

Equilibrium Analysis: Two Austrian Views

MAREK HUDIK

Email: Marek.Hudik@xjtlu.edu.cn

Web: <https://sites.google.com/site/marekhudik/home>

Abstract: I compare two views of the equilibrium concept: one from F. A. Hayek and the other from Fritz Machlup. I argue that Machlup's equilibrium concept is price-theoretic, that is, it is a tool of problem-based, comparative static analysis. In contrast, Hayek's equilibrium concept approximates the social order observed in reality. While the Hayekian equilibrium is an explanandum, the Machlupian equilibrium forms a part of the explanans. Further, Hayek's approach is more descriptivist than problem-based. I argue that the two equilibrium concepts are not mutually exclusive alternatives. In particular, the adequacy of the Machlupian equilibrium for price-theoretic analysis is unrelated to the adequacy of the Hayekian equilibrium for analyzing the social order. In fact, I show that the two types of analysis can be seen as complementary. I conclude that the main issue is not to decide whether the equilibrium concept is useful in general but to determine the proper sphere of application of a particular equilibrium concept.

Keywords: equilibrium, F. A. Hayek, Fritz Machlup, price theory, social order, Austrian economics, Marshallians, descriptivism

The concept of equilibrium has always been subject to controversy. While some have considered it a building block of economic analysis, others have identified it as an obstacle to understanding economic phenomena (for surveys, see e.g. Boland 2017; Milgate 1987; Tieben 2012; Weintraub 1986). Specific views about equilibrium analysis are held by Austrian economists, who tend to be on the skeptical side of the debate. The Austrian view derives mainly from the works of Hayek (1937, 2007), who, unlike some of his followers, did have a use for the equilibrium concept, at least in his earlier works. Nevertheless, his concept of equilibrium arguably differs from the concept used in conventional economic analysis. Hayek's views about equilibrium are sometimes—but perhaps not often enough—contrasted with those of fellow Austrian Fritz Machlup (1958), whose concept of equilibrium seems to be closer to the conventional view. Machlup defends an interpretation of the equilibrium concept as a tool of analysis that has no relationship to the question of whether there is some sort of order in society. This marks an important difference between Machlup's and Hayek's views. For Hayek, the use of equilibrium as a tool of analysis is justified precisely by the fact that there is a social order that in theoretical analysis can be idealized with an adequately defined equilibrium concept. In short, for Hayek equilibrium is an explanandum, while for Machlup, it is an analytical tool, and therefore, a part of the explanans.

The aim of this paper is to trace the main differences between Machlup's and Hayek's views, with the hope that this exercise will help to throw some light on the usefulness of the equilibrium concept to economics in general. I find two sources of the differences between the two authors' views. The first is methodological. I argue that Machlup's concept of equilibrium is Marshallian in the sense of Friedman (1949, 1953), or price-theoretic (Hudik 2017; Weyl 2017), in the sense that its use is dictated by the problem at hand rather than its descriptive accuracy. In contrast, Hayek's views are more descriptivist because he justifies the use of the equilibrium concept with reference to its correspondence with the real-world social order. It is tempting to describe the difference between these two positions as a difference between “instrumentalism” and “realism”, but this temptation should be resisted. Both Machlup and Hayek consider equilibrium an “instrument” and both of them consider it related to “reality”, albeit in different ways. The second source of difference between the views of these two Austrians is their difference in focus or subject matter. Machlup is simply interested in analyzing relationships among variables, namely, in isolating the effects of changes in one variable on other variables. In contrast, Hayek considers equilibrium not as representing a relationship among variables but among plans. Hayek's thoughts on equilibrium center on the following question: how is it possible that

plans of independent individuals with limited knowledge end up being compatible (or sometimes not)? Thus, it seems that Machlup's concept of equilibrium is not helpful in answering Hayek's question and vice versa. This underlines the argument made by Machlup (1958, 1), and repeated by many thenceforth, that if two people talk about equilibrium they do not necessarily talk about the same thing.

I draw two main conclusions from my analysis. First, if an equilibrium concept is found useless for a purpose or because it does not accurately reflect reality, it does not follow that this equilibrium concept is useless for any purpose. The price-theoretic case for equilibrium advanced by Machlup, and in particular, the various fruitful applications of this concept (see e.g. the works of Becker, who explicitly makes the equilibrium concept one of the cornerstones of his approach (Becker 1976)), are examples at hand. Second, price-theoretic equilibrium analysis is designed to deal with a specific subset of questions: it is concerned with comparative static analysis and focuses on large-scale and/or persistent phenomena (Becker 1993b; Hudik 2017; Stigler and Becker 1977). Arguably, this type of analysis is not directly applicable to the problem of social order analyzed by Hayek. Therefore, if the equilibrium concept is found useful in some applications, it does not follow that there is no room for non-equilibrium economics, as is envisioned by many economists of various traditions (e.g., Arthur 2006, 2010; Boettke, Horwitz, and Prychitko 1994; Burley and Foster 1994; Freeman and Carchedi 1996). In sum, the issue is not whether to use equilibrium analysis but identifying its proper area of application.

Hayek's views of equilibrium have been discussed in various contexts and in various degrees of depth. Some of these discussions focus on the interpretation and evolution of Hayek's views in the context of the Austrian school (Vaughn 1999, 2013), heterodox traditions (Lawson 2005), and economics in general (Giocoli 2003). Other discussions are critical of Hayek's views and attempt to develop them further (Lewin 1997; O'Driscoll, Jr. 1977; O'Driscoll, Jr. and Rizzo 1996; Rizzo 1990, 1992). Vriend (2002) and Bowles et al. (2017) demonstrate the relevance of Hayek's views to contemporary analysis of complex adaptive systems. All these and similar discussions are useful in interpreting and extending various aspects of Hayek's work. However, with few exceptions, they do not attempt to trace differences between Hayek's concept of equilibrium and alternative concepts. The discussions that dispense with equilibrium on Hayekian grounds do not explain why many economists find the equilibrium concept useful. In sum, such discus-

sions do not provide a satisfactory answer to the following question: for what type of analysis (if any) is equilibrium a useful concept?

Although Machlup's views of equilibrium are well known, they are usually given only a passing reference and are not developed further. Arguably, many Austrians did not find Machlup's views on equilibrium helpful in developing a market-process approach, and neoclassical economists had little to add to Machlup's analysis. Machlup's work is mentioned by Rizzo (1990, 1992) and O'Driscoll and Rizzo (1996), but mainly in the context of the Hayekian problem of plan coordination. Klein (2008) identifies Machlup's equilibrium concept as one of the four concepts used in Austrian tradition. Useful discussions of some aspects of Machlup's views include Finger (1971) and Foss (1995). In a thorough analysis of Machlup's methodology, Langlois and Koppl (1991) distinguish Machlup's views from Friedman's. An important part of my argument is that both Machlup and Friedman belong to the same price-theoretic camp in relation to the concept of equilibrium. Although I accept that there may be methodological differences between Machlup and price theorists such as Friedman, I argue that these theorists have similar views on the interpretation of equilibrium analysis.

The paper is organized as follows. Section I summarizes Machlup's concept of analytical equilibrium. Section II distinguishes between the price-theoretic and descriptivist approaches to economics, and presents the main characteristics of both. This section also argues that Machlup's views of equilibrium are price-theoretic. Section III presents the price-theoretic concept of equilibrium in action using Becker's (1991) analysis of restaurant pricing as an example. Section IV then turns to Hayek's concept of equilibrium. It summarizes Hayek's views and discusses them from the price-theoretic/descriptivist perspective. In particular, this section argues that Hayek's views tend to be descriptivist. Section V discusses the relationship between equilibrium as a theoretical concept and social order as a real-world phenomenon. This section argues that the price-theoretic tradition does not use the equilibrium concept to describe social order. Nevertheless, it can be used to answer certain questions about this order. This section demonstrates that the Hayekian and Machlupian approaches can be considered complementary.

I. MACHLUP'S ANALYTICAL EQUILIBRIUM

Machlup (1958) argues that equilibrium is an analytical concept—a methodological device for an explanation of a change. It is used to isolate all effects of a change in a particular variable or variables under the assumption that all other things remain equal. Equilibrium analysis proceeds in four steps: first, an initial equilibrium is defined (e.g. an equilibrium of supply and demand in a market for a good); second, a disequilibrating change is postulated (e.g. a general increase in income); third, adjusting changes are described (e.g. change in the demand for the good); fourth, a new equilibrium is identified (e.g. a new equilibrium of supply and demand). Machlup's interpretation can be extended from temporal to spatial analysis (i.e. to comparative statics in general). That is, in addition to explaining the effects of a change, the equilibrium analysis can be used to explain differences in the values of endogenous variables (e.g. prices) in geographically separated markets via differences in the values of exogenous variables (e.g. levels of income) (Hudik 2017).

For these analytical purposes, Machlup defines equilibrium as a “constellation of selected variables so adjusted to one another that no inherent tendency to change prevails in the model which they constitute” (Machlup 1958, 9) or as a “mutual compatibility of a selected set of interrelated variables of particular magnitudes” (Machlup 1958, 10). Note the word “selected” in both definitions. According to Machlup, equilibrium is not a definite concept but a relative one: the variables chosen for the equilibrium analysis depend on the problem at hand. In particular, there is no attempt to include “all” variables that may affect behavior in the real world. The relativity of the equilibrium concept implies that one and the same situation could be both an equilibrium and a disequilibrium at the same time, depending on the perspective.

Being a mental tool, analytical equilibrium is not identifiable with any concrete situation in the real world—in Machlup's (1958, p. 11) words, it is not an “operational” concept. The reason is that the real world is very complex. It has “infinitely more variables than any abstract economic model” (*ibid.*). According to Machlup, the purpose of equilibrium is not to provide an accurate or even approximate description of the real world and yet it is a useful analytical tool. Thus, it follows that rejections of equilibrium based merely on it not existing in reality miss the point. That is, for Machlup, the existence of some sort of equilibrium in

the real world is irrelevant. It follows that different attitudes toward the equilibrium concept are not necessarily due to differences in empirical propositions about the world (i.e. to what extent equilibrium can be identified in real-world phenomena) but are due to differences in methodological views. These methodological differences are discussed in the following section.

II. PRICE-THEORETIC APPROACH

Machlup's approach to equilibrium can be characterized as Marshallian or price-theoretic. The crucial characteristic of this approach in the present context is that it is problem-based, that is, the choice of relevant variables and parameters for a particular equilibrium analysis always depend on the problem at hand. The aim of price-theoretic analysis is to explain changes or differences in aggregate phenomena. In particular, the aim of such analysis is not to provide an accurate description of reality or to uncover the “true” categories in the world. Concepts used in price theory are simply mental tools that are adjusted for different purposes. With this practical purpose in mind, price theory uses approximations and simplifications at the expense of generality, descriptive accuracy, and mathematical elegance.

The approach that values the latter characteristics above practicality has been termed “Walrasian” by Friedman (1949, 1953). This alternative approach is “holistic” in that it attempts to reflect various features of reality⁷. The problem-based approach of price theorists has led many commentators to describe this type of analysis as “partial”, while the holistic approach of Walrasians has been described as “general”. However, these epithets are misleading because price theorists consider all relevant considerations related to the issue at hand, which, of course, rarely includes all markets in the economy (Friedman 1949). Likewise, price-theoretic focus on the explanation of real-world phenomena has been interpreted as “applied” analysis as opposed to “theoretical” enquiry that is concerned with the logical consistency of formal models (Hands 2017). In fact, this allegedly “applied” price-theoretic analysis is responsible for incorporating new variables into economic analysis, such as permanent income (Friedman 1957), education (Becker 1993a; Schultz 1971), and social influences (Becker and Murphy 2000). In contrast, the attempts to incorporate various real-world features into “theoretical” Walrasian models often result in intractability. Consequently, the set of variables considered in these models (i.e. market prices, income, and

technology) are the same for both Walras and his followers (Arrow and Hahn 1983).

For the purpose of this study, the label “Walrasian” is inadequate to describe approaches that value the descriptive accuracy of assumptions. One reason is that many of these approaches are critical of Walrasian economics and do not necessarily value mathematical elegance. Moreover, Walrasian economics arguably represents a widely inaccurate description of economic reality, although this is due to exogenously imposed constraints (i.e. reality is too complex to be accurately reflected in the model), rather than a matter of modeling philosophy. Therefore, I will use the term “descriptivism” to denote all the approaches that value the descriptive accuracy of theories. Descriptivism goes hand-in-hand with attempts to construct holistic, all-purpose models: what is important to descriptivists is the realism of assumptions as such and not the adequacy of assumptions for the problem at hand. Various critiques of rational behavior or perfect competition that refer to a lack of realism and ignore the purposes for which these theories were constructed are descriptivist according to my definition.

Machlup’s analytical equilibrium is wholly in line with the price-theoretic approach: he emphasizes the relativity of the equilibrium concept and its problem-dependence (Machlup 1958, pp. 10, 12–13, 21). He also argues that equilibrium is a tool rather than a state of the world. In fact, he claims that to “characterise a concrete situation ‘observed’ in reality as one of ‘equilibrium’ is to commit the fallacy of misplaced concreteness” (Machlup 1958, p. 12). For Machlup, it makes little sense to assess the equilibrium concept from the perspective of descriptive accuracy but from its adequacy for analyzing a particular problem at hand. Machlup (1958, p. 11) also rejects holism: he argues that the real world is too complex, and that theory must be selective.

Again, the selection of the “right” variables is not definitive but should be performed on a case-by-case basis. Finally and importantly, Machlup (1958, p. 8) uses Marshall’s analysis of time periods to illustrate his notion of equilibrium, which suggest his affinity to the price-theoretic tradition. In the following section, I provide an example of the price-theoretic approach to equilibrium.

III. EQUILIBRIUM ANALYSIS: AN EXAMPLE

To illustrate Machlup’s concept of analytical equilibrium, it is useful to consider Becker’s (1991) analysis of restaurant pricing. Becker begins by presenting an observation that prices of many restaurants seem to be too low given that they have long queues for tables. The situation can be illustrated in a conventional supply–demand diagram (Figure 1a). In this figure, p_o is the observed price while p^* is the price that equates the quantities supplied and demanded. If we consider the usual variables affecting demand (prices and income) and supply (cost and technology), we conclude that the situation is out of equilibrium, that is, the selected variables are not “adjusted to one another that no inherent tendency to change prevails in the model”, as Machlup’s (1958, p. 9) definition requires. In particular, in the conventional supply–demand model, there is a tendency for price to increase. However, we do not observe this tendency in reality: queues in front of restaurants (or theaters and sport stadiums) is a long-lived phenomenon. This fact calls for a different equilibrium model: none of the conventional variables can explain why we observe queues in some markets and not in others. The fact that this phenomenon is persistent and widespread eliminates an error as a probable cause.

Becker’s solution is to incorporate a new variable into the model. Namely, he assumes that the individual demand for

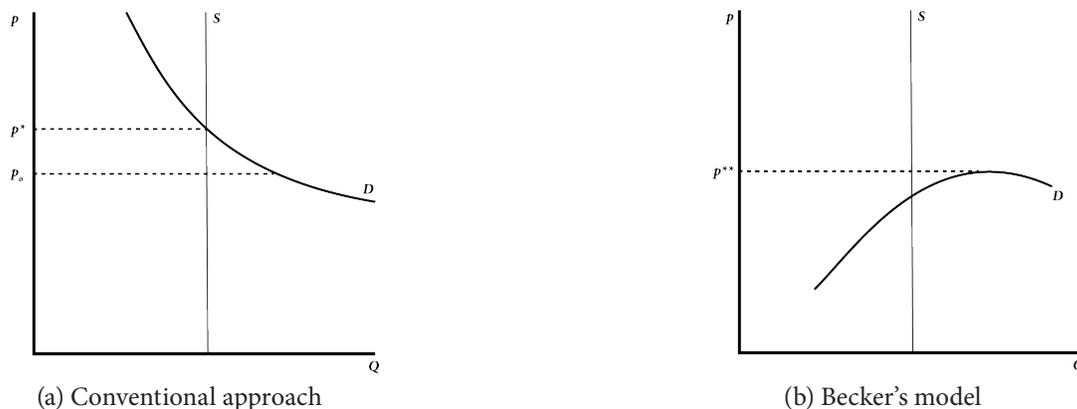


Fig. 1: Restaurant pricing

a good depends on the aggregate quantity demanded of this good. Therefore, the market demand can be written as:

$$Q = F(p, Q), F_p < 0, F_Q > 0 \quad (1)$$

where Q is the market demand and p is the price of the good in question. Intuitively, people enjoy a particular good (e.g. dinner at a restaurant) more when other people also want to consume this good. If the social effect is strong, the demand function may look like the one presented in Figure 1b. Interestingly, the intersection of the supply-and-demand curves is not an equilibrium because the restaurant can increase its profit by raising its price. The price p^{**} is an equilibrium price because there is no tendency for the price to change.

It is important to highlight the price-theoretic aspects of Becker's analysis. First, his analysis is problem-based. That is, Becker begins with an observation of a phenomenon and builds a model that aims to account for this phenomenon. To do this, the model abstracts from many variables; note for instance that the demand function (1) depends only on p and Q , while other variables, including the conventional ones, are excluded. This is not because they do not influence demand in general but because they are irrelevant to the problem at hand. In contrast, descriptivism would attempt to include all the variables that plausibly influence demand to build a general model of price formation. In addition, Becker's model does not specify any concrete mechanisms through which the aggregate demand for a good influences the individual demand for this good: the reason could be that a person wants to keep up with what is popular with other people or that confidence in the quality of the good is greater when the good is more popular (Becker 1991, p. 1110). This contrasts with descriptivism of behavioral and Austrian/evolutionary sorts which would call for the specification of decision (behavioral) or market (Austrian/evolutionary) processes. This final point brings us to the Hayekian view of the equilibrium, which is discussed in the following section.

IV. HAYEK ON EQUILIBRIUM

Hayek provides several definitions of equilibrium. For example, in his essay "Economics and Knowledge", Hayek (1948, p. 41) states that equilibrium means that the "different plans which the individuals composing [a society] have made for action in time are mutually compatible."² There seems to be a similarity between Hayek's concept of equi-

librium as a "compatibility of plans" and Machlup's concept of equilibrium as a "compatibility of variables"; however, this similarity is superficial. Hayek (2007, pp. 41–42) emphasizes that his concept of equilibrium refers specifically to *actions* and he contrasts his view with approaches that consider equilibrium as a relationship between the existing *things* (goods), i.e. results of past activities. The difference between the two concepts can also be illustrated by the example of Becker's (1991) restaurant pricing model described in the previous section. In this example, the situation of excess demand satisfies Machlup's definition of equilibrium given that the variables do not have a tendency to change. However, it does not satisfy Hayek's notion of compatibility of plans given that some consumers' plans are disappointed in this situation, that is, they do not succeed in having a meal at the restaurant due to insufficient capacity.³

Hayek did not develop his concept of equilibrium as a tool of industry analysis (e.g. to analyze restaurant pricing). Rather, due to his preoccupation with business cycles and economic planning, Hayek's concern was with general equilibrium. Here we find another difference between Hayek and Machlup. Although Hayek (1948, p. 44, 2007, pp. 46, 50) repeatedly states that equilibrium is a fictitious concept, he also argues that empirically there is a tendency toward equilibrium (Hayek 1948, pp. 45, 55, 2007, p. 50). The main evidence for this is that prices "tend to correspond to costs" (Hayek 1948, p. 51, 2007, p. 50n). Hence, Hayek's equilibrium as a concept reflecting the actual social order differs from Machlup's analytical equilibrium.

The usefulness of the equilibrium concept for Hayek does not end with a mere description of the social order. As Hayek (2007, p. 51) states:

Its function is simply to serve as a guide to the analysis of concrete situations, showing what their relations would be under "ideal" conditions, and so helping us to discover cause of impending changes not yet contemplated by any of the individuals concerned.

For Hayek (2007, pp. 42–43), the ultimate goal of all economic analysis is to provide a causal explanation of phenomena, and equilibrium analysis is merely a stepping stone toward this goal. However, to reach this goal, one must abandon the concept of a stationary equilibrium and use a broader concept that allows for the flow of time. One is tempted to use the term "dynamics" to describe Hayek's concept of equilibrium but Hayek (2007, pp. 42–43) explains why this term may be misleading.

Statics	Dynamics	
	Equilibrium analysis	Non-equilibrium analysis
Equilibrium as a stationary state	Non-stationary equilibrium	“Causal explanation of economic processes”
Marshallian long-run equilibrium	Marshallian analysis of periods	

Fig. 2: Approaches to equilibrium analysis

Figure 2 describes Hayek’s views on equilibrium analysis. In particular, according to Hayek, the term “dynamics” can refer to two types of analyses: (1) a causal explanation of economic processes that makes no use of the equilibrium concept; (2) an analysis in terms of non-stationary equilibria. Hayek (2007, p. 43) refers to this latter type of analysis as an “intermediary field” between static and causal analysis. While the term “dynamics” has been used in opposition to both “statics” and “equilibrium analysis” (because, according to Hayek, in past literature, both these types of analysis coincided in that most equilibria considered in the literature were stationary), Hayek emphasizes that an analysis can both use the concept of equilibrium and be non-stationary.⁴ It is important to note that Hayek also explains why the price-theoretic approach exemplified by Marshall’s analysis is not suitable for his purposes. As noted earlier, the price-theoretic approach is problem-based, which means that it ignores everything that is not relevant to the problem at hand. Hayek (2007, p. 40n) understands this aspect of price-theory very well:

the method of short-term equilibrium essentially consists in disregarding all these consequences of a given change whose significance, for the problem immediately under consideration, is of the second order of smalls. This means that we deliberately neglect consequences because they do not affect the parts of the system with which we are mainly concerned—a procedure which is clearly inadmissible when we are interested in the equilibrium of the system as a whole.

The Marshallian concept of short-run equilibrium is not suitable for Hayek’s purposes because it is supposedly a partial-equilibrium approach and he is interested in a general equilibrium. The concept of long-run equilibrium

satisfies the condition of being general but its disadvantage from Hayek’s (2007, p. 40) perspective is that it is stationary. Finally, although the Marshallian analysis of time periods as such marks a step toward non-stationary equilibrium analysis, Hayek finds this approach unsatisfactory. The main reason for this is that empirically, the distinction between the short run and the long run can be identified only in relation to a particular industry (industrial analysis is where Hayek finds this Marshallian device applicable) but not in relation to the economy as a whole. In considering the economy as a whole, changes occurring in the economy are not clustered around specific points in time but are dispersed over a continuous range (Hayek 2007, pp. 44–45). For example, if capital in a particular industry is fixed in the short run and variable in the long run, changes between the short run and the long run must occur in the industry producing these capital goods in the time between the short and long run. The changes in this capital-producing industry cannot be disregarded when we analyze the economy as a whole. At the same time it is unclear which point in time empirically marks the distinction between the short-run and long-run periods.

Two points in Hayek’s argument should be emphasized. First, Hayek finds Marshallian analysis appropriate for industry analysis.⁵ In other words, Hayek does not reject Marshallian analysis as such but because, according to him, it is inadequate for his purposes. Second, the reasons why Hayek finds Marshallian analysis inadequate for his purposes are partly descriptivist. Hayek rejects time-period analysis as an inaccurate description of reality: he argues that in reality, changes over time occur continuously rather than in jumps. While this is true, the relevant question from the price-theoretic perspective is what is sacrificed in our analysis of a particular phenomenon if we simplify the analysis by introducing two discrete periods. Hayek does

not address this issue. I conclude that the price-theoretic concept of equilibrium defended by Machlup and applied by Marshall and others, cannot be rejected on the basis of Hayek's argument. First because Hayek focuses on issues potentially outside the scope of price-theoretic analysis, and second because Hayek's arguments against this type of analysis are descriptivist, and therefore, stem from methodological differences.

The crucial aspect in Hayek's concept of equilibrium is its relationship to the social order. This aspect also marks the main difference between Hayek's and Machlup's views. That is (Machlup, and as it turns out, other price theorists) does not discuss the relationship of equilibrium to the social order at all. I focus this issue in more detail in the following section.

V. THE PROBLEM OF SOCIAL ORDER

Hayek begins with an observation of the social order and uses the general-equilibrium concept to describe and analyze this order. The relationship between equilibrium and social order has also been emphasized by other researchers (e.g. Arrow and Hahn 1983; Boettke, Horwitz, and Prychitko 1994; Holcombe 2007). For Hayek, this general equilibrium is a sort of a Platonic ideal that can be approximated in reality but never achieved. However, over time, Hayek came to prefer the term "order" instead of "equilibrium" (Vaughn 2013) but arguably, the change in the terminology did not represent a significant change in his view. The reason for the inadequacy of the term "equilibrium" for Hayek's purposes is that it does not allow for degrees of disequilibrium; in contrast, order can be approached to various degrees and can be preserved during a process of change (Hayek 2002, p. 15).

What is the role of the social order in the price-theoretic tradition? Interestingly, this tradition does not have a model of social order as conceived by Hayek. For example, although Marshall (1982) extensively refers to Adam Smith throughout his *Principles*, he never refers to his notion of the invisible hand. He only briefly mentions a policy implication of the invisible hand—the doctrine of "Free Trade". According to Marshall (1982, p. 627), Smith's "chief work was to find in the theory of value a common centre that gave unity to economic science." Note that this reference is not from the main text but from an appendix. There is also no reference to the idea of an invisible hand in Stigler's (1966), Friedman's (2008) or Becker's (1971) texts on price theory.⁶ Regarding the Walrasian general equilibrium, the

results are quite similar: these works do not refer to it at all, with the exception of Stigler (1966, p. 113), who only mentions it once in a historical box on Walras. Stigler notes how impractical the general equilibrium concept is due to the large number of equations it requires even in its simplest version. These few references once again illustrate that for price theorists, the concepts of equilibrium or perfect competition are simply tools of economic analysis and are not meant to represent the invisible hand. Instead, they are designed to address specific questions about changes and differences in behavior.

Thus, it seems that price-theoretic tools are not suitable for answering Hayekian questions; however, I argue that there is a complementarity between the Hayekian and Marshallian approaches. To illustrate, consider the Hayekian question: how is it possible that we observe an order rather than a chaos in the world where there is no central planner and each individual has limited knowledge? His answer is that we are able to do this thanks to the price system, which serves as a device for communicating information (Hayek 1945). To address his question, Hayek needs a concept of some sort of an order, possibly modeled with the Walrasian general equilibrium. However, the Hayekian question is not price-theoretic because in price-theoretic analysis, equilibrium is not an explanandum. In particular, the Hayekian question is not a question about comparative statics: there are no changes or differences between phenomena that call for explanation. Nevertheless, one can formulate a price-theoretic question that is related to the Hayekian problem of the social order: why do we observe some coordination of activities via a central planner and some coordination via the price system? This is the Coasean question (Coase 1937), but Hayek (1945, pp. 520–21) alludes to it as well. Note, that for this kind of question, the existence of social order (and the related concept of the Walrasian general equilibrium) is not directly relevant. However, Hayek's insight into the role of prices in the market order is relevant to it: his insight implies that command-and-control may not be always superior to spontaneous coordination via prices (i.e. that there is a trade-off). Therefore, the relevant equilibrium for the Coasean question is the equilibrium "amount" of planning (i.e. the optimum size of firms). To determine this equilibrium, one must consider not only the functioning of the price system highlighted by Hayek but also other variables, such as transaction and coordination costs (Coase 1937; Williamson 1985), as well as economies of scale and scope (Stigler 1951). In sum, Hayek's insight that prices commu-

nicate information can be used as a building block of price-theoretic analysis.

However, the complementarity between Hayekian and price-theoretic analysis also goes in the other direction, that is, price-theoretic tools can be used to answer specific questions about the social order. Consider Hayek's (1945, p. 526) famous tin example. In this example, Hayek demonstrates how prices communicate information about the increase in the relative scarcity of tin. He shows how little individuals need to know to take the "right" action. The price-theoretic toolbox is, of course, well suited for illustrating Hayek's point. Initially, there is an exogenous event that affects either the demand or supply of tin. This is what Machlup terms a "disequilibrating change". Hayek then describes the adjusting changes that follow: economization on tin, changes in markets of substitutes of tin and their own substitutes. All these changes can be captured by the supply-and-demand apparatus and by maximizing behavior. In this sense, price-theoretic tools can be used as building blocks for Hayek in addressing his problem of social order.

VI. CONCLUDING REMARKS

Equilibrium is often considered a modern reincarnation of Smith's invisible hand. It is not surprising that researchers who have only this particular interpretation of the equilibrium concept in mind find the equilibrium concept unsatisfactory. Hayek was perhaps one of those "disappointed Walrasians". In his early career, Hayek naturally turned to the Walrasian equilibrium concept as an up-to-date theoretical achievement of his time. Later, he attempted to substitute the Walrasian general equilibrium with a theoretical framework borrowed from systems theory and cybernetics. However, he was unable to construct a full-fledged formal theory along these lines. The steps toward such theory has been taken only quite recently. Interestingly, these developments have a common characteristic with the original Walrasian approach: they are descriptivist in the sense that they are driven by the search for realistic assumptions.

Price theorists have been skeptical about the usefulness of the Walrasian concept from the very beginning. They developed a problem-based approach in which the equilibrium concept alongside other theoretical constructs serves as an "engine of analysis". In this approach, theory is not driven by the search for realism of assumption but rather by adequacy in relation to the problem at hand. Machlup provided a powerful interpretation of the equilibrium concept as it is used in this tradition. Both Hayek and Machlup

were Austrian economists; nevertheless, the Austrian tradition followed mostly in Hayek's steps. Perhaps the time has come to explore the Machlupian path further.⁷ Due to its affinity with the price-theoretic tradition, it has the potential to broaden the horizons of Austrian economics. On the one hand, this tradition uses conventional tools of economic analysis. On the other hand, it shares some characteristics of the Austrian approach, such as real-world relevance and skepticism toward formalism for its own sake.⁸

NOTES

- 1 For a critique of holism in this sense, see Popper (1944). Price theory is compatible with what Popper refers to as a piecemeal approach.
- 2 In the original version of Hayek's (1937, p. 40) essay, the definition is formulated as follows: equilibrium means that "compatibility exists between the different plans which the individuals composing [a society] have made for action in time." A similar definition can be found in Hayek (1941, p. 43).
- 3 On non-market-clearing equilibria see Machlup (1958) and Rizzo (1992).
- 4 In non-stationary equilibrium analysis, two approaches are sometimes distinguished: "functional" and "causal-genetic". According to Rizzo (1990), Hayek belongs to the latter group. However, Hayek (1937, pp. 34–35n) explicitly mentions in a footnote that he uses the term "equilibrium" in the sense of "functional" analysis. This footnote was removed in a later reprint of the essay (Hayek 1948). Interestingly, Foss (1995) argues that Machlup's (1958) approach to equilibrium is "causal-genetic".
- 5 This is also where this type of analysis has been most fruitful historically (e.g. Stigler 1983; Arena and Quéré 2003).
- 6 This is not to say that these authors considered the notion invisible hand unimportant (e.g. see Friedman and Friedman 1980).
- 7 An important recent step in this direction is Zanotti and Cachanosky (2015). For Austrian–Marshallian connections, see Foss (1998).
- 8 I would like to thank Petr Špecián, Pavel Potužák and Tony So for their helpful comments.

REFERENCES

- Arena, Richard and Michel Quéré, eds. 2003. *The Economics of Alfred Marshall: Revisiting Marshall's Legacy*. Basingstoke: Palgrave Macmillan.
- Arrow, Kenneth Joseph and Frank Hahn. 1983. *General Competitive Analysis*. Amsterdam: North-Holland.
- Arthur, W. Brian. 2006. Out-of-Equilibrium Economics and Agent-Based Modeling. In *Handbook of Computational Economics, Vol. 2: Agent-Based Computational Economics*, edited by L. Tesfatsion and K. L. Judd, 2:1551–64. Amsterdam: Elsevier/North-Holland.
- . 2010. Complexity, the Santa Fe Approach, and Non-Equilibrium Economics. *History of Economic Ideas* 18 (2): 149–66.
- Becker, Gary S. 1971. *Economic Theory*. New York: Knopf.
- . 1976. *The Economic Approach to Human Behavior*. Chicago: University of Chicago Press.
- . 1991. A Note on Restaurant Pricing and Other Examples of Social Influences on Price. *Journal of Political Economy* 99 (5): 1109–16.
- . 1993a. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago and London: The University of Chicago Press.
- . 1993b. Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy* 101 (3): 385–409.
- Becker, Gary S. and Kevin M. Murphy. 2000. *Social Economics: Market Behavior in Social Environment*. Cambridge and London: The Belknap Press of Harvard University Press.
- Boettke, Peter J., Steven Horwitz, and David L. Prychitko. 1994. Beyond Equilibrium Economics: Reflections on the Uniqueness of the Austrian Tradition. In *The Market Process: Essays in Contemporary Austrian Economics*, edited by Peter J. Boettke and David L. Prychitko, 62–79. Aldershot: Edward Elgar Publishing.
- Boland, Lawrence A. 2017. *Equilibrium Models in Economics: Purposes and Critical Limitations*. New York: Oxford University Press.
- Bowles, Samuel, Alan Kirman, and Rajiv Sethi. 2017. Retrospectives: Friedrich Hayek and the Market Algorithm. *Journal of Economic Perspectives* 31 (3): 215–30.
- Burley, Peter and John Foster, eds. 1994. *Economics and Thermodynamics: New Perspectives on Economic Analysis*. New York: Springer Science and Business Media.
- Coase, R. H. 1937. The Nature of the Firm. *Economica* 4 (16): 386–405.
- Finger, J. M. 1971. Is Equilibrium an Operational Concept? *The Economic Journal* 81 (323): 609–12.
- Foss, Nicolai J. 1998. Austrian and Post-Marshallian Economics: The Bridging Work of George Richardson. In *Economic Organization, Capabilities and Co-Ordination: Essays in Honour of G. B. Richardson*, edited by Nicolai J. Foss and Brian J. Loasby, pp. 138–62. London and New York: Routledge.
- . 1995. Types of Price Theory. *Rivista Internazionale Di Scienze Sociali* 103 (2): 253–76.
- Freeman, Alan and Guglielmo Carchedi, eds. 1996. *Marx and Non-Equilibrium Economics*. London: Edward Elgar.
- Friedman, Milton. 1949. The Marshallian Demand Curve. *Journal of Political Economy* 57: 463–463.
- . 1953. *Essays in Positive Economics*. Chicago: University of Chicago Press.
- . 1957. *A Theory of the Consumption Function*. New Jersey: Princeton University Press.
- . 2008. *Price Theory*. New Brunswick and London: Transaction Publishers.
- Friedman, Milton and Rose Friedman. 1980. *Free to Choose: A Personal Statement*. New York and London: Harcourt Brace Jovanovich.
- Giocoli, Nicola. 2003. *Modeling Rational Agents: From Interwar Economics to Early Modern Game Theory*. Cheltenham and Northampton: Edward Elgar.
- Hands, D. Wade. 2017. Conundrums of the Representative Agent. *Cambridge Journal of Economics* 41 (6): 1685–1704.
- Hayek, F. A. 1937. Economics and Knowledge. *Economica*, New Series, 4 (13): 33–54.
- . 1941. *The Pure Theory of Capital*. Chicago: The University of Chicago Press.
- . 1945. The Use of Knowledge in Society. *The American Economic Review* 35 (4): 519–30.
- . 1948. Economics and Knowledge. In *Individualism and Economic Order*, 33–56. Chicago: The University of Chicago Press.
- . 2002. Competition as a Discovery Procedure. *The Quarterly Journal of Austrian Economics* 5 (3): 9–23.
- . 2007. *The Pure Theory of Capital*. Edited by Lawrence H. White. The Collected Works of F. A. Hayek. Volume XII. Chicago: The University of Chicago Press.
- Holcombe, Randall G. 2007. *Entrepreneurship and Economic Progress*. New York and London: Routledge.
- Hudik, Marek. 2017. Rational Choice Theory and Behavioral Economics: Alternatives or Complements? SSRN Scholarly Paper ID 2968845. Rochester, NY: Social Science Research Network.
- Klein, Peter G. 2008. The Mundane Economics of the Austrian School. *The Quarterly Journal of Austrian Economics* 11 (3–4): 165–87.
- Langlois, Richard N. and Roger Koppl. 1991. Fritz Machlup and Marginalism: A Reevaluation. *Methodus* 3 (2): 86–102.
- Lawson, Tony. 2005. The (Confused) State of Equilibrium Analysis in Modern Economics: An Explanation. *Journal of Post Keynesian Economics* 27 (3): 423–44.
- Lewin, Peter. 1997. Hayekian Equilibrium and Change. *Journal of Economic Methodology* 4 (2): 245–66.
- Machlup, F. 1958. Equilibrium and Disequilibrium: Misplaced Concreteness and Disguised Politics. *The Economic Journal* 68 (269): 1–24.
- Marshall, Alfred. 1982. *Principles of Economics: An Introductory Volume*. Philadelphia: Porcupine Press.
- Milgate, M. 1987. Equilibrium: Development of the Concept. In: *The New Palgrave: A Dictionary of Economics*, edited by J. Eatwell, M. Milgate, and P. Newman, pp. 498–512. London.
- O'Driscoll, Jr., Gerald P. 1977. *Economics as a Coordination Problem*. Kansas City: Sheed Andrews and Mc Neel, Inc.
- O'Driscoll, Jr., Gerald P. and Mario J. Rizzo. 1996. *The Economics of Time and Ignorance: With a New Introduction*. London and New York: Routledge.
- Popper, Karl. 1944. The Poverty of Historicism, II. A Criticism of Historicist Methods. *Economica* 11 (43): 119–37.
- Rizzo, Mario J. 1990. Hayek's Four Tendencies Toward Equilibrium. *Cultural Dynamics* 3 (1): 12–31.
- . 1992. Equilibrium Visions. *South African Journal of Economics* 60 (1): 66–73.

-
- Schultz, Theodore W. 1971. *Investment in Human Capital*. New York: The Free Press.
- Stigler, George J. 1951. The Division of Labor Is Limited by the Extent of the Market. *Journal of Political Economy* 59 (3): 185–93.
- . 1966. *The Theory of Price*. New York: Macmillan.
- . 1983. *The Organization of Industry*. Chicago and London: The University of Chicago Press.
- Stigler, George J. and Gary S. Becker. 1977. De Gustibus Non Est Disputandum. *The American Economic Review* 67 (2): 76–90.
- Tieben, Bert. 2012. *The Concept of Equilibrium in Different Economic Traditions: An Historical Investigation*. Cheltenham, UK, Northampton, MA: Edgar Elgar.
- Vaughn, Karen I. 1999. Hayek’s Implicit Economics: Rules and the Problem of Order. *The Review of Austrian Economics* 11 (1–2): 129.
- . 2013. Hayek, Equilibrium, and The Role of Institutions in Economic Order. *Critical Review* 25 (3–4): 473–96.
- Vriend, Nicolaas J. 2002. Was Hayek an Ace? *Southern Economic Journal* 68 (4): 811–40.
- Weintraub, E. Roy. 1986. *Microfoundations: The Compatibility of Microeconomics and Macroeconomics*. Cambridge: Cambridge University Press.
- Weyl, E. Glen. 2017. Price Theory. SSRN Scholarly Paper ID 2444233. Rochester, NY: Social Science Research Network. <https://papers.ssrn.com/abstract=2444233>.
- Williamson, Oliver E. 1985. *The Economic Institutions of Capitalism*. New York: The Free Press.
- Zanotti, Gabriel J. and Nicolás Cachanosky. 2015. Implications of Machlup’s Interpretation of Mises’s Epistemology. *Journal of the History of Economic Thought* 37 (1): 111–38.