1. Introduction

THE AIM OF THIS BOOK

This book deals with one of the most puzzling concepts of economic science, namely that of economic equilibrium. One may call this concept puzzling, because for what is generally considered a relatively young science it has a remarkably long tradition. The first ideas concerning economic equilibrium can be found in the works of the Ancient Greeks, as will be shown below.

Another puzzling feature of economic equilibrium is its centrality to modern economics. It is said that ‘[w]herever economics is used or thought about, equilibrium is a central organizing concept’ (Hahn 1984, 43). Whether it concerns policy makers or theorists, of the neoclassical, Keynesian or Austrian school, all use some form of equilibrium theory to develop their ideas and support their main theoretical and political claims.

The equilibrium concept has also greatly advanced the mathematization of economics. Mathematical neoclassical general equilibrium theory is considered by many as one of the peak achievements of economics, and finds applications well beyond the domain of economics (for example Rosenberg 1992, 250). Yet no part of economics raises more questions than general equilibrium theory. Philosophers are puzzled by its explanatory role (Hausman 1981a, Rosenberg 1992). General equilibrium theory sets a standard of mathematical sophistication, but its assumptions are in irredeemable conflict with economic reality and the theory is thought by many to have no applications at all (for example Blaug 1992, 161).

For that and other reasons, non neoclassical economists reject this theory as a starting point of economic analysis. They develop alternatives to the neoclassical equilibrium model which are considered more realistic, because they do not rely on the rationality assumption (for example Post Keynesian and Marxist economics) or see equilibrium as a process of never ending change rather than an end-state (Austrian economics and Institutionalists). The equilibrium concept, in other words, is a major cause of controversy between the different schools of economic thought (Caravale 1992 and Lawson 2005).

It is also a very versatile concept. Fritz Machlup (1958) once tried counting the different theoretical manifestations of the equilibrium concept in
the economic literature, but ended up complaining about its many meanings. Backhouse (2006, 163) concluded that ‘[e]quilibrium has become such an extremely elastic notion’. Traditionally, equilibrium is seen as a balance of forces, but it can also be understood as a state of rest or as a tendency towards such a state. In mathematical economics equilibrium is first of all a property of a mathematical model. As a logical concept, it makes no claims about economic reality but solves a system of equations. Others consider equilibrium a metaphor of the harmony or stability of an economic order. It is remarkable that a concept with so many different interpretations could become one of economics’ core analytical constructs.

The aim of this book is to clear up some of the puzzles surrounding this concept. Before that task is addressed, it may be worthwhile to have a closer look at some of the points mentioned above; the surprising persistence, centrality and controversial nature of the equilibrium concept.

THE LONG HISTORY OF EQUILIBRIUM THEORY

Equilibrium must be one of the oldest ideas in economics. As early as the sixth century BC Heraclitus of Ephesus (c. 582–507 BC) suggested a circular flow of goods and money, an exchange of ‘merchandise for gold, and gold for merchandise’ (quoted in Lowry 1974, 434). The idea of circulation between goods and money proved a crucial one and led, amongst others, to the modern formulation of the quantity theory of money.1 Heraclitus’s philosophy is also said to have inspired the idea that the market is a self-regulating system (Spiegel 1971, 13). The recognition that a society of self-interested individuals need not result in chaos was an important step in the development of economics as a scientific discipline.2 It suggested that the market society was a separate order which could be explained in terms of a distinct set of laws. Given that order was seen as the profound feature of that society, these explanations took on the form of equilibrium laws.

Another modern equilibrium concept, which has its roots in ancient Greek thought, is that of general economic interdependence. One of the earliest expressions of this idea can be found in the writings of Xenophon (430–354 BC), a student of Socrates. He observed that the price of copper depends on the profitability of the copper trade, suggesting that factor and commodity prices are related through changes in supply (Rothbard 1995, 13). The modern formulation of this idea, mathematical general equilibrium analysis, is considered by many the crowning achievement of economic science.3

Further, it is suggested that the idea of equilibrium as stationary prices originates from Aristotle (384–322 BC). He was the first to recognize that traders have a reciprocal benefit from exchange (Lowry 1969). A condition
of voluntary exchange is therefore that these benefits are proportional to a certain ratio of, for instance, production expenses. In that case exchange values remain in equilibrium as long as prices cover producers’ outlays and so guarantee a continuation of current production levels. This equilibrium concept was the basis of Adam Smith’s distinction between natural and market prices (Smith 1937, 55–56).

Centuries later the Scholastics further elaborated upon this idea. Albertus Magnus (1193–1280) was more explicit about the different costs that would determine exchange value. His student Thomas Aquinas (1225–1274) stressed the intensity of human wants as a regulator of value and so brought about the dichotomy of supply and demand theories of price (Ekelund and Hébert 1997, 31). In the sixteenth century, scholastic thinking on economics was carried further by the School of Salamanca. Luis Molina (1535–1600) and Cardinal Juan de Lugo (1583–1660) were two of its key figures. They were responsible for a shift away from the scholastic emphasis on problems of price determination towards a focus on exchange in a supply and demand framework (Rothbard 1995, 101–127).

The French writer Pierre de Boisguilbert (1646–1714) probably introduced the word equilibrium into the economic literature (Spiegel 1975, 614). For him equilibrium signified the hand of God who through his laws had endowed the economy with a specific sense of order (Perrot 1992b). A British contemporary of Boisguilbert, Sir Dudley North (1641–1691), is said to have been one of the first to use the equilibrium concept as an analytical construct. In Cartesian fashion he deduced the equality of the prices of specie and coin money as an equilibrium outcome from the premise that excess demand raises prices while an excess supply tends to reduce them (Letwin 1963).

With the advent of the classical school of economics the deistic overtones of the equilibrium concept gradually disappeared. No longer was equilibrium seen as the product of God’s laws, but as a result of the impersonal forces of the market economy. It was recognized that, instead of God’s guiding hand, competition would force profit seeking individuals to moderate their selfish greed to a level consistent with a stable economic order. A view common to the classical economic literature was that competition would act like a gravitational force constantly pulling prices to a cost of production level, giving rise to the idea that equilibrium was best seen as a tendency towards that level (for example Smith 1937, 58).

Around this same period the French physician François Quesnay (1694–1774) constructed an arithmetical table of economic relationships – the Tableau Économique (1st edition 1758) – showing production and consumption in a condition of perfect balance. The aim of this table was to explain how a unrestricted trade would best guarantee the nation’s economic
prosperity. With the aid of this table it could be shown that state intervention, for example in the form of taxes or government expenditures, would disturb the precarious balance between consumption and production and cause an inevitable fall of the national product.

Quesnay’s Tableau was the basis of Say’s law of markets. This law defined an equilibrium condition for the macroeconomy stating that the value of aggregate supply would always equal aggregate demand (Sowell 1972a). This conclusion was contested in the general glut controversy in the early 19th century. Underconsumptionists like Thomas Malthus (1766–1834) and the Swiss historian Simonde de Sismondi (1773–1842) argued that production could well stagnate at a less than full-employment level from a lack of effective demand (Bleaney 1976). Their argument was based on a method of dynamic analysis that we would now call period analysis. This method defined equilibrium in explicit dynamic terms, as a stationary rather than a static state that precludes an analysis of how changes between equilibria take place.

In the meantime, economists struggled to give a satisfactory explanation of market equilibrium because of a failure to distinguish between supply and demand as price-determined and price-determining factors. J.S. Mill (1806–1873) was one of the first to clearly see supply and demand as schedules connecting price and quantities supplied or demanded. Yet for him price theory, a subject he considered by his work ‘complete’ (Mill 1909, 440), still consisted of three distinct laws of economic value considering the Law of Supply and Demand valid only for goods absolutely limited in supply (ibid., 448). A fully integrated price theory had to await the work of Alfred Marshall (1842–1924) who saw all prices as instances of the same principle of supply and demand. In Marshall’s hands, equilibrium theory became a method of dealing with the problem of time in economic analysis. He isolated causes according to their speed of adjustment and analyzed the conditions of market equilibrium in terms of the causes appropriate to the time period under study. He constructed a sequence of equilibria in different time frames each presupposing the attainment of the equilibria of shorter duration. An economy cannot be in a state of long-term equilibrium unless it simultaneously satisfies the conditions of short-term and very short-term market equilibrium.

The introduction of the marginal principle in the second half of the 19th century turned the attention of economists towards a new field of study – microeconomics. From Smith’s time onwards, the classical economists had emphasized the problems of the generation and distribution of the national product. Their main concern was the possibility that production would ultimately stagnate in a long-term equilibrium called the stationary state
because of a scarcity of natural resources. It was this latter principle – scarcity – which became the heart of the new microeconomics.

For that development to arise, the scarcity principle had to be combined with another principle with a long-standing tradition in economic thought, namely that of rationality. This idea had been part of the hedonistic doctrine which saw human behaviour as the rational pursuit of pleasure and the avoidance of pain (Myers 1983). William Stanley Jevons (1835–1882) translated pleasure and pain into utility terms: goods or activities which give pleasure to people have a positive utility, while pain stands for negative utility (Jevons 1879, 28–33). The scarcity and the rationality principles combined suggest that a rational agent seeks to maximize utility subject to the constraint that his or her resources are limited. A new equilibrium concept had been defined which proved amenable to explicit mathematical treatment. Classical mechanics showed examples of how to solve constrained maximization problems with the use of differential calculus. For Jevons ‘the principle of indifference’ signifying an equilibrium between choices was a direct analogue of the equilibrium of the lever (ibid., 102–106). Neoclassical economics became the study of making the best use of scarce resources, that is of maximization under constraints. The criterion being maximized and the constraints imposed on the choice would vary from one context to the next: household’s consumption and labour supply, firms’s production and government policies. But all constrained maximization problems have a common mathematical structure and employ the same equilibrium concept.

Marshall’s achievement in the field of price theory was rivalled by that of Léon Walras (1834–1910). Asking if it would be possible for all markets to clear simultaneously, the latter posed a question that would prove crucial to the further development of economic analysis. The emphasis on market interdependencies distinguishes his general equilibrium analysis from Marshall’s partial equilibrium approach, which examined the conditions of market clearance for specific markets or industries assuming the behaviour of other markets or industries constant by means of a ceteris paribus clause.

Yet the issue of market interdependencies had been brought up by a host of earlier writers, most notably Boisguilbert, Cantillon, Quesnay, Smith, and Cournot. But the problems raised by the observation that the economic system is a whole – all the parts of which are connected, proved too difficult to solve without the appropriate mathematical techniques. Even Cournot, one of the first to use a differential equation in economics, considered the problem of a general equilibrium of all markets beyond the power of (his) mathematical reasoning (Cournot 1838[1927], 127). The achievement of Walras was that he showed how the problem of general equilibrium could be conceptualized in a system of simultaneous equations. He did not provide a rigorous mathematical solution to the problem of general equilibrium. His
‘proofs’ consisted in counting the number of known and unknown variables and merely indicate the possibility of providing such a solution.

The existence proof of general economic equilibrium had to await a generation of more able mathematicians and was not found before the 1930s (in Wald 1936). In the meantime in Austria an alternative, non-mathematical formulation of neoclassical economics was developed by Carl Menger (1840–1921) and his students Eugen von Böhm-Bawerk (1851–1914) and Friedrich von Wieser (1851–1926). Menger rejected the notion of an equilibrium state to replace it with the idea that there are structural forces in the market economy continually working to reduce the gap between the quantities demanded and supplied. Out of his concern for the institutions and knowledge conducive to that task grew a subjective variant of the marginal doctrine, analyzing the dynamics of what the orthodox neoclassical would call disequilibrium adjustments. A characteristic of that tradition is the notion that equilibrium theory is a thought experiment allowing one to examine the consequences of real economic forces by comparing their operation to the working of an economy where they are not present, an economy which for that reason cannot be observed in reality and must be considered a utopia. The equilibrium constructs developed by the main Austrian theorists, Schumpeter’s circular flow, Mises’s evenly rotating economy and Hayek’s monetary equilibrium, are what Weber called ideal types.

Yet this Austrian conception of economic equilibrium did not appear so distinct until the 1930s. In 1929 Hayek still saw the equilibrium theory of the Lausanne school as the starting point for all economic explanation (Hayek 1933a, 42n, 86, 95–6). However, by 1933 he started to realize that the perfect competition model underlying this theory was the wrong basis for analyzing the problem of coordination in a decentralized economy. Perfect competition assumes that full coordination has already been obtained and so precludes an analysis of that problem. A proper explanation of the coordination problem requires consideration of the process by which people acquire information and adjust their plans so as to better dovetail their activities. For Hayek equilibrium signified a situation of mutual coordination in which all market participants expect to be able to realize their planned activities (Desai 1994).

The importance of this view was not recognized in a period when the impact of Keynes’s economics started to make itself felt. Recent research has shown the problem of coordination to be crucial to Keynes’s conception of economics too (Garretsen 1991). But this point was easily lost in the subsequent (static) neoclassical formulation of his aggregate supply and demand framework, which became the textbook interpretation of the Keynesian model.

In Marshallian fashion, Keynes distinguished between equilibria for different time frames, but emphasized the problems of short-term
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macroeconomic equilibria, where expectations and output could be assumed constant (Kregel 1976). This choice was not just a matter of convenience. World War I and the Great Depression of the 1930s had caused a feeling that the world economy was inherently unstable and subject to violent shifts. The neoclassical equilibrium construct, stressing the problems of long-term adjustment, overlooked these problems. For that reason Keynes (1936, 3) considered it a ‘limiting point of the possible positions of equilibrium’. His aim was to develop a more general notion of economic equilibrium, one which would be able to account for real economic problems such as unemployment. For him unemployment was essentially a problem of the economy as a whole, not a microeconomic problem of market failures.

Yet the choice for the short-term equilibrium construct had also a high pragmatic value. It is suggested that the use of static equilibrium analysis applied to a monetary economy that was out of equilibrium gave Keynes’s theory its rigour and simplicity (Kohn 1986). This fact may well explain the quick acceptance of his ideas (Blaug 1991a).

A later generation of Keynesian scholars sought to abandon the concept of equilibrium altogether in order to provide a more rigorous microfoundation for the Keynesian ideas (Leijonhufvud 1968). But their so-called disequilibrium models are better termed ‘rationed equilibria’ for they employ the technique of constrained optimization (Malinvaud 1977, 5). What distinguishes them from neoclassical equilibrium models is the possibility of trading at non-market clearing prices. But the underlying equilibrium notion is the same: in equilibrium economic agents receive no signals to alter their current choices. Consequently, the economy resides in a position of rest.

The 1970s marked a return to the equilibrium theories of Keynes’s classical predecessors. Adopting the hypothesis of rational expectations, Robert Lucas managed to explain aggregate fluctuations of output in terms of an equilibrium model (Kim 1988, Van Zijp 1992). In the new-classical conception of economics markets always clear, even during the phases of the business cycle. Unemployment is a voluntary choice, as market forces keep the labour market at a natural rate of unemployment – a phrase invented by Milton Friedman. To pinpoint the equilibrium the economy is heading for, one only needs to determine this rate.

The introduction of game theoretical concepts helped new-Keynesians explain why individual adjustments are insufficient to clear markets at the macroeconomic level (Cooper and John 1988). The path-breaking work of Arrow and Debreu in the 1950s generated the proof of the existence of general equilibrium, but a similar result is still not found for the issues of stability and uniqueness. The Sonnenschein-Debreu-Mantel results of the 1970s destroyed the initial conjecture of Arrow, Block and Hurwicz (1959) that the tatonnement process was always globally stable. The disappointment
caused by these negative results explains the long period of standstill in research in this field (Ingrao and Israel 1990, 343). A parallel development followed a different approach and casted off the straightjacket of tatonnement. This inspired the non-tatonnement process of price adjustment, which allowed for trading at false prices (Fisher 1983).

On a less abstract level, economists prefer the supply and demand framework of Marshall’s partial equilibrium approach to causally explain the behaviour of markets (Hausman 1990). Dissenting economists, like the Neo Austrians, criticize these approaches for their mechanical application of mathematical techniques and blind faith in the reliability of econometric testing procedures. But in their turn the dissenters seem unwilling to abandon their version of the equilibrium paradigm (Clark 1987; Vaughn 1992; Caravale 1992, 1997). One may or may not accept Coats’s conclusion (1969, 292) that ‘economics has been dominated throughout its history by a single paradigm – the theory of economic equilibrium via the market mechanism’, but this concept does have a long and continuing history indeed.

THE ALLEGED DOMINANCE OF THE EQUILIBRIUM CONCEPT

Thus the observation that nowadays an economics without the equilibrium concept seems unthinkable, is not surprising. For instance, Hahn (1984, 43) writes that ‘[w]herever economics is used or thought about, equilibrium is a central organizing idea’. In a similar spirit Klant (1994, 15) says that ‘equilibrium, the situation in which supply and demand are equal to each other, is a central concept in economics, and equilibrium analysis the central activity of economists’. What explains the dominance of the equilibrium concept in modern economic theorizing? Hahn argues that equilibrium theory ‘make[s] precise the limits of economic analysis’ (ibid., 54, 67). In his view, equilibrium theory defines the domain of economics, ruling out disequilibrium as a logical impossibility (Boland 1992, 45). For Hahn, the function of equilibrium theory is to prevent logical errors in economic theorizing and hence the wrong policies that are deduced from them.

The dominance of equilibrium theory in modern economics is reflected in the economic text books. For example, Varian’s Microeconomic Analysis (1992) explains the workings of the general equilibrium model (henceforth GE model) and its components, even when a general proof of the existence of a general economic equilibrium is considered beyond the scope of the book (Varian 1992, 320). In a likewise manner, modern macroeconomics is an exercise in equilibrium theory. Blanchard and Fischer (1989) adopt a neoclassical benchmark with optimizing agents and competitive markets. A
new-Keynesian text such as Romer (1996) may not accept the Walrasian claim that markets clear all the time, but it does proceed from the assumption that aggregate performance has a foundation in optimizing behaviour. Walrasian and non-Walrasian economics alike adopt what Rosenberg (1992) calls an ‘extremal strategy’. They are theories expressed in extremal principles according to which the economy’s behaviour always minimizes or maximizes the variables reflecting its possible states (Rosenberg 1992, 231). A benefit of a theory based on this principle is that it allows the use of differential calculus to express its leading ideas. Hence, the customary sentence in the preface to most economic textbooks states that a minimal understanding of calculus is required to master its contents. A more substantial consequence of the extremal strategy is that it makes economics an exercise in equilibrium theory. Economic states are explained as the outcomes of optimization procedures which, ceteris paribus, guarantee a continuation of the current situation. According to the GE model, prices remain stationary as long as given conditions, for example technology, preferences and endowments, do not change. In new-Keynesian economics a situation of underemployment will persist as long as real price rigidities prevent workers to allocate available resources between leisure and work differently, and offer more labour at the going wage rate.

The importance of equilibrium theory to contemporary economic research and teaching raises questions about its cognitive status. One can hardly maintain that equilibrium theory is a paradigm case of scientific progress. Yet leading methodologists continue to place the equilibrium concept at the heart of economic science. Hausman (1992) defines the domain of economics in terms of seven fundamental laws which together form its basic equilibrium theory. According to Rosenberg (1992), economics is best viewed as a branch of applied mathematics, which studies the formal conditions of general equilibrium. Like mathematicians, economists emphasize the importance of deductive rigour, and strive to obtain more general proofs of their propositions, without much concern for the usefulness of these results. By best satisfying the demands of deductive rigour GE theory has become ‘the most prestigious economics of all and set standards that all economists aspire to reach’ (Blaug 1992, 169).

CONTROVERSIES ABOUT EQUILIBRIUM THEORY

However, the example set by GE theory is not appreciated by all economists alike. On the contrary. According to many, GE theory epitomizes much of what is wrong with modern economics. As Blaug observes (ibid.):
The leading characteristic of GE theory has been the endless formalization of purely logical problems without the slightest regard for the production of falsifiable theorems about actual economic behaviour. . . The widespread belief that every economic theory must be fitted into the GE mold if it is to qualify as rigorous science has perhaps been more responsible than any other intellectual force for the purely abstract and nonempirical character of so much of modern economic reasoning.

Similar complaints are voiced by Morishima (1991, 70) who warns that ‘GET economists . . . have sunk into excessive mental aestheticism. If this bad habit is not corrected, . . . then the twenty first century will see the degeneration of their subject’. This opinion is shared by another renowned mathematical economist, Maurice Allais, who argues that GE theory has no scientific value and should therefore be rejected, given that it is based on the hypothesis of general convexity of the production fields, ‘a hypothesis which is disproved by all the empirical data and leads to absurd consequences’ (Allais 1990, 5).

Likewise, in heterodox circles GE theory is an evident target for its lack of empirical support and the unrealism of its assumptions. Neo Austrians consider the neoclassical mainstream a degenerating program, not in the least because of its exclusive emphasis on the analysis of equilibrium states (Rizzo 1996). According to them, ‘modern economics is trapped in an ahistorical equilibrium world, unable to render intelligible the purposive action of human beings in the real world’ (Boettke, Horwitz and Prychitko 1994, 70). To a large extent Post Keynesians share this Austrian critique of neoclassical equilibrium theory. They also criticize it for its disregard of processes in historical time and point to the importance of uncertainty and institutional change (for example Kaldor 1972, Robinson 1974). But they also reject the notion that market processes move the economy to a predetermined equilibrium, a notion which most Austrians seem to embrace (Clark 1987).

However, the dissenting economists are by no means united in their approach to equilibrium theory. What Coddington (1983) calls ‘hydraulic’ Keynesians see equilibrium in terms of the stable (statistical) relationships between disembodied and homogenous flows of goods and money in the macroeconomy. A second group of Keynesians wants to dispense with this kind of aggregate analysis and aims to derive Keynesian conclusions from the neoclassical micromodel of rational choice. Their ‘reconstituted reductionism’ focuses on situations in which prices fail to clear markets, imposing new constraints on individual choice. Finally, focusing on the matters of uncertainty and ignorance, ‘fundamentalist’ Keynesians reject the aggregate perspective of the former and the mechanical optimizing framework of the latter approach. They go furthest in their rejection of the
equilibrium approach, arguing that the economy is inherently unstable or too kaleidic for the equilibrium notion to make sense.

Similarly, Austrian economists are divided about the meaning of the equilibrium concept. Kirzner (1997a and 1997b) embodies a tradition in Austrian economic theory which emphasizes the coordinating function of markets. This function is perceived in dynamic terms, bringing about a greater compatibility of individual plans. Instrumental in this process are the entrepreneurial alertness of economic agents and the dispersion of knowledge through relative price changes. Lachmann (1976a and 1986) and his followers reject the assumption of convergence to a predetermined equilibrium which underlies this view. According to them, there is no reason to expect the equilibrating forces of the market process to dominate the disequilibrating propensity of unexpected changes. What emerges from their reflections is an image of the market as a continuous process without beginning or end, propelled by the interaction between the forces of equilibrium and the forces of change. In Institutionalist circles a similar controversy rages about the applicability of the idea of equilibrium in a world characterized by unpredictable change (Hodgson 1993 and Vromen 1995). This short review of conflicting opinions about the equilibrium concept shows that equilibrium divides the ranks of economists.6

THE EQUILIBRIUM CONCEPT IN THE HISTORY OF ECONOMICS

These three aspects of the equilibrium concept – its remarkable persistence in the history of economic thought, the centrality of the equilibrium concept to modern economics, and the fact that many controversies in economics revolve around the concept of economic equilibrium – raise several questions about the history of this concept in economic theory. The most important of these are the following:

1. What is the origin of this concept? The origin of the equilibrium concept in economics is an intriguing question. The ancient Greeks, the earliest writers on economics, were the first to perceive the economy as an equilibrium system. But given that economics as a scientific discipline did not yet exist, it can be asked what led them to view the economy in these terms. Probably, they borrowed an equilibrium concept from philosophy or theology. Concerning the later development of economics, the question arises whether equilibrium as a theoretical tool was developed autonomously, within economics as a science, or whether it was copied from other disciplines such as physics, mathematics, or biology.
2. What does equilibrium mean in economics? The theoretical meanings of the equilibrium concept are manifold. It refers to the equality between quantities supplied and demanded, on specific markets or on a macroeconomic scale. It can be an aspect of the extent to which the expectations of individuals are compatible or of the alertness of entrepreneurs towards unexploited and unrecognized opportunities for profit. In another sense, economic equilibrium reflects a welfare optimum or maximum economic efficiency, but it can also be used to identify a stable (statistical) relationship between aggregate magnitudes. This diversity is reflected in the different backgrounds that equilibrium has as a metaphor. As a physical concept, equilibrium signals a balance between two forces or a position of rest. According to biological metaphors, the economy can be seen as an organism and equilibrium as an aspect of the dynamic relationship between organisms and their environment.

3. What are the methodological functions of equilibrium? As a scientific tool, economic equilibrium performs different methodological functions. In modern economics, equilibrium analysis is a specific form of mathematics which raises questions about its cognitive status. Is it merely an exercise in logic or does it make causal claims about the working of economic forces? Can equilibrium analysis be used to describe certain features of reality or do we need it to support certain normative claims?

4. Did these functions change over time? Needless to say, the function of equilibrium theory and analysis changed over time. The existence of different economic traditions is proof of this fact. Some traditions such as the Austrian school try to revive earlier traditions, while others are based on new developments in equilibrium theory such as the introduction of game theoretic concepts. These traditions or schools of thought adopt the equilibrium concept for different methodological purposes.

5. What explains the persistence of equilibrium concepts? The long tradition of the equilibrium concept asks for an explanation: what is the appeal of this concept to economists? There can be scientific reasons such as the idea that equilibrium complies to a scientific criterion, for example that of empirical progressive scientific programs. Another possibility is that equilibrium theory is considered a scientific ideal such as theoretical unification. Normative considerations are a further option explaining the preference for an equilibrium theory.

6. What explains the dominance of equilibrium reasoning in neoclassical theory? Neoclassical theory is considered the pinnacle of equilibrium reasoning. Why are equilibrium concepts so important to this branch of economic science?

7. Why does it arouse such strong criticisms in other schools? The methodology of equilibrium analysis is often a bone of contention between
neoclassical economics and other schools of thought. What explains that combative reputation of non-neoclassical economic traditions in this regard?

These seven questions motivated several studies on the role and development of equilibrium concepts in the history of economic thought. Milgate’s article in the New Palgrave (Milgate 1987) on this subject is an interesting starting point. He attributes the first use of the word equilibrium to James Steuart in 1769 and traces its development to present day equilibrium analysis. The strength of his analysis is that it discusses the changes in the meaning of the concept in economic theory. It contributes little, however, to our understanding of the origin and background of the equilibrium concept. In this regard Lowry (1974) and Spiegel (1975) supplement it by locating the origin of the equilibrium idea in Ancient Greek thought. According to Spiegel, this background has resulted in two separate traditions in GE theory, a ‘Platonist’ one, stressing the formal aspects of GE theory; and an empiricist tradition, which he calls ‘Aristotelian’. The disadvantage of this separation is that it forces the history of the equilibrium concept into these two categories, ignoring those concepts which fall outside their scope.

In this respect, Ingrao and Israel (1990) promise a more general approach. The sub-title of their book The Invisible Hand says that it deals with ‘economic equilibrium in the history of science’. But this subtitle is misleading, for the subject treated is the history of mathematical GE theory; that is that branch of economics which aims to mathematically prove the existence, stability and uniqueness of a state of general economic equilibrium. Weintraub (1985, 1991) covers the same subject. In his General Equilibrium Analysis (1985b) he discusses the development of the existence proof in the GE literature of the period 1930–1954. This case study supports his appraisal of Neo Walrasian economics as a progressive research program in the Lakatosian sense. Surprisingly, this attempt to appraise an economic theory is abandoned in his next book Stabilizing Dynamics (1991), where it is argued that ‘there is no formula for generating appraisals of work in economics’ (Weintraub 1991, 8). What remains is a reconstruction of the literature on equilibrium and dynamics from the 1930s to the present day. These texts, then, are also limited in scope, for their exclusive concern again is the history of mathematical GE theory.

Giocoli (2003) offers an interesting supplement to the history of general equilibrium analysis by discussing the introduction and impact of game theory in economics. He argues that after a delay of 30 years, starting from the second half of the 1970s game theory managed a swift transformation of neoclassical microeconomics. The gist of this turnaround consisted in altering the dominant view on the role of rationality in economic theory. The Nash
equilibrium became the embodiment of the idea that economic agents are rational. This formalistic interpretation of the choice theoretic foundation of economics implied an escape from the psychology that occupied earlier neoclassical rationality. But today many economists still find the consequences of this change hard to swallow. As a result, some of them return to the psychological interpretations of rationality of earlier generations. In their view, real human deliberation needs to be the focus of economic theorizing, not some abstract mathematical principle.

Caravale (1992) and Dow (1996) confront different traditions in equilibrium theory. But their analyses focus on contemporary theory and offer no information on the historical development of these traditions. A more historical perspective is provided by Hollander (1987) and Walsh and Gram (1980). Hollander’s work on the history of economic thought has but one major theme: to show that classical economics already contained the essential elements of the Walrasian general equilibrium paradigm: the concept of the margin, supply and demand schedules, and a recognition of the relationship between factor and output markets (Hollander 1987, 427–28). Thus a marginalistic revolution never occurred. According to Hollander, the transition to the neoclassical paradigm was gradual, involving a shift of emphasis rather than a sharp break with a past classical tradition. In contrast, Walsh and Gram (1980) argue that such a break did occur. They distinguish between two separate traditions in GE theory, a classical one dealing with the production and distribution of surplus value; and a neoclassical tradition which places the problem of the optimal allocation of scarce resources at the centre of economic analysis.

A thought-provoking contribution to this literature is Clower (1998). In just over 12 pages Clower is able to dissect ‘three centuries of demand and supply’, as the title of his article runs. Clower’s appraisal of the history of economic thought in this field is critical. He denies that three centuries of economic inquiry in terms of supply and demand has given us a better understanding of economic processes. Sarcastically, he notes that there has been ‘much growth’ in economic theory but ‘little development’. What disappoints him most is that economists have systematically ignored the impact of economic institutions and the related logistics of exchange. As a result, they blindly assumed that the economy possesses strong self-adjusting capacities. In particular, markets are assumed to almost always and everywhere work perfectly. Clower investigates the ‘diversions’ in the history of economic thought that have caused this distorted image of economic reality. In addition, he offers a suggestion to improve our future track record by investigating explicit algorithms for economic exchange in computer simulations. Clower’s history of supply and demand theory is clearly one with a message.
Mosini (2006) is a recent addition to the literature on the concept of equilibrium in economics. This book contains essays studying the role of equilibrium in economics from both a historical and philosophical point of view. The historical part focuses on the metaphorical role of equilibrium. This role is assumed to differ between economics and the natural sciences which it is often said to follow (Grattan-Guinness 2006). Further essays in this part concern Smith, Isnard and Cournot. The philosophical part is said to deal with contemporary economics but mainly discusses the methodology of equilibrium economics. In this discussion the question what economists actually do with their equilibrium theories is simply overlooked (for example Lawson 2006 and Backhouse 2006).

Two studies in the Dutch language that must be mentioned in this context are Keesing (1939) and Huussen (1985). Keesing discussed the different conceptions of equilibrium in economics and critically analyzed their function. His general critique was that the use of static concepts of economic equilibrium blocks the progression of scientific knowledge in economics. The reason for this is that, as a static concept, economic equilibrium has paradoxical consequences. This involves the claim that equilibrium theory is both logically consistent in the sense that economic decisions are coordinated and empirically significant because of a supposed real-life tendency towards equilibrium. Keesing advocated a dynamic disequilibrium approach as the best way forward in economics. Huussen analysed the role of the equilibrium concept in economics from a philosophical perspective. His study consists of methodological reflections on its explanatory role in the history of economic thought. He concluded that in a number of specific senses the equilibrium concept plays a pivotal role in economic theory, a role moreover that cannot be replaced by alternative conceptions such as Popper’s notion of rationality.

In sum, current texts which deal with the history and meaning of the equilibrium concept address several of the questions listed above. However, the results of these studies are difficult to compare as their focus differs to a large extent. Some focus on a specific tradition in equilibrium theory, for example GE analysis (Kornai 1971; Weintraub 1985b, 1991; Ingroa and Israel 1990), Keynesian theory (Sebastiani 1992; Ertürk 1996), Austrian economics (Rizzo 1979). Others limit the discussion to a specific period, for example the transition from the classical to the neoclassical period (Hollander 1987), or the work of specific economists – for example Adam Smith (Myers 1976) or Léon Walras (van Daal and Jolink 1993). Another feature of these texts is that they define categories of equilibrium analysis which seem mutually exclusive. Spiegel (1975) and Walsh and Gram (1980) are notable examples of this approach. The disadvantage of these definitions is that they artificially constrain the analysis: a concept must fit into one of their categories in order to enter the analysis.
HISTORY OF SCIENCE AND THE SCOPE OF THIS STUDY

Until this point, I have interchangeably used the terms equilibrium concept and equilibrium theory. One may ask if this correspondence is warranted. In my view, concepts and theories are both tools for generating scientific explanations and in that sense not essentially different. Science often makes use of concepts that are themselves the products of theoretical explanation. Nagel (1961, 17) refers to energy and entropy as examples of theoretical concepts that are widely used in scientific explanation, but which lack a direct link with an existing phenomenon. I argue that equilibrium falls in the same category. An equilibrium concept like the balance between supply and demand is an explanatory principle used in many economic theories. Used in this manner, equilibrium is the starting point of theoretical inquiry but often also its end product. For a particular market period, that the quantities supplied S equal the quantities demanded D is a truism, but when we are able to define S and D as functions of the price p, we get the skeleton of a theory. We are now able to state under which conditions price adjustments will be able to bring about the equality of S and D (S' > 0 and D' < 0 etcetera). Put briefly, one first needs to define the concept (S = D) in order to generate a theory which explains it.

How to investigate the historical development of a concept like that of equilibrium (with all its different meanings) in economics? This task must start by recognizing that history is not a value-free science. A history of ideas automatically raises questions about method, because the choice of a subject in a historical analysis is never arbitrary. In the words of Blaug (1975, 234): ‘to believe that it is possible to write a history of science “as it actually happened” without in any way revealing our concept of sound economic practice or how good science differs from bad science is to conduct the Inductive Fallacy in the field of intellectual history; by telling the story of past developments one way rather than another we necessarily disclose our view of the nature of scientific explanation.’ Put differently, by choosing to deal with one subject rather than another the historian expresses a certain preference of method. Kuhn’s warning that all observations are theory-laden applies to historical analysis as well. Just as a prescriptive methodology of science cannot be derived without considering historical facts, the ideal of a value-free, descriptive historiography of science is simply unachievable. As Lakatos (1970, 135) put it, ‘Philosophy of science without history of science is empty: history of science without philosophy of science is blind’.

The present study takes this warning seriously. The aim of this book is to investigate the historical development of equilibrium theory in economics as an analytical concept. That means that the focus of the analysis is on the theoretical function of the concepts that in the history of economic thought
were addressed as economic equilibrium. In addition, it is asked why in a particular period in history equilibrium theory played the theoretical role it did. Why did Smith believe that market prices would tend towards an equilibrium with natural prices? What was the function of the stationary state in Ricardo’s economics? To answer such questions the methodological function of the equilibrium concept must be considered. It then appears, for instance, that Smith used the metaphor of a natural equilibrium because he believed that a free market economy would operate like the parts of a machine working in an orderly fashion. To others, market equilibrium was just an aspect of economic reality that needed explanation.

Methodology in this sense is not what Lakatos meant when he wrote that history of science is ‘blind’ without the philosophy of science. Lakatos was thinking about the need to express one’s methodological convictions as an instrument to guide the selection and analysis of historical topics. In the words of Weintraub (1985b, 55), in order to appraise work in economics ‘we first need to say whether it is a theory, a research program or something else entirely’. Here methodology is a meta-theoretical framework consisting of statements about what differentiates good from bad science, what constitutes a progression of knowledge and what not, how to test theories, when to accept or reject them, etcetera.

However, the problem is that economists fundamentally disagree about the nature of economic research and the methodology associated with it. It is therefore impossible to reconstruct the methodology of past economic traditions in terms of a unified framework. This study tries to see the methodology of economic equilibrium theory through the lenses of its original expositors. Inevitably, this approach invokes the aforementioned inductive fallacy. I realize that, in a sense, the history of science and the philosophy of science are both blind because they lack a trustworthy compass. However, I also believe that good history and good philosophy of science ultimately find their audience. Why is Schumpeter’s *History of Economic Analysis* still an authoritative text, more than sixty years after its publication? Not because of his philosophical framework, which can be criticized for its excessive faith in the progress of science, but because of Schumpeter’s unique blend of economic and historical scholarship that keeps arousing the interest of readers. In similar vein, I hope that historians and economists are persuaded by this narrative that the history and philosophy of science may be blind but that they are not empty.

The lessons that are to be learned from the history and methodology of equilibrium theory in economics are of a diverse nature. In the first place, there is the question of the definitions of economic equilibrium. Chapter 2 explores this issue. Secondly, Chapter 3 studies the nature of neoclassical equilibrium theory – the most dominant branch in modern economics – from
a methodological perspective. This chapter shows why there is no unified methodological framework to assess economic theories. But it also argues that the disagreement about the standards of science need not be a problem. Different methodological approaches generate different explanations about the function and importance of neoclassical equilibrium theory, each of which has to be considered on its own merits.

The third topic of this book is the historical development of equilibrium theory in economics which is discussed in the subsequent nine chapters. Chapter 4 addresses the origins of the equilibrium concept in economics. This chapter investigates whether North and Boisguilbert deserve their credits as pioneers of equilibrium analysis. Chapter 5 examines the first graphical model of economic equilibrium, the tableau économique of François Quesnay and the physiocrats. This conception of economic equilibrium is compared to the work of Richard Cantillon who is often considered a predecessor of the physiocrats. However, the analysis will show that his ideas about the nature of economic equilibrium are in some respects the exact opposite of physiocratic analysis. Chapter 6 introduces the work of Adam Smith. He is in popular parlance the founding father of modern economics, but also a perfect example of the many scientific influences that directed the development of economic theory. This inheritance is demonstrated by looking into the natural metaphors that played a role in Smith’s analysis of economic equilibrium.

Chapter 7 takes the analysis a step further in time and addresses the statics and dynamics of classical economics. This chapter focuses on the controversy around Say’s law of markets in the early nineteenth century. It is argued that this controversy highlights a number of issues surrounding the use of the equilibrium concept in classical economics. Firstly, modern reconstructions of classical economics in terms of a static theory of general economic equilibrium ignore the fact that Ricardo and his followers saw equilibrium as a dynamic tendency towards an equality of aggregate supply and demand. Secondly, the opponents of the Ricardian School in the glut controversy endorsed the view that real economies in those days lacked the capacity to automatically restore an imbalance between aggregate supply and demand. In that sense the glut controversy can be seen as a debate about the nature of economic equilibrium.

Chapters 8 and 9 discuss the relationship between equilibrium theory and mathematical economics. The introduction of mathematics greatly facilitated the development of neoclassical equilibrium economics. However I argue that what I call the mathematical transformation of equilibrium theory also pushed economic analysis into a direction that led to a neglect of typical features of classical economics, such as the notion that equilibrium represents a dynamic tendency of market forces through historical time.
Chapter 10 addresses the subjectivist challenge of the Austrian school, which contributed to neoclassical revolution of the 1870s from a non-mathematical angle. Nowadays, this school is defined in terms of the market process approach, which places the issue of coordination of decentralized decision at the core of its analysis. In this chapter, I shall discuss the roots of this tradition. In particular, I will argue that the founding fathers – Menger, Böhm-Bawerk and Wieser – developed their subjectivist challenge in very diverse directions with profound effects on their conception of equilibrium.

Chapter 11 focusses on the troublesome relationship between equilibrium theory and monetary theory. Due to the influence of the quantity theory, money is generally seen as a veil which can safely be removed to expose the underlying mechanism of real economic equilibrium. It is not for nothing that large parts of economic theory are couched up in real terms and treat nominal changes as transitory effects. This chapter discusses the tensions between the static and dynamic interpretations of the quantity theory in the history of economic thought. It argues that there never was a full victory of real over monetary analysis. Economists have always felt the need to account for the complex dynamics between the monetary and real sectors of the economy, but they have also experienced the theoretical problems of explaining this connection. In those cases, static equilibrium theory often formed a convenient instrument to reduce the complexity of the question to more manageable size. I shall address Keynes’s use of this ‘short cut’ to the analysis of a monetary economy, as well as the attempts of modern theory to integrate money into the framework of general equilibrium analysis.

Chapter 12 investigates the innovating work of the Swedish and Austrian schools in the field of monetary theory. These schools did take the difficult road towards a dynamic analysis of monetary changes. The result was a reformulation of the concept of equilibrium. I shall discuss the theoretical developments linking equilibrium with monetary dynamics in these approaches. I shall also argue that it proved an unsuccessful revolution. The issues addressed were challenging, but the Swedish and Austrian approaches towards monetary dynamics did not gain a wide audience. This chapter explores the reasons of this failure.

The subsequent four chapters investigate the prospects of equilibrium theory through the lense of its negation. If equilibrium theory is considered a troublesome venue, for both theoretical and methodological reasons, then what can economics achieve by putting the analysis of disequilibrium centre stage? I will discuss several traditions in economics, who believe that they are carrying forward economic analysis in this direction. This brings into focus the Post Keynesian school and its call to take seriously the impact of uncertainty in economics (Chapter 13). The Austrian school follows a similar line of argumentation but substitutes a microeconomic point of view for the
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Keynesian focus on macroeconomics. The Austrian theory of entrepreneurship as part of their process-oriented approach to economics is the subject of Chapter 14. Chapter 15 then introduces themes that unite several heterodox schools in economics, evolution and institutions. It is here that new ground in uncovered for making disequilibrium a more important concept than equilibrium. Meanwhile in neoclassical economics one does not rest content with the present state of equilibrium theorizing. Chapter 16 discusses the efforts to strengthen the disequilibrium foundations of equilibrium analysis within the neoclassical mainstream.

In spite of these efforts the main finding of these chapters is that the disequilibrium revolution rebounces. Even the harshest critics of equilibrium theory fail to develop an alternative without applying some kind of equilibrium concept. The challenge of disequilibrium theory so paradoxically underlines the centrality of equilibrium to economics.

Chapter 17 concludes this book with the ultimate question: Which way forward in economics: equilibrium of disequilibrium theory? The answer is that a definitive answer cannot be given, but that a horses-for-courses approach is called for, combining the insights of both theories.

NOTES

1. For a history of monetary theory and the development of the quantity theory in particular, see Vickers (1959), Laidler (1991) and Chapter 12.
2. Ekelund and Hébert (1997, 119) consider the perception ‘of a natural order to society, existing in the absence of any form of central planning . . . one of the most liberating ideas ever to emerge in the history of economic thought’. An idea, moreover, which ‘shunted economic analysis onto a new path’.
3. Schumpeter’s unbounded admiration for Walras’s general equilibrium economics is well-known. In his History of Economic Analysis, he called Walras’s work the ‘Magna Charta of economic theory’ (Schumpeter 1954, 242, 968).
4. It must be stressed that Aristotle was by no means clear about what exactly determined this ratio. For a long time the usual interpretation was that Aristotle used relative labour costs to determine exchange values (Spiegel 1971, 32). More recently, commentators have argued that Aristotle’s ‘proportional reciprocity’ refers to differences in subjective perceptions of utility (Lowry 1969). Finally, Rothbard (1995, 16) maintains that the entire construction is bogus, for Aristotle writes that ‘the number of shoes exchanged for a house must . . . correspond to the ratio of builder to shoemaker’. But how can there possibly be a ratio between builders and shoemakers? In what units are we supposed to express such a ratio? Rothbard argues that this ratio has no meaning and that this particular exercise should be dismissed as an unfortunate example of ‘Phytagorean quantophrenia’ (ibid.).
I use this phrase with some hesitation, as Weber’s ideal types were part of a specific methodology which in some respects (for example testing ideal types) was in complete contradiction to the approach of the Austrian school. See Klant (1972, 135–143).

Caravale (1992, 75) likewise points to the fact that different conceptions of equilibrium are often not made explicit in economic discourse. He remarks that, as a result, equilibrium forms the source of considerable confusion: ‘Very frequently theoretical controversies between individual economists and between schools of thought are in fact made more intractable by existing differences in the conceptions of economic equilibrium, which are not clearly spelled out, and in the roles assigned to the notion of economic equilibrium.’ See also Lawson (2005) and Lawson (2006).

A link of this kind requires additional rules of correspondence, such as experimental procedures for identifying or measuring specific physical properties. See Nagel (1961, 17).

Equilibrium is therefore both input and output for scientific explanation, which sometimes breeds confusion. An example is Hausman’s (1992) definition of equilibrium theory in terms of seven ‘laws’ which themselves qualify as equilibrium theory, such as neoclassical consumer choice theory and the theory of the firm. See Hausman (1992, 53) and Chapter 3.