1. Introduction

The main concern of economics is thus with human beings who are impelled, for good and evil, to change and progress . . . [T]he central idea of economics . . . must be that of living force and movement.
Alfred Marshall

The purpose of this book is to put forward an alternative to equilibrium economics, the paradigm that has dominated the mainstream of economic thought for the best part of a century. That alternative is what may be called classical economics, namely the intellectual tradition that began with Adam Smith, evolved in the nineteenth century, was continued in the twentieth century by Marshall and the Austrians amongst others, and is today represented by theorists of complexity.

The hallmarks of the classical tradition are principally three. The first is the belief that the growth of the economy, rather than relative prices, should be the principal object of analysis. Coupled with that belief is an understanding of the market economy as a collection of processes of continuing change rather than as a structure, and that the nature of this change is self-organising and evolutionary. Finally there is a conviction that economic activity is rooted in human nature and the interaction of individual human beings. Many people might suppose from the similarity of the terms ‘classical’ and ‘neoclassical’ that the one school of economic thought is closely related to the other. In fact, as this book will try to show, they are more nearly exact opposites.

We need an alternative to conventional equilibrium economics because it does not provide us with a good understanding of how the economy works. Equilibrium theory is essentially a mechanistic metaphor. The progressive refinement of the theory during the twentieth century was intended to deliver determinacy of solutions together with simplicity of structural form. This has been achieved in principle, but at the cost of such drastic simplification of assumptions and the exclusion of so many important elements of economic activity that the resulting theory has little correspondence with reality. It is not surprising therefore that it has been useful neither for prediction nor for explanation.

This is particularly harmful for policy makers. The importance of real world phenomena that cannot be accommodated within the structure of
static equilibrium analysis is frequently overlooked or downplayed. The arrival of the recession of 2008–2010 took Treasury officials and central bankers on both sides of the Atlantic by surprise. They had been almost unanimously agreed that, thanks to their policies, from around 2000 onwards the Western world had entered a new era of stability and growth that would last indefinitely. Furthermore, recovery from the recession has proved unexpectedly resistant to orthodox policy measures. It is difficult to separate these policy failures from the conventional equilibrium theory on which they were based.\textsuperscript{5} Surely it cannot be a coincidence that the study of business cycles was displaced from the academic curriculum by a version of static equilibrium theory called macroeconomics? Although a return to sustained economic growth is desperately sought by politicians throughout the Western world as they struggle to balance their books and provide their voters with jobs, little is heard about the contribution that capturing increasing returns might make to this objective, perhaps because increasing returns do not fit easily into the static equilibrium model. Such basic issues as free trade and protection and the market versus state management appear to divide opinion in the profession as much as ever. Competing solutions to these and other policy questions remain intellectually not much further advanced than Adam Smith left them (Kennedy 2008: 2). Many other examples can be cited. The point is that conventional equilibrium theory provides policy makers with a poor understanding of how a market economy actually works.

Equilibrium theory has focused the attention of academic economists on issues surrounding the efficient allocation of a given set of resources amongst a number of competing uses at a single moment of time. While such questions have engaged the best brains of at least two generations in a number of intellectual conundrums,\textsuperscript{6} it has diverted them from an analysis of those features of a market economy that have impressed themselves on human history.

There is first of all the ability to sustain growth in aggregate productivity over long periods of time. This is a unique feature of the market economy: no other form of economic organisation has been able to deliver sustained increases in living standards for masses of people. The poorest citizens of a rich country today are materially better off than their wealthiest compatriots of a hundred years ago, and immeasurably better off than mediaeval kings and princes.

Another characteristic feature of market economies is the periodic fluctuations in total output and employment that have been apparent since at least the beginnings of industrialisation. A third feature is the system of markets itself, with its associated sets of prices. But perhaps the most striking feature of the market economy, distinguishing it from other forms
of economic organisation, is the fact of incessant change. New goods in a bewildering variety are added every week to the shelves of our supermarkets. We have come to expect continuous improvement in the quality and technical specification of both producer and consumer goods. We take for granted constant novelty in the various forms of communication, computing and entertainment services that we are offered.

For economists, it should be important to be able to explain these phenomena: the process of growth in productivity that has brought about our rising living standards, the origins and development of the business cycle, the nature of markets and the processes of change. But on all these questions, equilibrium theory is silent. It is difficult to exaggerate the inappropriateness of using the concept of ‘equilibrium’ to try to analyse a market economy. Equilibrium means being at a state of rest. A market economy is never at a state of rest. It is essentially restless, as Marshall understood (Metcalfe 2006: 651).

As we shall see in Chapter 10, the present state of equilibrium theory is the culmination of a century long digression in the academic teaching of economics from the classical tradition, using linear algebra in pursuit of the illusion of becoming a ‘hard science’ (Mirowski 1989), accompanied by the marginalisation of important cognate disciplines like economic history and the history of economic thought. Equilibrium theory has difficulty in either explaining or predicting movements in a market economy. These difficulties arise from the limitations imposed by its assumptions and omissions, limitations that make equilibrium theory ‘difficult, if not impossible, to relate to empirical reality’ (Colander 2009: 416). There are three critical assumptions.

The first assumption made by equilibrium theory is that the economy is static. The configuration of the economy is analysed at a single moment in time. If change is to be investigated the most that can be hoped for is a comparison between two static equilibria A and B, before and after the notional change. The path by which the economy moves from A to B cannot be analysed. The implication is that adjustment is instantaneous and costless. To put it another way, the question of how resources became allocated the way they are is resolved before the analysis begins. Equilibrium theory ignores the market process by which the state of affairs is brought about that it simply assumes to exist.

The logic of choice may be appropriate for the analysis of individual action. The preferences of one individual together with their knowledge of the relevant facts determine a unique solution. But the analysis of individual choice cannot legitimately be extended to a market process in which the decisions of several individuals influence one another, their actions and reactions succeeding each other in time. Once we allow for the
behavioural interdependence of individual consumers and producers, the inadequacy of the static equilibrium model of the market process becomes clear (Samuelson 2006: 244). The problem then becomes one of how the data for each individual, on which they base their different plans, are adjusted to the actions of other people. It is precisely this process of adjustment on which complexity analysis focuses its attention. It is a dynamic self-organising process whose nature and characteristics are assumed away by static analysis. Market equilibrium assumes that the data for different participating individuals have been fully adjusted to one another, but does not tell us how this was brought about (Hayek [1948] 1980: 93–94).

From the perspective of equilibrium theory, the essential economic problem consists in allocating the scarce resources of society amongst consumers as efficiently as possible, given everyone’s preferences and the available technologies and resources. To make possible a determinate solution to this problem, it is assumed that there is a single global stock of knowledge that is freely accessible to all participants in the economy. This stock includes knowledge of all prices, future as well as present, of all technologies, and of all possible investment opportunities and their outcomes. The prior problem of how all this knowledge can be known to one mind or can somehow be collected in one place is simply assumed way. This is the second critical assumption of equilibrium theory.

In practice, the knowledge that is put to work in a market economy is widely dispersed. Different people know different things, and what they know is largely subjective and incomplete, and often tacit or contradictory. The progress of the economy means that new commercial knowledge is constantly being discovered. The real economic problem is therefore this: how can all this dispersed knowledge, new as well as existing, be discovered and communicated to all the different participants in an economy? To put it another way, how can the range of diverse and specialised economic activities that make up a market economy be coordinated in a tolerably effective manner? The actions of every participant in a market economy are guided by a common set of prices, prices being signals that abridge knowledge of what is happening in different markets. If they are to be reliable guides to action, prices must be generated by markets.

There is a fundamental difference between the way prices are determined in equilibrium theory and in classical theory. In equilibrium theory producers and buyers are assumed to know in advance the lowest cost at which a commodity can be produced. Classical theory believes this information will only be discovered by a market process of competition. Likewise, in equilibrium theory producers are assumed to be fully informed about the preferences of consumers, including the kinds of goods they would like
and the prices they would be willing to pay for them. Classical economists would regard this kind of knowledge not as given data, but as facts that can only be ascertained through competition (Hayek 1948: 95).

The distinction between the two approaches to the nature of knowledge in a market economy is more than academic. It came to have immediate practical importance with the establishment of a planned economy in the Soviet Union in the 1920s. Marx and his immediate followers had shied away from the question of how economic activity in a socialist state would be coordinated. Early critics argued that without market prices it would be impossible to achieve any remotely rational allocation of resources. Socialist economists like Oskar Lange argued to the contrary that a central planning authority could gather enough information to compute prices centrally for handing down to factory managers, and that once sufficiently powerful computers became available the problem would be solved. This was disputed by Hayek, Mises and others who argued that the dispersed, subjective and fragmentary nature of economic knowledge meant that the problems of acquiring, centralising and communicating it in a command economy could not be overcome. A vigorous debate, now known as the socialist calculation debate, ensued in the academic journals in the 1930s (Hayek [1948] 1980: 119–209). The debate was definitively resolved by the collapse of the Soviet Union in 1989, the political system being brought down by the inability of the planned economy to deliver either the increasingly sophisticated range of goods desired by consumers or the advanced defence equipment required by the military. Given the similarity of the assumptions made about the nature of economic knowledge by equilibrium theorists and by the proponents of central planning, the implications of this episode are significant.

The third critical assumption of equilibrium theory is that of rational behaviour. It is assumed that consumers and businessmen use the perfect knowledge that is believed to be at their disposal in a consistent and calculating manner to make optimising choices. It is implicitly assumed that their brains have the power to absorb and process all the available information, unclouded by cognitive biases. Even stronger assumptions are required to justify the so-called ‘rational expectations’ approach that dominates equilibrium macroeconomics. Here, it is additionally required that every market participant shares a ‘true’ model of how the economy works and is able to use that model to form identical expectations about the future path of the economy. All other participants have identical beliefs and information and therefore share the same view of the future.

It is self-evident that such assumptions do not reflect the reality of a world of conflicting opinions. The assumptions need to be relaxed in one or both of two directions. One is to allow different agents to form different
expectations, and the other is to allow agents to form their expectations over time in the light of experience. It seems plausible that people form their own understanding of how an economy works through a learning process involving the social transmission of information and ideas. However, the most casual observation suggests that people do not share a common view of the working of the economy, whether that is a true one or not. We live in a world of conflicting opinions and forecasts, where individuals act differently. Only after actions have been taken do we learn who was (more nearly) right, and who was (more nearly) wrong. Despite this, ‘rational expectations’ remains the predominant assumption about expectations formation in the contemporary literature of equilibrium theory. Why is this so? Presumably for reasons of analytical convenience. Choosing assumptions to fit a model rather than the facts does not seem to be a scientifically satisfactory procedure.\(^{11}\)

Many other restrictive assumptions are commonly made by equilibrium theory in order to achieve determinacy, an important one being the convexity assumption that effectively rules out increasing returns, but these three are the important ones.

Also important in understanding the limitations of equilibrium theory is an awareness of what is left out. Institutional, social and political factors are generally excluded. The result is that those who interpret economic events from the perspective of equilibrium theory will typically give undue weight to those factors that are quantifiable, and underestimate the influence of unquantifiable ones. The historical context of events is likewise frequently discounted in equilibrium analysis, general influences being emphasised at the expense of the particular.

Even more damaging than the omission of institutional factors is the omission of the human factor. The absence of change and uncertainty in equilibrium economics means that there is no scope for entrepreneurship. Likewise, there is no place for human emotions like fear and greed that play their part in forming expectations and levels of confidence. Nor for the emotions that drive economic growth like ambition, curiosity, or an altruistic desire to serve humanity (Mokyr 2006: 311).

Many economists recognise that equilibrium theory is remote from the practical issues that confront them, but they are reluctant to let go of it because they value its logical rigour, and cling to the principle of determinacy. Their standard defence is familiar:

1. A market economy behaves ‘as if’ the assumptions of equilibrium theory were true.
2. Only predictions matter, not explanations. Therefore it doesn’t matter if assumptions are unrealistic.
3. Evolutionary selection will eventually drive outcomes to the optimal equilibrium, because good outcomes will drive out bad ones.

The rejoinder to these points is straightforward. (1) There is no persuasive evidence in favour of this proposition. On the contrary, most markets are evidently out of equilibrium most of the time. (2) The purpose of theories should be to explain, rather than to predict. Even if we were to accept the criterion of prediction, economic forecasts based on equilibrium models have invariably performed badly. (3) Simulations show that only with certain parameter values do complex systems converge to equilibrium. There is no guarantee that that equilibrium will be an optimum. The conclusion must be that equilibrium theory is irrelevant to an understanding of how a market economy works (Kaldor 1972).

The story of the development of economic theory since Adam Smith is seen by equilibrium theorists as a search for an ever more formal structure. The search was so keenly pursued that the formal structure became an end in itself, and its ultimate purpose was lost sight of. The story has two aspects. In the first, society looking for a theory of growth was fobbed off with a theory of value (Robinson 1966). In the second, the achievement of formality, simplicity and elegance of theoretical structure was bought at the cost of making such drastic omissions and such simplistic assumptions that all connection with empirical reality, that which is to be explained, has been lost. The theory cannot explain anything of importance about the contemporary market economy, nor does it contribute to an understanding of how that economy works.

Equilibrium theory has got away with this because, until quite recently, there was no other competing theory of comparable formality and simplicity. Now there is. The rival theory has greater explanatory power, and offers new insights into how the economy works. It has the great advantage that it is not a static theory but a dynamic theory, it deals with processes not structures, and it does not require assumptions about states of equilibrium. It is therefore well-suited to addressing questions of growth and fluctuation, the big questions of a market economy.

None of the foregoing criticisms of equilibrium theory is original. It has been necessary to rehearse them in this introductory chapter in order to clear the ground for the alternative that is expounded in the main part of the book. If the present work has any originality it lies in emphasising the congruence of the economic applications of complexity theory with many of the strands of thinking represented by the Austrian school, itself a continuation in the twentieth century of the older classical tradition in economic thought. Taken together, these three apparently disparate schools form a single continuous line of thought that can justly be termed ‘classical’.12
While the earlier Classical School is usually said to have ended with J.S. Mill, I shall apply the term ‘classical’ to an intellectual tradition that has been continued up to the present day by a number of economists of whom I shall single out Marx, Menger, Marshall and Allyn Young as well as Schumpeter and Hayek. More recently, the classical tradition has been continued in the writings of Boulding, Kaldor, Shackle and Loasby, amongst others. Let me repeat the three principles that can be said to characterise this tradition:

The first is that classical economists believe that economic growth, not the theory of value, is the primary issue with which economic analysis should be concerned. Since growth means change, classical economics analyses processes of change, not structures or end states.

The second principle of the classical tradition is recognition that the nature of change in a market economy is self-organising and evolutionary. Change is seen as beginning with individuals adapting their behaviour, then spreading throughout the economy from the bottom up as a result of further adaptation on the part of other individuals and businesses. A self-organising process is one where the interactions among the individual elements of a group lead to patterns of behaviour at the aggregate level of the group as a whole that are different from, and cannot be predicted by, the behaviour of the elements themselves. Self-organising processes are pervasive in market economies. In the classical view, economic activity is an irreversible process that takes place in historical time: it involves qualitative as much as quantitative change. Change is determined largely by factors occurring within rather than outside the economy, so a market economy is also an evolutionary process.

Thirdly, classical economists recognise that a market economy is an ever changing assembly of relationships among individual human beings. An understanding of human motivations and beliefs must therefore be central to any economic analysis.

The differences between classical theory and equilibrium theory can be summarised in the following terms. Classical theory focuses on change and growth within open, dynamic nonlinear systems that are normally far from equilibrium. Equilibrium theory, on the other hand, analyses the theory of value within closed, static linear systems that are always in equilibrium. As to the essential nature of economic activity, classical economics makes no distinction between micro- and macroeconomics. Patterns of activity at the macro level emerge from interactions at the micro level. Evolutionary processes provide the economy with novelty, and are responsible for its growth in complexity. In equilibrium theory micro- and macroeconomics remain separate disciplines; there is no endogenous mechanism for the creation of novelty or growth.
Introduction

The behaviour of human beings in classical theory is analysed individually. People typically have incomplete information that is subject to errors and biases, and they use inductive rules of thumb to make decisions and to adapt over time. Their interactions also change over time as they learn from experience. In equilibrium theory, individual behaviour is assumed to be homogeneous and can be modelled collectively. It is assumed that humans are able to make decisions using difficult deductive calculations, that they have complete information about the present and the future, that they make no mistakes and have no biases, and therefore have no need for adaptation or learning (Beinhocker 2006: 97).

In the following chapters we shall try to show that the classical perspective provides a better understanding of how market economies work than does equilibrium theory. We begin with human behaviour in Chapter 2. It is sometimes forgotten that all economic activity is the result of human actions that depend in turn on the different and variable motives and beliefs of millions of individual human beings. Human knowledge is at the root of the growth of output. Human qualities like judgment, perseverance and leadership lie behind every successful business, while human weaknesses have brought about some spectacular market failures. Markets are moved by changes in expectations, while human emotions like greed and fear drive cycles of prosperity and recession. The way humans interact with one another is different from the behaviour of other animals and even more different than the behaviour of physical particles when they collide with each other. Human behaviour therefore needs to be modelled differently from natural phenomena. Within the broad class of complex adaptive systems, there is a hierarchy of behaviours of increasing complexity. Biological phenomena are more complex than physical phenomena, and human behaviour is more complex still. A market economy therefore needs to be distinguished from other types of complex systems and treated as a separate class, namely as a human complex adaptive system.

It is the restless nature of human beings that is chiefly responsible for the relentless and incessant change that we see manifested in every developed market economy. Novelty and continuous improvement in technology and in the quality of consumer and capital goods is one of the distinguishing features of a market economy, and it requires explanation. This is the subject of Chapter 3.

Changes in economic activity originate from initiatives by individuals. The changes their actions set in motion compel responsive changes on the part of other people. In other words, they adapt their behaviour. Individuals and businesses in market economies learn to adapt their behaviour largely by processes of trial-and-error; they learn from experience.
They do this for the simple reason that they lack the knowledge to do otherwise. An important part of the changing environment to which they are responding is simply the changing behaviour of other market participants. Adaptation leads to the emergence of new patterns of behaviour that eventually permit a growth in total productivity. From this perspective, the benefit of a market economy may not be so much its efficacy in the allocation of resources at a moment in time, or even their efficient allocation over time, but rather that, more than other forms of organisation, it facilitates adaptability or adjustment to change. Adaptation, emergence and evolution are discussed in Chapter 4.

The adjustments that take place in a market economy are mutual and voluntary. There is no control exercised from the top down either from within or from outside the economy. From mutual adjustments in behaviour at the micro level, there emerge, through intermediate layers of similar actions, discernible patterns of activity, irregular but persistent, at the level of the economy as a whole. Those relatively stable patterns, those modest but apparently steady changes that we observe on the surface of most economies are the outcome of incessant and frequently disruptive, interactions taking place below the surface. This fits the description of a self-organising system, or, in modern parlance, a complex adaptive system. The vision of an economy as a self-organising system can be traced back to the classical economists of the eighteenth century, and even earlier. But it has been substantiated by some recent advances in applications of nonlinear mathematics. Chapter 5 reviews the properties of self-organising systems and their implications for economic analysis.

In the next four chapters we use the concept of self-organisation to understand some of the characteristic features of a market economy. In Chapter 6, we show how markets themselves are best understood as self-organising processes that perform the vital functions of price discovery and product selection. Only when markets are treated as processes can we make sense of competition and entrepreneurship. Markets have evolved over a long period of time, and are still evolving.

The sustained annual increments in total output per head that we associate with market economies are the result of another self-organising process, the process of economic growth. In Chapter 7 we show how trade, a distinctly human characteristic, sets in motion a process of increasing specialisation of economic activities that results in sustained increases in productivity. When the higher profits and wages accruing from those productivity gains are spent they lead to an expansion of purchasing power in the economy as a whole. This increases demand somewhere which will justify a further degree of specialisation in that part of the economy,
raising total productivity still further, and so on in a cumulative spiral of
growing productivity and incomes.

Another distinctive pattern to be seen in industrialised market econom-
ies is that periodic fluctuation in total output and employment known
as the business cycle. A recent study identified no fewer than 148 occa-
sions since 1870 where a country experienced a cumulative fall in output
of at least 10 per cent (Barro and Usua 2008). Each of these episodes
differs from one another in several ways. They are triggered by different
events, and the industries principally affected may be different. Nor can
any statistical regularity be detected in the frequency, amplitude or dura-
tion of each cycle. It may therefore be more appropriate to think of such
fluctuations as having a recurring pattern, rather than forming a cycle, a
term that perhaps implies too great a degree of regularity. In Chapter 8 we
analyse the common pattern that is discernible in most economic fluctua-
tions. It, too, has the characteristics of a self-organising process.

Market economies, like the societies of which they are part, are often said
to operate within a ‘framework’ of institutions. But the rules of behaviour
of societies including formal laws as well as social norms, together with the
organisations that embody them such as markets and governments, evolve
gradually over time. Most of today’s business practices are the outcome
of a long and continuing process of cultural evolution. The classical
economists were well aware that most of the important institutions of their
society were the product of evolution rather than design. It might seem,
on the other hand, that contemporary institutions, such as banking laws,
owe their existence to acts of deliberate collective decision making. Surely
they cannot be said to have evolved? On closer examination, however, it
turns out that legislation also evolves. Like individuals and businesses,
governments progress by trial-and-error. The functions of government are
the subject of Chapter 9.

Chapter 10 traces the continuity of classical thought from the older
classical school through the work of Menger and his twentieth century
followers to contemporary theories of self-organisation as reflected in
the analysis of complex systems. It is widely supposed that the analysis
of dynamic nonlinear systems originated quite recently in the natural
sciences, and in the mathematical sense that may be correct. However,
the principles of self-organisation to which the mathematics gives expres-
sion were identified much earlier by social scientists. When the results of
the first applications of the methods of complexity to economics became
available, it was recognised that they represented a rediscovery of classi-
cal economics. For most of the twentieth century classical economics has
been marginalised, the mainstream of economic thought being occupied
by equilibrium theory in its neoclassical version. Neoclassical economics
is now revealed to be not the mainstream but a backwater, a dead end in the history of economic thought. It is the Austrian economists and their successors, the theorists of complexity, who are the true inheritors of the classical tradition in economic thought.

NOTES

2. Within the term ‘equilibrium economics’ I include neoclassical and neo-Keynesian theories, and any others that use the static equilibrium framework of analysis.
3. ‘Hardly an author can be found, not even Keynes himself, who is so much the exact antipode of Milton Friedman in every part of the economist’s theoretical vision as Carl Menger’ (Streissler and Weber 1973: 165).
4. Mirowski (1989). The term ‘equilibrium’ seems first to have been used in the context of economic theory by Sir James Steuart. It was never used by either Smith or Hume. Its modern usage appears to have originated with Cournot in 1838, gaining currency in the English-speaking world with Mill ten years later (Milgate 2008: 22). The term has two broad meanings. First, a point at which there is no incentive within a system to change behaviour, e.g. a steady or stationary state, and second, a stationary position in a dynamic process. The former interpretation is commonly associated with economics, whereas the latter is the sense in which the term is most often used in the natural sciences (Winter 2008: 57).
5. ‘The typical graduate macroeconomics and monetary economics training received at Anglo-American universities during the past 30 years or so may have set back by decades serious investigations of aggregate economic behaviour and economic policy-relevant understanding.’ Willem Buiter, ‘The Unfortunate Uselessness of most “State of the Art” Academic Monetary Economics’, Financial Times blog 3 March 2009, available at www.ft.com/maverecon.
6. See, for example, Harcourt (1972).
7. It might be thought that the equilibrium theory of value would be able to explain at least the workings of markets. But so restricted is its construct of ‘perfect’ competition, that it excludes almost all the activities that the verb ‘to compete’ describes (Hayek 1948: 92).
8. ‘[T]he limitations of the concept [of equilibrium] in dealing with conditions of persistent and imperfectly predicted change will not be removed until economics possesses a developed theory of change’ (Stigler 2008: 57).
9. The extraordinary volumes of trading observed in financial markets arise in large part from the fact that different people know, or think they know, different things.
10. Classical economists believe that market economies have evolved over time to meet the need to coordinate dispersed commercial knowledge, in much the same way that language has evolved to meet human needs to communicate with one another, and law has evolved to meet society’s need to resolve disputes.
11. It may not be surprising to find that economic models based on rational expectations have difficulty in explaining such robust stylised facts as the trade-off between inflation and unemployment (Carroll 2006, p.6).
13. Macroeconomic theory has extended the theory of value into the topics of growth and fluctuations, but, as we shall see in Chapter 10, such extensions are fraught with difficulties.
14. For example, Mandeville ([1732] 1988).