, New Haven: Yale University Press.
- \_\_\_\_\_ (1967), "Values and Collective Decision-Making"; in Philosophy Politics, and Society, ed. P. Laslett and W. Runcimen, London: Blackwell.
- \_\_\_\_\_ (1969), "The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation"; in The Analysis and Evaluation of Public Expenditures of the PPB System, Joint Economic Committee, Washington: Government Printing Office, 59-71.
- \_\_\_\_\_ (1971), Essays in the Theory of Risk-Bearing, Chicago: Markham.
- \_\_\_\_\_ (1974a), The Limits of Organization, New York: W.W. Norton and Company.
- \_\_\_\_\_ (1974b), "Limited Knowledge and Economic Analysis," American Economic Review, 61, March, 82-93.
- \_\_\_\_\_ (1978), "The Future and the Present in Economic Life," Economic Inquiry, 16, April, 157-169.
- \_\_\_\_\_ (1971), General Competitive Analysis, San Francisco: Holden-Day.
- \_\_\_\_\_ and D. Starrett (1973), "Cost and Demand Side Approaches to Price Determination," ed. J.R. Hicks and W. Weber, Carl Menger and the Austrian School of Economics, Oxford: Oxford University Press.
- Azariadis, C. (1975), "Implicit Contracts and Unemployment Equilibria," Journal of Political Economy, 41, December, 1183-1202.
- Baily, M.N. (1974), "Wages and Employment under Uncertain Demand," Review of Economic Studies, 41, January, 37-50.

- Bator, F.M. (1957), "The Simple Analytics of Welfare Maximization," American Economic Review, 47, March, 22-59.
- \_\_\_\_\_ (1958), "The Anatomy of Market Failure," Quarterly Journal of Economics, 72, August, 351-379.
- Barro, R.J. (1972), "A Theory of Monopolistic Price Adjustment," Review of Economic Studies, 39, January, 17-26.
- \_\_\_\_\_ (1976), "Rational Expectations and the Role of Monetary Policy," Journal of Political Economy, 2, January, 1-33.
- \_\_\_\_\_ (1979), "Second Thoughts on Keynesian Economics," American Economic Review, 69, May, 54-59.
- \_\_\_\_\_ and S. Fischer (1976), "Recent Developments in Monetary Theory," Journal of Monetary Economics, 2, April, 133-167.
- \_\_\_\_\_ and H.I. Grossman (1971), "A General Disequilibrium Model of Income and Employment," American Economic Review, 61, March, 82-93.
- Baumol, W.J. and R.A. Quandt (1964), "Rules of Thumb and Optimally-Imperfect Decisions," American Economic Review, 54, March, 23-46.
- Becker, G.S. (1974), "A Theory of Social Interactions," Journal of Political Economy, 82, December, 1063-1093.
- \_\_\_\_\_ (1976), The Economic Approach to Human Behaviour, Chicago: University of Chicago Press.
- Benassy, J.-P. (1975), "NeoKeynesian Disequilibrium Theory in a Monetary Economy," Review of Economic Studies, 61, October, 503-524.
- \_\_\_\_\_ (1976), "The Disequilibrium Approach to Monopolistic Price Setting and General Monopolistic Equilibrium," Review of Economic Studies, 43, February, 69-82.
- Blanchard, O.J. (1979), "Wage Indexing Rules and the Behaviour of the Economy," Journal of Political Economy, 87, August, 798-815.
- Boland, L.A. (1970), "Conventionalism and Economic Theory," Philosophy of Science, 37, June, 239-248.
- \_\_\_\_\_ (1975), "Uninformative Economic Models," Atlantic Economic Journal, 3, November, 27-32.
- \_\_\_\_\_ (1978), "Time in Economics vs. Economics in Time: The 'Hayek Problem'," Canadian Journal of Economics, 11, May, 240-262.
- \_\_\_\_\_ (1979a), "Knowledge and the Role of Institutions in Economic Theory," Journal of Economic Issues, 13, December, 957-971.
- \_\_\_\_\_ (1979b), "A Critique of Friedman's Critics," Journal of Economic Literature, 13, June, 503-522.

- Borch, K.H. (1968), The Economics of Uncertainty, Princeton: Princeton University Press.
- Breton, A. and R. Breton (1969), "An Economic Theory of Social Movements," American Economic Review, 59, May, 198-205.
- Brunner, K. (1975), "Comment" on "The Demand for and Supply of Inflation," by R.J. Gordon, Journal of Law and Economics, 18, December, 837-857.
- \_\_\_\_\_ and W.H. Meckling (1977), "The Perception of Man and the Conception of Government," Journal of Money, Credit, and Banking, 9, February, 70-85.
- \_\_\_\_\_ and A.H. Meltzer (1971), "The Uses of Money: Money in the Theory of an Exchange Economy," American Economic Review, 61, December, 784-805.
- Buchanan, J.M. (1965), "An Economic Theory of Clubs," Economica, 32, February, 1-14.
- \_\_\_\_\_ (1975a), The Limits of Liberty: Between Anarchy and Leviathan, Chicago: University of Chicago Press.
- \_\_\_\_\_ (1975b), "A Contractarian Paradigm for Applying Economic Theory," American Economic Review, 65, May, 225-30.
- \_\_\_\_\_ and W.C. Stubblebine (1962), "Externality," Economica, 29, November, 371-384.
- \_\_\_\_\_ and G. Tullock (1962), The Calculus of Consent, Ann Arbor: University of Michigan Press.
- Cagan, P. (1956), "The Monetary Dynamics of Hyperinflation:; in Studies in the Quantity Theory of Money, ed. M. Friedman, Chicago: University of Chicago Press.
- Carleton, D.W. (1979), "Contracts, Price Rigidity, and Market Equilibrium," Journal of Political Economy, 87, April, 1034-1062.
- Clower, R.W. (1965), "The Keynesian Counter-Revolution: A Theoretical Appraisal;" in The Theory of Interest Rates, ed. F.H. Hahn and F.P.R. Breckling, London: Macmillan.
- \_\_\_\_\_ and A. Leijonhufvud (1975), "The Coordination of Economic Activities: A Keynesian Perspective," American Economic Review, 65, May, 182-189.
- Coase, R. (1937), "The Nature of the Firm," Economica, 4, November, 386-405.
- \_\_\_\_\_ (1960), "The Problem of Social Cost," Journal of Law and Economics, 3, October, 1-44.
- Dahlman, C.J. (1979), "The Problem of Externality," Journal of Law and Economics, 22, April, 141-162.

- Davis, L.E. and D.C. North (1971), Institutional Change and American Economic Growth, Cambridge: Cambridge University Press.
- Debreu, G. (1959), Theory of Value. New Haven, Conn.: Yale University Press.
- Demsetz, H. (1964), "The Exchange and Enforcement of Property Rights," Journal of Law and Economics, 7, October, 11-26.
- \_\_\_\_\_ (1967), "Toward a Theory of Property Rights," American Economic Review, 57, May, 347-359.
- \_\_\_\_\_ (1969), "Information and Efficiency: Another Viewpoint," Journal of Law and Economics, 12, April, 1-22.
- Dornbusch, R. (1976), "Expectations and Exchange Rate Dynamics," Journal of Political Economy, 84, December, 1161-1176.
- Drazen, A. (1980), "Recent Developments in Macroeconomic Disequilibrium Theory," Econometrica, 48, March, 283-306.
- Drèze, J. (1975), "Existence of an Exchange Equilibrium under Price Rigidities," International Economic Review, 16, June, 302-320.
- Fama, E.F. (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, 25, May, 383-417.
- Feige, E.L. (1967), "Expectations and Adjustments in the Monetary Sector," American Economic Review, 57, May, 462-473.
- \_\_\_\_\_ and D.K. Pierce (1976), "Economically Rational Price Expectations," Journal of Political Economy, 84, June, 499-522.
- Fischer, S. (1977), "Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule," Journal of Political Economy, 85, February, 191-206.
- \_\_\_\_\_ (1979), "Anticipations and the Non-Neutrality of Money," Journal of Political Economy, 87, April, 225-252.
- Fisher, F.M. (1972), "On Price Adjustment Without an Auctioneer," Review of Economic Studies, 39, January, 1-16.
- \_\_\_\_\_ (1976a), "A Non-Tatonnement Model with Production and Consumption," Econometrica, 44, September, 907-938.
- \_\_\_\_\_ (1976b), "The Stability of General Equilibrium: Results and Problems"; in Essays in Economic Analysis, eds. M.J. Artis and A.R. Nobay, London: Cambridge University Press, 3-29.
- \_\_\_\_\_ (1978), "Quantity Constraints, Spillovers, and the Hahn Process," Review of Economic Studies, 37, February, 19-31.
- \_\_\_\_\_ (1981), "Stability, Disequilibrium Awareness, and the Perception of New Opportunities," Econometrica, 49, March, 279-317.



- Friedman, B.M. (1979), "Optimal Expectation and the Extreme Information Assumptions of 'Rational Expectations' Macromodels," Journal of Monetary Economics, 5, January, 23-41.
- Friedman, M. (1953), Essays in Positive Economics, Chicago: Chicago University Press.
- \_\_\_\_\_ (1957), The Theory of the Consumption Function, New York; National Bureau of Economic Research.
- \_\_\_\_\_ (1969), The Optimum Quantity of Money and Other Essays, Chicago: Aldine.
- \_\_\_\_\_ (1970), "A Theoretical Framework for Monetary Analysis," Journal of Political Economy, 78, March, April, 193-238. Discussion in "Friedman and His Critics," Journal of Political Economy, 79, October/November, 1972.
- Furubotn, E.G. and S. Pejovich (1972), "Property Rights and Economic Theory: A Survey of the Recent Literature," Journal of Economic Literature, 10, December, 1137-1162.
- Galbraith, J.K. (1958), The Affluent Society, Boston: Houghton-Mifflin.
- \_\_\_\_\_ (1967), The New Industrial State, Boston: Houghton-Mifflin.
- Gellner, E. (1964), Thought and Change, London: Weidenfield and Nicholson.
- Goldberg, V.P. (1974a), "Institutional Change and the Quasi-Invisible Hand," Journal of Law and Economics, 17, October, 461-496.
- \_\_\_\_\_ (1974b), "Public Choice--Property Rights," Journal of Economic Issues, 8, September, 555-579.
- Gordon, D.F. (1974), "A Neo-Classical Theory of Keynesian Unemployment," Economic Inquiry, 12, December, 431-459.
- \_\_\_\_\_ and J.A. Hynes (1970), "On the Theory of Price Dynamics"; in Microeconomic Foundations of Employment and Inflation Theory, E.S. Phelps, ed. New York: Norton, 369-393.
- Gordon, R.J. (1975), "The Demand for and Supply of Inflation," Journal of Law and Economics, 18, December, 807-836.
- \_\_\_\_\_ (1976), "Recent Developments in the Theory of Inflation and Unemployment," Journal of Monetary Economics, 2, April, 185-219.
- Grandmont, J.-M. (1977a) "The Logic of the Fix-Price Method," Scandinavian Journal of Economics, 79, 2, 1969-186.
- \_\_\_\_\_ (1977b), "Temporary General Equilibrium Theory," Econometrica, 45, April, 535-572.
- Grossman, S.I. and J.E. Stiglitz (1976), "Information and Competitive Price Systems," American Economic Review, 66, May, 246-253.

- Hahn, F.H. (1970), "Some Adjustment Problems," Econometrica, 38, January, 1-17.
- \_\_\_\_\_ (1973), On the Notion of Equilibrium in Economics, Cambridge: Cambridge University Press.
- \_\_\_\_\_ (1978), "On Non-Walrasian Equilibria," Review of Economic Studies, 45, February, 1-18.
- \_\_\_\_\_ (1980), "Monetarism and Economic Theory," Economica, 47, February, 1-13.
- Hayek, F.A. von (1945), "The Use of Knowledge in Society," American Economic Review, 35, September, 519-530.
- \_\_\_\_\_ (1948), Individualism and the Economic Order, Chicago: University of Chicago Press.
- Hicks, J.R. (1937), "Mr. Keynes and the 'Classics': A Suggested Interpretation," Econometrica, 5, April, 147-159.
- \_\_\_\_\_ (1939), Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory. Oxford: Clarendon Press.
- Hirschleifer, J. (1972), "Where Are We in the Theory of Information?" American Economic Review, 67, May, 31-39.
- \_\_\_\_\_ (1980), Price Theory and Applications, Englewood Cliffs, N.J.: Prentice-Hall, Inc.
- Howitt, P. (1980), "Activist Monetary Policy under Rational Expectations," Journal of Political Economy, 89, April, 249-269.
- Hurwicz, L. (1973), "The Design of Mechanisms for Resource Allocation," American Economic Review, 63, May, 1-30.
- Hutchison, T.W. (1979), Knowledge and Ignorance in Economics, Chicago: University of Chicago Press.
- Jarvie, I.C. (1972), Concepts and Society, London: Routledge and Kegan Paul.
- Jensen, M.C. and W.H. Meckling (1976), "Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure," Journal of Financial Economics, 3, October, 305-360.
- Kapp, K.W. (1976), "The Nature and Significance of Institutional Economics," Kyklos, 29, Fasc. 2, 209-232.
- Keynes, J.M. (1936), The General Theory of Employment, Interest, and Money. London: Macmillan.
- Koopmans, T.C. (1957), Three Essays on the State of Economic Science, New York: McGraw-Hill.

- Korliras, D.G. (1978), "Non-Tatonnement and Disequilibrium Adjustments in Macroeconomic Models"; in Equilibrium and Disequilibrium in Economic Theory, ed. G. Schwödiauer, Boston: D. Reidel Publishing Company.
- Kornai, J. (1971), Anti-Equilibrium; Amsterdam: North-Holland.
- Kregel, J.A. (1976), "Economic Methodology in the Face of Uncertainty: The Modelling Methods of Keynes and the Post-Keynesians," Economic Journal, 86, June, 209-225.
- Kuhn, T.S. (1970), The Structure of Scientific Revolutions, second edition, Chicago: University of Chicago Press.
- Lachman, L.M. (1976), "From Mises to Shackle: -An Essay on Austrian Economics and the Kaleidic Society," Journal of Economic Literature, 14, March, 54-62.
- Lamberton, D.M., ed. (1971), The Economics of Information and Knowledge, Harmondsworth, Middlesex: Penguin.
- Leijonhufvud, A. (1968), On Keynesian Economics and the Economics of Keynes. New York: Oxford.
- \_\_\_\_\_ (1973), "Effective Demand Failure," Swedish Journal of Economics, 45, March, 27-58.
- Lipsey, R.G. and K. Lancaster (1957), "The General Theory of Second Best," Review of Economic Studies, 24, No. 1, 11-32.
- Lucas, R.E., Jr. (1972), "Expectations and the Neutrality of Money," Journal of Economic Theory, 4, April, 103-124.
- \_\_\_\_\_ (1975) "An Equilibrium Model of the Business Cycle," Journal of Political Economy, 83, 1113-1144.
- \_\_\_\_\_ (1976), "Econometric Policy Evaluation: A Critique," Journal of Monetary Economics, 2, Supplement, Carnegie-Rochester Conference Series, 1.
- \_\_\_\_\_ (1980), "Methods and Problems in Business Cycle Theory," Journal of Money, Credit, and Banking, 12, November, 696-715.
- \_\_\_\_\_ and L.A. Rapping (1969), "Real Wages, Employment, and the Price Level," Journal of Political Economy, 77; October, 721-754.
- Machlup, F. (1967), "Theories of the Firm: Marginalist, Behavioural, Managerial," American Economic Review, 57, March, 1-33.
- Malinvaud, E. (1977), The Theory of Unemployment Reconsidered. New York: Wiley.
- Malmgren, H.B. (1961), "Information, Expectations and the Theory of the Firm," Quarterly Journal of Economics, 75, August, 399-421.

- Manne, H.G., ed. (1975), The Economics of Legal Relationships: Readings in the Theory of Property Rights; St. Paul, Minnesota: West Publishing Co.
- Marschak, J. (1971), "Economics of Information Systems," Journal of the American Statistical Association, 66, March, 192-219.
- McCallum, B.T. (1979), "The Current States of the Policy-Ineffectiveness Debate," American Economic Review, 69, May, 240-245.
- Mishan, E. (1971), "The Postwar Literature on Externalities: An Interpretive Essay," Journal of Economic Literature, 9, March, 1-26.
- Modigliani, F. (1977), "The Monetarist Controversy or, Should We Forsake Stabilization Policies?" American Economic Review, 67, March 1-19.
- Muellbauer, J. and R. Portes (1978), "Macroeconomic Models with Quantity Rationing," Economic Journal, 88, December, 788-821.
- Mueller, D.C. (1976), "Public Choice: A Survey," Journal of Economic Literature, 14, June, 395-435.
- Muth, J.F. (1961), "Rational Expectations and the Theory of Price Movements," Econometrica, 29, July, 315-35.
- Negishi, T. (1962), "The Stability of a Competitive Economy: A Survey Article," Econometrica, 30, October, 635-669.
- Newman, G. (1972), Institutional Choices and The Theory of Consumer Behaviour, M.A. Thesis, Simon Fraser University.
- \_\_\_\_\_ (1974), "Review of G.L.S. Shackle, Epistemics, and Economics: A Critique of Economic Doctrines," Philosophy of the Social Sciences, 4, Winter, 409-412.
- \_\_\_\_\_ (1976), "An Institutional Perspective on Information," International Social Science Journal, 28, September, 466-491.
- \_\_\_\_\_ (1977), "Individualism and Holism: Some Fundamentals," mimeo.
- \_\_\_\_\_ (1978), "The Problem of Knowledge Dynamics," mimeo.
- \_\_\_\_\_ (1979), "Economic Incentives, Limited Knowledge, and Reform in the Theory of Economic Development," Paper presented at the Annual Meetings of the International Society for Political Psychology, Washington, D.C.
- \_\_\_\_\_ and L.A. Boland (1979), "On the Role of Knowledge in Economic Theory," Australian Economic Papers, 18, June, 71-80.
- \_\_\_\_\_ and D. Gill (1976), "More on Expected Inflation and Unemployment," Atlantic Economic Journal, 4, Fall, 46-50.
- \_\_\_\_\_ and Z.A. Spindler (1979), "Toward a Theory of Aggregate Supply Management," Revista Internazionale Di Scienze e Commerciali, 26, 1113-1133.

- Niehans, J. (1971), "Money and Barter in General Equilibrium with Transactions Costs," American Economic Review, 61, December, 773-783.
- North, D.C. (1978), "Structure and Performance: The Task of Economic History," Journal of Economic Literature, 16, September, 963-978.
- Nozick, R. (1974), Anarchy, State, and Utopia; New York: Basic Books.
- Okun, A. (1975), "Inflation: Its Mechanics and Welfare Costs," Brookings Papers on Economic Activity, 2, 351-390.
- Olson, M. (1965), The Logic of Collective Action: Public Goods and the Theory of Groups; Cambridge: Harvard University Press.
- Patinkin, D. (1965), Money, Interest, and Prices (second edition); New York: Harper and Row.
- Popper, K.R. (1945), The Open Society and Its Enemies, Vol 2; London: Routledge and Kegan Paul.
- \_\_\_\_\_ (1957), The Logic of Scientific Discovery; New York: Basic Books.
- Phelps, E.S., et al. (1970), Microeconomic Foundations of Employment and Inflation Theory; New York: Norton, 1970.
- \_\_\_\_\_ and J.B. Taylor (1977), "Stabilizing Powers of Monetary Policy under Rational Expectations," Journal of Political Economy, 85, February, 163-89.
- Radner, R. (1972), "Normative Theory of Individual Decision: An Introduction," in Decision and Organization, eds. C.B. McGuire and R. Radner, Amsterdam: North-Holland.
- Rawls, J. (1971), A Theory of Justice; Cambridge, Mass.: Belknap.
- Rees, A. (1966), "Information Networks in the Labor Market," American Economic Review, 56, May, 559-566.
- Richardson, G.B. (1960), Information and Investment; Oxford: Oxford University Press.
- Roberts, B. (1973), "The Extension of Optimality Criteria: An Axiomatic Approach to Institutional Choice," Journal of Political Economy, 81, March/April, 386-400.
- \_\_\_\_\_ and R. Holdren (1972), Theory of the Social Process: An Economic Analysis; Ames, Iowa: Iowa State University Press.
- Roberts, P.C. (1971), "An Organizational Model of the Market," Public Choice, 10, Spring, 81-92.
- Ross, S.A. (1977), "Disclosure Regulation in Financial Markets: Implications of Modern Finance Theory and Signalling Theory," mimeo, University of Pennsylvania.

- Rothschild, M. (1973), "Models of Market Organization with Imperfect Information: A Survey," Journal of Political Economy, 81, November/December, 1283-1308.
- Salop, S. (1976), "Information and Monopolistic Competition," American Economic Review, 66, May, 240-245.
- Samuels, W.J. (1971), "Interrelations Between Legal and Economic Processes," Journal of Law and Economics, 14, October, 435-450.
- \_\_\_\_\_ (1978), "Information Systems, Preferences, and the Economy in the JEI," Journal of Economic Issues, 12, March, 23-41.
- Samuelson, P.A. (1947), Foundations of Economic Analysis; Cambridge: Harvard University Press.
- Sargent, T.J. (1973), "Rational Expectations, the Real Rate of Interest and the Natural Rate of Unemployment," Brookings Papers on Economic Activity, 429-472.
- \_\_\_\_\_ and N. Wallace (1975), "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule," Journal of Political Economy, 83, April, 241-54.
- \_\_\_\_\_ and N. Wallace (1976), "Rational Expectations and the Theory of Economic Policy," Journal of Monetary Economics, 2, April, 169-184.
- Shackle, G.L.S. (1973), Epistemics and Economics: A Critique of Economic Doctrines; Cambridge: Cambridge University Press.
- Shiller, R.J. (1978), "Rational Expectations and the Dynamic Structure of Macroeconomic Models," Journal of Monetary Economics, 4, January, 1-44.
- Solow, R.M. (1979), "Alternative Approaches to Macroeconomic Theory: A Partial View," Canadian Journal of Economics, 12, August, 339-354.
- \_\_\_\_\_ (1980), "On Theories of Unemployment," American Economic Review, 70, March, 1-11.
- \_\_\_\_\_ and J.E. Stiglitz (1968), "Output, Employment, and Wages in the Short Run," Quarterly Journal of Economics, 82, November, 537-560.
- Spence, M. (1973), "Job Market Signalling," Quarterly Journal of Economics, 87, August, 355-374.
- \_\_\_\_\_ (1974), "An Economist's View of Information," Annual Review of Information Science and Technology, 9, 52-78.
- \_\_\_\_\_ (1976), "Informational Aspects of Market Structure: An Introduction," Quarterly Journal of Economics, 90, November, 591-597.
- Stigler, G.J. (1961), "The Economics of Information," Journal of Political Economy, 69, June, 213-225.

Stigler, G.J. (1970), "The Optimum Enforcement of Laws," Journal of Political Economy, 78, May/June, 526-536.

\_\_\_\_\_ (1971), "The Theory of Economic Regulation," Bell Journal of Economics and Management Science, 3, Fall, 3-21.

\_\_\_\_\_ and G.S. Becker (1977), "De Gustibus Non Est Disputandum," American Economic Review, 67, March, 76-90.

Stiglitz, J.E. (1975), "Information and Economic Analysis," in Current Economic Problems, eds. M. Parkin and A.R. Nobay; Cambridge: Cambridge University Press.

Taylor, J.B. (1975), "Monetary Policy During Transition to Rational Expectations," Journal of Political Economy, 83, October, 1009-1021.

\_\_\_\_\_ (1980), "Aggregate Dynamics and Staggered Contracts," Journal of Political Economy, 88, February, 1-23.

Theil, H. (1967), Economics and Information Theory; Chicago: Rand McNally.

Thornton, D.B. (1979), "Information and Institutions in the Capital Market," Accounting, Organizations, and Society, 4, No. 3, 211-233.

Tisdell, C. (1975), "Concepts of Rationality in Economics," Philosophy of the Social Sciences, 5, Autumn, 259-272.

Tobin, J. (1972), "Inflation and Unemployment," American Economic Review, 62, March, 1-18.

\_\_\_\_\_ (1977), "How Dead Is Keynes?" Economic Inquiry, 16, October, 459-468.

Tullock, G., ed. (1972), Explorations in the Theory of Anarchy, Blacksburg, Center for the Study of Public Choice, Virginia Polytechnic Institute.

Varian, H.R. (1978), Microeconomic Analysis; New York: W.W. Norton and Company, Inc.

\_\_\_\_\_ (1977), "Non-Walrasian Equilibria," Econometrica, 45, April, 573-590.

Wagner, R.E. (1976), "Institutional Constraints and Local Community Formation," American Economic Review, 66, May, 110-115.

Walters, A.A. (1972), "A Note on Rules, Authorities, and Information," Journal of Political Economy, 80, January/February, 176-178.

Weintraub, E.R. (1975), "'Uncertainty' and the Keynesian Revolution," History of Political Economy, 7, Winter, 530-548.

\_\_\_\_\_ (1979), Microfoundations: The Compatibility of Microeconomics and Macroeconomics; Cambridge: Cambridge University Press.

Weiss, L. (1980), "The Role for Active Monetary Policy in a Rational Expectations Model," Journal of Political Economy, 88, April, 221-233.

Weitzman, M.L. (1974), "Prices vs. Quantities," Review of Economic Studies, 41, October, 477-491.

Williamson, O.E. (1975), Markets and Hierarchies: Analysis and Antitrust Implications; New York: Free Press.

\_\_\_\_\_ (1976), "The Economics of Internal Organization: Exit and Voice in Relation to Markets and Hierarchies," American Economic Review, 66, May, 369-377.