

## Economic Theory and Equilibrium

*Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.*

—J. M. Keynes (1936)

One of the most important concepts in both economics and finance is the notion of *equilibrium*. Strange as it may seem, however, it is a concept about which there has been much disagreement historically and about which there remains significant confusion. Nevertheless, invoking the concept of equilibrium is the deus ex machina by which we accomplish many of our tasks in finance and economics. Consider some examples:

- The prices of risky assets and bundles of cash flows typically depend on some kind of equilibrium concept.
- Entry and exit of new competitors or participants in markets occurs when we are “out of equilibrium” but stops when we are “in equilibrium.”
- The ability of firms to sustain positive economic profits over time depends on our conception of an equilibrium and whether we are “in one” or “out of one.”

Clearly, we need to add some teeth to this concept.

In some ways, developing a more precise concept of what is meant by “equilibrium” is the issue at the very heart of economic theory itself. For many, an exploration into theoretical economics—and its history—is out of place in a book like this, even in an appendix. But even at a deeply theoretical level, economics has a surprising amount of relevance for many of the problems this addresses. This Appendix thus begins with a brief introduction to why readers might want to consider what economic theory has to say about some of the concepts discussed here. We then turn to discuss more broadly what alternative theories of economics have said—and say—about equilibrium.

## RELEVANCE OF ECONOMIC THEORY

---

Lionel Robbins described economics as “the science which studies human behavior as a relationship between ends and scarce means which have alternative uses” (Robbins, 1932, p. 16). Especially when we recognize that scarce resources go well beyond hard assets like oil and include less tangible but equally important assets like knowledge, information, and human capital, it is hard to argue that economic theory is irrelevant. But at the day-to-day level of corporate decision making, economic theory has been so marginalized that it is viewed as being largely irrelevant.

The now almost universal aversion to economics in practical discussions is not confined to business practitioners. *Everyone* outside the economic profession has probably at one time or another regarded economists as overly theoretical and abstract creatures disconnected from the operations of “the real world.” Several reasons account for this general unpopularity of economics and its perceived general lack of real applicability.

The first is a self-inflicted wound for which economists have only themselves to blame. Namely, scholarly economics journals and studies have over the years become increasingly reliant on highly mathematical and technical modeling approaches. The *methodology* of economics has in effect erected a barrier to entry around the academic side of the profession. Within the academic profession of economics, those without either the mathematical skills required to be a theorist or modeler or the statistical skills required to be an empiricist or econometrician are regarded as “not very good.” They do not get tenure at the coveted universities, and their papers appear in second- and third-rate journals. Paradoxically, the better the economist by most current metrics of the profession, the less likely it is that an average person with a B.A. from a liberal arts school will be able to digest what they say and write. Although not, to be sure, universally true, the correlation between work that the economics profession tends to reward and work that outsiders cannot understand is disturbingly high.

Despite the preponderance of technical modeling that goes on in economics today, this was not always the case. In fact, the only stumbling block to reading Smith or Ricardo or Mill or any of the other great classical economists—basically anyone writing before 1870 about the behavior of humans in the face of resource scarcity—is their use of older styles of written English. The “barriers to entry” for the classical works, though, are small.

Also important to recognize is that the classical economists were *not* marginalized. On the contrary, they were quite frequently very important members of society, and their works received mainstream attention and significant debate from virtually all classes of society. Historically, economics was neither a science nor a subject aimed primarily at the intellectual. The major

works of two of the greats—Smith and Ricardo—actually were direct responses to *political legislation* of their day concerning restraints on international trade.

A second reason for the marginalization of economic theory today must surely be the widespread perception its general failure as a science. Although I shall have more to say on the methodology of economics as teleology a bit later, suffice it to say now that this criticism is largely correct, albeit frequently misunderstood. An example will suffice to illustrate the point. In physics, the law of gravity says that when an apple becomes detached from the tree, it will fall to the ground. No matter how much data you collect, this will be true 100 percent of the time. In economics, the criteria for determining the “success” of models are much laxer. The law of demand, for example, states that the price someone is willing to pay for a good is inversely proportional to the quantity demanded—that is, “demand curves” slope down. Although every fiber of our being may agree that this is intuitively true, economists would regard a regression R-square of 30 percent to be a wild success. Tell a physicist that you can explain only 30 percent of apple falls and she will laugh at you.

Finally, the history of economics is fraught with tremendous disagreement *within the profession* about certain nontrivial issues. For many years, a central subject of debate among economists concerned the importance of the supply of land in determining economic profits. Today, most economists do not even consider land as a separate and distinct factor of production. And if reputable members of the profession cannot agree, how can those outside it agree?

Essentially the same problem is encountered in theology. Even within Christianity, the often vitriolic and always impassioned disagreement among members of the pastorate and clergy in different Protestant denominations and in the Catholic Church lead many laymen to be fairly confused. People tend more often than not, at least initially, to be biased to what they are used to hearing, rather than to what might be considered “correct.” Add to that that both economics and religion often deal with inherently “untestable” propositions—you cannot *prove* that a demand curve slopes downward any more than you can *prove* God exists—and you have a generally befuddled population.

An important difference between economics and religion—and the two are indeed often compared—is that at least in religion the layman has access to “primary source documents” and to the same data as the clergy. People can pick up the Bible or the Koran and read them for themselves, drawing their own conclusions as they see fit. And they can supplement those conclusions by listening to debates by the experts of their field.

Economics, by contrast, is a highly data-intensive field in which many professionals do not even have the raw materials required to engage in statis-

tical inference. And, as noted earlier, outsiders are doomed to be forever locked out of reading the debates economists have with themselves without a strong background in calculus and regression analysis.

To keep the analogy going, however, let me quote the pastor of my own church, Erwin W. Lutzer, who likes to remind people that “Everyone is entitled to their own opinion, but everyone is *not* entitled to their own truth.” If for the purpose of this example assuming that there *is* an absolute truth, the question then is how best to find it out. In this regard, disagreements among theologians do not alter the fundamental principles of what is true about God. Likewise, the inability of economic theories to be reconciled with the data and communicated effectively to the public does not alter the truisms that may well underlie the behavior of humans and firms facing resource scarcity. In other words, economics may be *inaccessible* to many, and it may be *abstract* in theoretical form and empirical practice. But it is absolutely not *irrelevant*.

To draw one final parallel between economics and religion in the context of the prior statement, it is often true that much can be gained by the struggle to find the truth, even when the quest for 100 percent “proof” is doomed to fail from the start. In theology, self-examination together with careful study of the extant doctrinal beliefs, primary documents, exegetical controversies, and the like can lead one to become quite comfortable with an absolute belief system. And this may well be true despite the absence of physics-like laws that can be postulated and either proven or disproved.

German historian Karl Popper criticized much of economics as resting on a set of “nonfalsifiable” propositions—they could not be *disproved*. Nevertheless, he was the first to recognize that the analysis of the problem was the source of the greatest intellectual gain, not the resolution of the underlying question.

In the spirit of Popper, certain parts of this book take a fairly close look at competing economic theories. You are encouraged not to be put off by this, however, but rather to be stimulated into drawing *your own* conclusions. Some of the theories we discuss in this book *are* testable, and, indeed, have been tested. They are falsifiable by their nature and thus true or false. That does not mean we have clear answers to the questions underlying these theories. As noted, the methodology of economics may never give us a clean answer to whether a falsifiable theory is correct. And in still other cases, we will deal with theories that are nonfalsifiable—for example, Frank Knight’s belief that profits can arise only from sources of randomness that cannot be measured. If they cannot be measured, they cannot be tested.

The use of derivatives in risk transfer is an extremely practical and narrow field of interest. That does not make this subject free of significant debate, both methodological and empirical. And like it or not, the economic theories we put forth *do matter* and they *do affect* how people view these

products and markets and participate in derivatives activity. Take an example. J. M. Keynes believed that establishing an uncovered, naked short position in a derivatives contract based on a physical commodity would generate positive average profits over time. This is strong stuff—it says that being short makes money on average. If this is true, it should affect the way firms hedge, the way individuals construct their portfolios, and the way practical market mechanisms address “long” versus “short” positions. We thus have an obligation to take a hard, serious look at this theory.

## **SCHOOLS OF ECONOMIC THOUGHT AND CHARACTERIZATIONS OF EQUILIBRIUM**

---

The so-called “professionalization of economics” did not begin until the end of the nineteenth century, mainly in England and the United States. Prior to that, the analysis of economic problems was undertaken by theologians, lawyers, philosophers, businessmen, and statesmen—those who had “day jobs” other than “economist” who either analyzed economic problems as part of those other jobs or on their own time. Consider the number of great early economists throughout history for whom economics was not their actual profession: Adam Smith was a moral philosopher; Richard Cantillon was a merchant banker and real estate speculator; Thomas Malthus was a clergyman in the Church of England; John Stuart Mill and David Ricardo were Members of Parliament; Antoine Augustin Cournot was a professor of mathematics; and Karl Marx was a journalist (only later in his life a revolutionary).<sup>1</sup>

The beginning of economics as a true profession was marked by the emergence of the *Quarterly Journal of Economics* as the first scholarly journal of the field in 1886, followed quickly by the *Economic Journal* in 1890 and the *Journal of Political Economy* in 1892. Commensurate with the creation of “true economists” was the beginning of the field’s progression toward increasingly more mathematical formalism and to a shift from what economic historians like to call the classical and neoclassical periods.<sup>2</sup> Both the classical and neoclassical periods are also considered “schools of thought” in economics today. There are several other schools of thought, moreover, that do not conform to specific periods of time. Most of these are not discussed here, with one exception.

### **Classical Period**

The classical period began with Adam Smith’s *Wealth of Nations* published in 1776 and ran roughly up to the period from 1870 to 1890. This period of economics arguably contains the greatest advances in thought of any period—

relative to where things started, of course—but lacked the development of a consistent and coherent theme. Indeed, throughout most of the period the major players were arguing with one another. These players included Adam Smith, David Hume, Thomas Malthus, John Stuart Mill, David Ricardo, and Karl Marx.

A central preoccupation of the classical economists was what we now call *capital theory*. Most classical economists considered there to be two or three factors of production, depending on how you define the terms: labor, land, and capital. Capital theory seeks to clarify what exactly is meant by the slippery term, as well as what gives capital its “value.” As an example of the lack of agreement, Malthus (1820) believed that the value of capital was what determined the value of what capital produced, whereas Ricardo (1817) considered the value of capital to be the value of labor sacrificed to capital-intensive production. Marx (1859) later extended the Ricardian “labor theory of value” into the theory that the value of capital came from the ability of its owners to *exploit* labor during capital-intensive production.

A major theme of the classical period that is evident to at least some degree in all the major works is the belief that production capabilities were determined totally exogenously by a mixture of the available land and resources, the state of knowledge, and the supply of capital. This assumption came to characterize *Ricardian economics* after its initial developer. Disagreement occurred, however, about distribution. Ricardo also felt that the distribution of resources occurred to ensure that all participants earned an essential constant profit, and resources moved around to ensure that fact. Mill and others argued instead that the distribution of wealth was driven by human behavior and was endogenous.

Another major precept of the classical period was the belief that most things in an economy tend toward some *natural rate*, and it was in this belief that the core concept of equilibrium was defined for the classical economists. According to the classicists, the value of resources in the market tended toward the natural rate, and shifts in supply were required to bring about that tendency. The tendency of supply shifts to cause a convergence between market and natural rates is essentially the Classical or Ricardian definition of an equilibrium.<sup>3</sup>

### The Marginalist Revolution and the Neoclassical Period

The birth of the neoclassical period is generally credited to William Stanley Jevons (a meteorologist and chemist turned economist) and Léon Walras (an economist in Lausanne, Switzerland) (Backhouse, 2002). Jevons and Walras—together with Carl Menger—led the so-called “marginalist revolution” that turned much of classical economic theory—including its characterization of equilibrium—on its head.

Specifically, Jevons and Walras believed that market values of assets and factors of production were determined by interactions between supply and demand “at the margin.” As Hicks (1989) notes, however, Jevons and Walras did a better job of identifying the problem with the classical theory (i.e., ignoring the importance of incremental benefits and costs) than in proposing a solution.

Jevons (1871) introduced us to the Law of One Price—identical goods of uniform quality must sell for the same price. Jevons’s “law of indifference” then stated that the market price of a good was the price at which the marginal or incremental unit of that good would sell. The problem with that idea is that he never really explained how the market reached that point. In addition, if equilibrium is taken to mean the equality of supply and demand, then Jevons’s proposition implied that markets are always and constantly in equilibrium.

Walras (1874) was working without knowledge of Jevons but reached essentially the same theoretical impasse (Hicks, 1989). Walras argued that the market price of a good was the price at which supply and demand curves intersected. Walras is often credited with being one of the first two economists to recognize, moreover, that demand schedules trace to a concept known as *marginal utility*—the idea that the incremental quantity demanded of something depends on the incremental value or utility that the economic agent gets from the good (Schumpeter, 1954; Robbins, 1998). (Menger was the other economist to recognize this, as we shall see.)

What Walras did *not* do, however, was contemplate any realistic adjustment mechanism by which the market forces of supply and demand were reconciled. Instead, Walras merely supposed the existence of an auctioneer who literally called out prices. In his famous adjustment process of *tatônnement*, the auctioneer continued calling out prices until the marginal utility of some agent (i.e., the demand) was equal to supply. But especially on the supply side, Walras was fairly silent on where this auctioneer got her information.

Edgeworth (1881) refined the notion of a Walrasian equilibrium by introducing the possibility of *recontracting*. If the Law of One Price or Jevons’s law of indifference was violated, economic agents would simply amend their prior price agreements. A buyer who purchased at an excessive price would recontract by repudiating his first purchase agreement and then identifying a new seller from whom the good could be purchased at a lower price. Or a buyer who had unfilled demand at a given price could entice suppliers to provide more of the good by offering a higher price. Either way, the uniform price would tend to equate supply and demand at the margin.

The “equilibrium” postulated by Edgeworth, however, did not necessarily result in the same allocation of resources as the “equilibrium” postulated by Walras. In Edgeworth’s case, gains and losses on trades conducted “out of equilibrium” would generate income effects that dictate where the final equi-

librium would occur, which might happen to be exactly the same as a Walrasian equilibrium but probably would not be.

Marshall (1890) is often regarded as having applied formalistic and mathematical principles to the early classical economists. In some sense this is accurate as concerns his notions of equilibrium. One of the most important concepts developed by Marshall was the notion of a *short run* and a *long run*. The short run was essentially Edgeworth's recontracting period in which profits and losses were possible because of deviations in supply and demand with their "true" long-term values. In the long run, all profits were driven to their natural rate of zero. *Only imperfect competition can explain positive long-run profits in a Marshallian equilibrium.* On the production side, entry by new firms occurs until the marginal entrant has a minimum average cost. The long-run demand supply curve is then the long-run minimum average cost curve, and a long-run equilibrium is one in which price (demand or marginal revenue) is equal to minimum average cost, which in turn is equal to marginal cost (supply).

### The Neoclassical School

For the most part, Marshall's *Principles* is regarded as the defining price theory text of the neoclassical school of the price system. The basic tenets of the neoclassical school include the following: the Law of One Price; the distinctions between short-run and long-run behavior of market participants and markets; the inability of firms to earn positive economic profits in the long run in a perfectly competitive market; returns to scale in production; nonsatiation and diminishing marginal utility in consumption; and market efficiency.

### Menger and the Austrian Critique

Around the same time that the neoclassical period and school began to emerge with Jevons, Menger, an Austrian, led (perhaps unintentionally) a move in a slightly different direction—later to become known as the Austrian school, so named because most of the contributors to this theory were resident at the University of Vienna.

The Austrians had several major points of departure with neoclassical economists; chief among them was the disdain of most Austrians after Menger to embrace mathematics as a tool of economic analysis. Unfortunately, as the neoclassical paradigm became steadily more rooted into the intellectual fabric of the times, the Austrian school was quickly marginalized. Defenders of the neoclassical approach argued that Austrians simply lacked the technical acumen to use mathematics, and in some cases that was probably an accurate criticism (Schumpeter, 1954).

The criticisms of the Austrians, however, were unfortunate inasmuch as

some significant developments in economic theory were made by Austrians—for example, the work on capital theory by Böhm-Bawerk (1891) and Lachmann (1978). But many of these concepts did not work their way into conventional economic thinking until they were ultimately championed by someone deemed closer to the neoclassical school, such as Nobel laureates F. A. Hayek and Sir John Hicks, who were sympathetic to the Austrian school but regarded as and accepted by the neoclassical establishment.

Although it is easy and tempting to point at the use of mathematics as the major distinction between the neoclassical and Austrian schools, this is a severe oversimplification of what actually were fairly serious methodological disagreements.<sup>4</sup> An important gulf between the neoclassical and Austrian schools concerned the definition of value or marginal utility. Menger (1871) deserves probably as much credit as Walras (1874) for recognizing the role of marginal utility in governing consumption optimality. But unlike Walras and other neoclassicals, Menger (1871) advanced the theory of *subjective value*, which held that each individual's values and utilities were subjective, relative, dependent on the psychology and wants of that particular individual, and—importantly—not directly comparable across different economic agents. So, the *concept* of marginal utility was identified in Menger, but, along with it, the impossibility of operationalizing the concept also was born.

The differences between the Austrian and neoclassical schools in areas apart from utility often had a parallel with the disagreement on value. Namely, neoclassical economics tends to stress objective and knowable quantities, whereas the Austrian school tends to stress subjective and unknowable quantities. Apart from the objective versus subjective value debate, this chasm is perhaps nowhere more obvious than in the notion of equilibrium.

The neoclassical theory of equilibrium essentially postulates an equilibrium as a balance of forces—supply and demand—that lead to either a state of rest or a steady state of uniform motion in a system. Adjustments occur discretely as the economic system jumps from one state into another until it reaches a point of stability and balance.

In the Austrian theory, equilibrium can be better defined as a situation in which knowledge and expectations lead to consistent plans. Hayek (1937) defines an equilibrium as a situation in which “the different plans which the individuals composing [an economic system] have made for action in time are mutually compatible.” To Austrians, equilibrium thus is more of a *tendency* than a stationary or steady state. Importantly, perhaps the richest insights from the Austrian school thus are not its analyses of equilibrium, but rather its analysis of *disequilibrium*.

In the neoclassical paradigm, disequilibrium is simply not very interesting. It is just a condition in which markets do not clear and must adjust toward a market-clearing set of prices. In the Austrian paradigm, disequilibrium is basically the constant state of affairs. Markets still *tend* toward equilib-

rium, but the constant changes in information, knowledge, and expectations of individuals make the market much more of a *process* than a state of nature.

The consequences of the divergence between the Austrian and neoclassical schools are significant. The neoclassical picture is a fairly choppy one in which individuals and firms jump discretely toward a Marshallian long run in which everyone believes the same thing and no firm can make positive profits. But what if the Austrian school were right and there is essentially no such long run? That would imply some form of stable situation in which profits *are* possible and information is *not* equal across market participants.

### **The Neo-Austrian Middle Ground**

Importantly, it is not really necessary to pick a philosophical allegiance to explore these issues. Perhaps no one understood this more than Sir John Hicks, who liked to call himself a “neo-Austrian.” Himself a Nobel laureate in economics, Hicks was deeply rooted in the neoclassical tradition. And yet, Hicks recognized the importance of some of the Austrian concepts. Like many, he did not believe that the Austrian school had put forth an alternative theory of economics to the neoclassical or even the classical school. But he did believe there was much about neoclassical economics that could benefit from Austrian insights. For example, Hicks adopted a Hayekian notion of equilibrium as consistency in plans in most of his work, recognized the importance of heterogeneous expectations and information in the process by which markets adjust, and fundamentally disagreed with the Marshallian notion of a clean dichotomy between a short run and a long run. Yet, he embraced these Austrian beliefs without ever giving up the standard tools of formal economic analysis pioneered by Jevons and Walras.

The vast majority of this book takes a methodological approach quite similar to that of Hicks. Throughout most of the book we essentially retain the core features of the neoclassical paradigm (the Law of One Price, marginalism, rising supply price, etc.), but we remain openly sympathetic to the Austrian critique and to the Austrian views of the market as a process and equilibrium as a consistency in plans rather than a balance of forces. Indeed, as we see throughout this book, it becomes quite hard to explain a lot of financial and derivatives market activity without being *a little bit* Austrian.

### **NOTES**

---

1. For those seeking a good introduction to the history of economics and the great economists, Backhouse (2002) is a good place to start. More seasoned veterans may prefer a deeper look, such as Schumpeter (1954) or Robbins (1998)—both are classics but neither is “light beach reading.”

2. Certainly there were intellectual contributions to and developments in the theory of “economics” before the classical period. Robbins (1998) refers to these early works as comprising two groups. “Anticipations” of what was to come more systematically later includes all the early works, such as Plato and Aristotle. Between those who anticipated economics and the classical period was the “Emergence of Systems” in which several key intellectuals advanced theories that recognized some of the fundamental organizing principles of classical (and in some cases neoclassical) economic theory. Major contributors to this period include Cantillon, the Physiocrats (Mirabeau, Quesney, Law, and Turgot), Locke, and Hume.
3. Ricardian economics is here equated with classical economics because Ricardo first took natural rates to the extreme and truly *systemized* them. To Ricardo, *everything* had a natural rate—a natural rate of profits, a natural rate of interest, a natural rental rate for land and labor, and so on—and shifts in supply of all these variables were required to bring market and natural rates into equality. See Hicks (1989).
4. See White (1977).