Epistemological and Ontological Indeterminism: Hayek and Schumpeter[1]

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Received: 02 June 2020; Accepted: 12 September 2022.

Summary

The aim of this article is to compare and contrast the ideas of Friedrich von Hayek and Joseph Alois Schumpeter, who both adopted an indeterminist approach in their economic analyses, through a discussion of their relative strengths and weaknesses. The analysis makes extensive references the ideas of Karl Popper and Roy Bhaskar because of their profound impact on philosophical as well as economic thought. The article examines the indeterminism that marks the theories of Hayek and Schumpeter from an ontological and epistemological standpoint. More specifically, it addresses Popper and Hayek on the side of epistemological indeterminism as they theorized indeterminacy on the basis of the uncertainty of the future, and temporality in general, as well as the ever-changing and always incomplete nature of knowledge, whereas it analyzes Bhaskar and Schumpeter as ontological indeterminists who saw indeterminacy as resulting from the nature of economic and social systems. The article's conclusion is that epistemological approaches to the study of indeterminacy are bound to remain within a static framework and that an ontological reasoning is needed for a transition to a dynamic framework. In other words, the reasons lying behind discontinuity in economic systems can be found only within the inherent characteristics of those systems. Therefore, any economic analysis should start with a careful assessment of the social reality's nature, because faulty assumptions about it will inevitably lead to disconnect between theory and practice.

Keywords: economic reality, open systems, indeterminacy, uncertainty, Popper, Hayek, Bhaskar, Schumpeter

JEL: B25, B40, D80

[1] This article is produced from a part of the doctoral thesis.

Introduction

Although crises are far from being rare especially in the past century, some may still be taken by surprise in the face of them. The failure to predict and prevent these crises, which often have profound global impact, points to a "crisis" in the theory as well. Earlier systemic crises led to changes in both theory and policy. For example, in the wake of the Great Depression in 1929, liberal capitalism gave way to welfare capitalism characterized by Keynesian interventions, whereas the oil crises in the 1970s led to the replacement of such interventionist policies by a neoliberal orthodoxy. Extending the frame of analysis further back in time, Eric Hobsbawm (1975, p. 301) identified three main periods of crisis in which the viability of the capitalist system was brought into question: 1815–1848, 1873–1896, and 1917–1948. More recently, the 2007 global crisis has led to a serious scrutiny of the capitalist global system and its theoretical basis. Although there are vocal critiques questioning the sustainability of the capitalist system as it is, many other economists remain confident that such crises are only temporary and could be overcome through a number of measures.

The theories on the question of stability and instability of market systems can be divided into two opposite poles based on their basic assumptions about social reality. The first one involves those theories that posit the world as a *closed* system that is inherently stable because it is static, and therefore, it tends toward harmony and equilibrium. Thus, if the system is destabilized, the culprit should be looked for outside. This is the understanding behind the idea that crises are "shocks" or "surprise events." On the other pole are theories that share the assumption that the world is an *open* system that is dynamic, characterized by structural changes, and lacking an inherent stability mechanism. Such a perspective, which excludes equilibrium from its scope, makes it possible to include the constantly changing character of the economic reality into the analysis.

This study aims to have a theoretical discussion on the unpredictability of "open" economic systems. Thus, its scope covers the indeterminist approaches in economic thought. Within this framework, it consists of the following three sections: the first section that offers a general introduction to the notion of "indeterminacy," the second section that discusses the relevant ideas of Karl Popper and Friedrich von Hayek who addressed this notion from an epistemological perspective, and the third section on Roy Bhaskar and Joseph Alois Schumpeter whose theories relied on an ontological understanding of "indeterminacy." Throughout this study, the main argument is that the question of indeterminacy can better be understood if the analysis adopts an ontological approach. In other words, the reasons behind the dynamism and discontinuity in social and economic systems lie in their very modes of existence. The social reality is a dynamic and complex whole that is inherently relational and in a constant state of flux. Therefore, the openness of social systems should be understood as an ontological issue rather than a result of limited or absent human knowledge. In other words, indeterminacy originates from the very nature of social reality that extends beyond the dimensions of time and knowledge.

1. Indeterminacy

The literature on determinism involves many different definitions and concepts. Whereas concepts such as contingency, randomness, emergency, uncertainty, liberty, and free will indicate an indeterminist approach, concepts such as necessity, causality, law-likeness, predictability, and fatalism point to a determinist approach. Although premodern debates on determinism revolved around the notion of "the inevitable destiny," determinism as a modern worldview has its theoretical basis in Newtonian physics. In both of these approaches, the world is seen as a system that works in a machine-like fashion in which all situations result from their original conditions. The most prominent proponent of the notion of deterministic mechanism was Pierre Simon Laplace, who introduced the idea of an omniscient intellect ("Laplace's demon") that foresees everything. Laplace borrowed this idea from Newtonian physics; yet, it was the dominant view in physics only until the late 19th century. The emergence of quantum physics and relativity in the 20th century moved the general scientific consensus to the idea that the universe is indeterminate. However, deterministic approaches continue to form the backbone of many sciences despite the fact that these shifts in physics harmed their dominance greatly.

In all sciences, especially in economics, indeterminism should be preferred over a deterministic approach. The positivist methodology of the "science" of economics, along with the determinism imposed by this methodology, naturalizes capitalism and posits it as the universal and most ideal system. Theories that assume markets' stability hinge upon the ontological idea of an inherently static universe. However, the social reality, which is the object of study of economics, is not static and unchanging as presupposed by mainstream theories. Economics as a science should therefore address the world as a dynamic and ever-changing system. On this issue, it could be argued that economists have two main motives that are in direct contrast with one another. On the one hand, some economists aim to reach certainty and predict the future behavior of market systems by relying heavily on sciences such as mathematics and physics to produce elegant models that are otherwise based on unrealistic assumptions; on the other hand, those economists motivated by "truth-seeking" reject such static models and focus on open systems that involve change and dynamism. This second group adopts the philosophical methodology called "indeterminism," which can be summarized as the approach that sees the universe as an open system in which the past and the future are asymmetrically positioned; that is, the future cannot be predicted through the existing knowledge of the past (Dinç Alada, 2012, pp. 19–21).

It would be wrong to argue that determinism has been the sole dominant approach in the history of economic thought. Many economists attempted to analyze the changing world by staying away from such assumptions of a static world that tends toward equilibrium. However, these attempts failed to become the dominant paradigm. Unlike the natural sciences that began to feel the influence of indeterminism only in the 20th century, economists adopted the approach much earlier. Among the

economic theorists who explored the idea of open systems in the 18th century are Richard Cantillon, Etienne Bonnot de Condillac, Pierre Le Pesant de Boisguilbert, and even Adam Smith.

Cantillon's theory of entrepreneurship is an important example here. According to this theory, which was the first to analyze the importance of the entrepreneur, markets in the real world are marked by uncertainty, and the task of the businessman is to endure it. The entrepreneur is the one who faces and overcomes this uncertainty with the expectation of a profit in return (Murray Rothbard, 2010).

The most important among these names is Richard Cantillon. Cantillon viewed as incomprehensible the market system determined by perfect knowledge and certainty, as envisaged by Ricardo, Walras, and the neoclassical economists. Cantillon's greatest contribution to the economic thought was his views on entrepreneurship as he was one of the first to analyze the entrepreneur's importance. Cantillon argued that markets in the real world are characterized by uncertainty, and the businessman's task is to endure it. The entrepreneur is the one who faces and overcomes this uncertainty with the expectation of a profit in return. In this model, profit is the reward gained by the entrepreneur for his or her successful prediction in a production process marked by uncertainty. The idea, embraced by Walras and Ricardo, of long-term equilibrium of markets that are thus perfectly knowable and predictable excludes Cantillon's uncertainty factor (Rothbard, 2010).

Cantillon divides producers in the market economy into two classes: "hired people," who receive fixed wages or land rents, and "entrepreneurs," with nonfixed, uncertain returns. For instance, an entrepreneur farmer bears fixed production costs, yet the price he or she will sell his or her produce for is nonfixed, or a merchant purchases a product for a fixed price, yet the selling price of the product is nonfixed. Because these entrepreneurs face uncertain sell volumes and prices, their revenues become nonfixed. For Cantillon, competition and entrepreneurship go hand in hand. Similar to Knight and Austrian economists, Cantillon's theory of entrepreneurship focuses on the entrepreneur's role of bearing uncertainty. Schumpeter's theories on entrepreneurship focus on the personality traits of the entrepreneur. Unlike Schumpeter's destructive entrepreneur, Cantillon's entrepreneur assumes an equilibrating function (Rothbard, 2010).

Adam Smith, in his History of Astronomy, which has been largely ignored in contemporary economic thought, saw uncertainty and fallibility as significant factors in the formation of the human mind as well as human social behavior (Alada, 2000, p. 15). Smith explained fallibility through the example of the individual who strives to reconstitute his or her mental balance when faced with a surprising or shocking event. He argued that such attempts to restore equilibrium also have the potential to lead to innovation and discovery. The feeling of disappointment created by the encounter with the sudden event encourages scientific curiosity. What drives scientific curiosity here is not knowledge, but the lack of it *ex post* (Alada, 2000, p. 23). Smith's fallible human is the source of scientific discovery and innovation. Developments and innovations in economic life require balance or tendency toward balance in individuals' mental states.

The notion of asymmetry between the past and the future is used, from a mental point of view, to account for ruptures in our concept of time due to unexpected events. If we accept the proposition that economic behavior is fundamentally about decision-making, if a decision-making individual's expectations are not met, the individual experiences a rupture, or a surprise. What causes the feeling of surprise is the experience an individual has at the moment of realization that his or her reasoning was flawed. Such a flaw arises out of either a misrepresentation of the matter's details or characteristics, or lack of information about the matter itself. Smith was one of the first to highlight the prevalence of such lapses of thought in individuals' decision-making processes. Smith's "History of Astronomy" is one of the most overlooked works in contemporary economic thought. In this book, Smith makes a strong a case for the profound importance of indeterminacy and fallibility in the formation of individuals' social behavior (Alada, 2000, p. 15). Smith's analysis is of importance because it links the developments and innovations taking place in economic life to human beings' mental states. Innovation in economic life requires a situation in which individuals are in a mental state of equilibrium. On the other hand, scientific discoveries emerge out of individuals' mistakes, that is, the discrepancy between the individual's imagination and the actual situation. Smith thought that individuals are in a constantly changing process of mental reasoning. More specifically, individuals strive to improve their conditions by constantly attempting to reach a mental equilibrium through trial and error. Smith's famous "invisible hand" metaphor is central to the process of individuals making mistakes and reinstating equilibrium (Alada, 2000, pp. 25–27).

Smith explained fallibility through the example of the individual who strives to reconstitute his or her mental equilibrium when faced with a surprising or shocking event. Smith emphasized the fallibility of the mental framework that the individual constructs in his or her mind. What is of importance here is the lack of knowledge that the individual experiences after what Smith called "extraordinary occurrences," prior to which no risk is sensed. The behavioral framework that Smith introduced in "History of Astronomy" has three stages. The first is the momentary mental state of equilibrium that Smith called "quietude." At the second stage, the individual's mental state of equilibrium is broken by an unforeseen occurrence, which causes the individual to lose his or her behavioral norm oriented toward the future. When this happens, it becomes impossible to return to the initial state of equilibrium. At the third stage of this behavioral framework, the individual attempts to at least go back to the initial state of equilibrium. At this stage, the individual experiences uncertainty due to the unforeseen and unexpected occurrence. The individual at this stage has to rediscover the missing link to eliminate the void caused by uncertainty (Alada, 2000, pp. 17–20).

In the same book, Adam Smith put forth important ideas regarding the dynamism of the mental aspect of decision-making. He used a behavioral-psychological model consisting of three subsequent emotional moments: wonder, surprise, and admiration. These moments refer to the distinct mental states that arise out of an unexpected occurrence (Okay Güneş, 2015,

p. 484). Smith addressed the feeling of wonder alongside those of passion, panic, and fear, and this feeling of wonder emerges with the feeling of surprise caused by the sense of fear from an unexpected danger. Wonder is ensued by anxiety about probable future occurrences, and when this happens, mental quietude is no longer the case. The individual moves from a quiet/safe initial mental state of equilibrium to a new mental equilibrium that also involves pain (Güneş, 2015, p. 485). Smith's perception of wonder seems to be consistent with fundamental uncertainty. In this state of uncertainty, no potential occurrence is predetermined or predictable; the future has to be created (David Dequech, 2011, p. 631). Smith partially linked the feeling of wonder with that of surprise. What distinguishes surprise from wonder is the collapse of the initial condition that hinged on opinions and beliefs. The reason behind this collapse is the inability of the mind, through its normal mode of reasoning, to make sense of the information that became available after the unexpected occurrence. This is why it is impossible to return to the initial mental state. Essentially, mental rupture occurs because of the inconsistency between the two points in time characterized by different opinions about the future. It is now impossible to expect what was initially anticipated to happen, and thus, there is pain (Güneş, 2015, p. 485).

At this point, the individual will have a motivation to rediscover the missing mental link arising from his or her desire to return to the initial mental state of equilibrium. By reconfiguring his or her ideas, the individual attempts to bring back together the invisible chain. When a new mental equilibrium is formed, there emerges a special kind of quietude, which arises out of the consciousness of the nature's harmonic motion, and it is called admiration. The most important feature of such a moment is that it makes possible innovations and discoveries (Güneş, 2015, p. 485). Smith similarly suggested that the individual's attempts to rediscover the missing link and reinstitute the lost equilibrium following an unexpected occurrence may lead to innovations and discoveries. The feeling of disappointment created by the encounter with the sudden event encourages scientific curiosity. What drives scientific curiosity here is not knowledge, but the lack of it *ex post* (Alada, 2000, p. 23). In short, Smith's fallible human is the source of scientific discovery and innovation. Developments and innovations in economic life necessitate equilibrium or tendency toward equilibrium in individuals' mental states.

Thorstein Veblen is another important economist working on uncertainty and indeterminacy. The indeterminacy in Veblen's work is related to his approach to economic reality. Veblen considered economic reality as a complex and open system. The open economic reality approach, which emerged in the 20th century both in the philosophy of science and by transferring the concepts from it to economic analysis and emphasizing this dynamic aspect of social reality, can be seen in Veblen's pioneering and groundbreaking works toward the beginning of the century.

Thorstein Veblen, who is regarded as the founder of institutional and evolutionary economics, is a very skillful critic of the analysis of mainstream economics based on equilibrium and stability. His criticism can be roughly grouped under the following headings: the animistic approach in mainstream economics; the atomistic and hedonistic treatment of individuals; and, most importantly, the neglect of the evolutionary approach. In line with these criticisms, Veblen's suggestion is that economics should be a theory of processes. He argues that the institutions are formed because of habits and instincts and institutional change must be at the core of economic analysis. Therefore, economic analysis is evolutionary and dynamic.

The first proof of an open economic reality is seen in the incorporation of the evolutionary approach into the analysis. Claiming that the history of humanity is the history of the evolution of social institutions, Veblen (1909) argued that these institutions are habits of thought. The basic elements behind institutional change are instincts, habits, and technological change. According to Veblen, while technology forms the structure of society, it also shapes habits of thought for society. Veblen (1909, p. 628) argues that material civilization is a scheme of institutions—institutional fabric and institutional growth. On the other hand, institutions are products of people's habits. The phenomenon called culture is formed by a cumulative sequence of human habits.

Another indication of an open economic and social reality is the rejection of the atomistic treatment of the individual, which are interrelated approaches, and the interrelationship between structure and agency. In open systems, structures and agents are interconnected, and this dependency relationship is constantly changing. The variability between structures and agents is an obstacle to the closure of social systems. "The wants and desires, the end and aim, the ways and means, the amplitude and drift of the individual's conduct are functions of an institutional variable that is of a highly complex and wholly unstable character" (Veblen, 1909, p. 628).

The open economic reality assumed in Veblen's analysis can also be read through his criticisms of animism and teleological bias toward neoclassical economics. Animism and teleological bias mean that the method of economics is limited to deduction, and the information obtained can only be taxonomic. Veblen presents the cumulative causality approach to these criticisms. In an analysis that examines a constantly transforming, changing, and evolving social reality, the correct method should be a cumulative causality research. The cumulative causality approach excludes positivism and calls for going beyond observable reality. Cumulative causation is the key element undermining a teleological economic analysis. In addition, this approach is an obstacle to the natural order approach, which has an ultimate and lofty purpose.

In an analysis that tries to explain economic reality through deduction through universal laws, cumulative causality or causal succession is pushed aside. This big mistake shows that the information obtained from this research can only be taxonomic information (Veblen, 1899, p. 426). Taxonomic science and knowledge are based on the assumption that the social sphere is stable and unchanging and that the world is governed by regularities that are subject to classification in terms of "normal" or "neutral" states. But for Veblen, the social world is evolutionary and historical because it is constantly transforming. An evolutionary historical approach to science excludes what Veblen calls "taxonomic" (Davis, 2005).

Veblen's emphasis on causality and metaphysical principles has been ignored in social sciences because they have been seduced by positivism. Positivism, on the other hand, includes the relation of the unobservable to science, that is, the rejection of metaphysics. Veblen openly opposed the positivist rejection of metaphysical (ontological) assumptions and the inevitability of metaphysics and argued for the importance of causal explanation. Veblen (1900, p. 241) argued that the ultimate term or basis of knowledge will always have a metaphysical character and rejected the view that science can only be founded on experience or experimentation. Unlike positivists, Veblen drew attention to the existence of hidden causes behind observable events. There may be some causal mechanisms behind observable phenomena, but these mechanisms are not always obvious or in operation. According to Veblen, mainstream economics is built on an incomplete social ontology. The social reality assumed by economic analysis dominated by positivism and deduction implies a closed system. Veblen's emphasis on cumulative causality and metaphysics indicates that this social reality cannot be considered as a closed system; that reality is a constantly transforming, complex, and open system; and that it is not possible to reach the knowledge of this reality based on observation and experiment alone.

It is possible to suggest that the number of studies that adopt a view of the world that falters go up during and after crisis periods. For example, the chaotic atmosphere that followed World War I and the Great Depression of 1929 led economists of the time to explore alternatives to existing economic theories. They came up with new ideas that proposed to fundamentally change the character as well as the orientation of economics. The most important among these new ideas was indeterminacy as a significant factor in explaining social systems and markets' behaviors (George Shackle, 1967, pp. 5–6). Although the dominant view of economics at the beginning of the 1930s was still based on the idea of a "steady and stable world," it gave way to an "anarchic and unsteady world" by the end of the decade. Among the prominent economists of this period who studied the processes of change, dynamism, and indeterminacy are Gunnar Myrdal, Terence Hutchison, Frank Knight, and John Maynard Keynes.

Myrdal, distinguishing between *ex ante* and *ex post* analysis, formulated a theoretical scheme based on the future's fundamental distinctness from the past (Myrdal, 1939, pp. 46–47). In his book *Monetary Equilibrium*, Myrdal (1939) made an important distinction between prospective and retrospective methods used for calculating economic quantities such as revenues, savings, and investments. He called the value of such quantities calculated after a specific period "ex post," and their initial value "ex ante." Focusing on investment and saving quantities, Myrdal asserted that ex ante investment or saving decisions are generally not equal to ex post investments or savings (Myrdal, 1939, pp. 46–47).

Hutchison (1935), similarly, saw the idea of the rational individual who foresees the future perfectly in his/her quest to maximize profit as a tautology, which thus makes it unfit for economic analysis. According to Hutchinson (1937), an analysis that recognizes indeterminacy, and especially that considers the money factor (which should be addressed as a sign of indeterminacy), cannot assume rational behavior, because such an assumption could only be valid in a world that is free of indeterminacy. Therefore, he proposed a method in which human decisions are conceived as taking place in a universe that involved both indeterminacy and certainty. Hutchison maintained that a universe without uncertainty is one that is automatic and without problems. In such a universe, the economic person is a pleasure machine, because his or her life is fully mechanical. According to Hutchison, risk, uncertainty, and more- or less-accurate expectations from the future are features not only of an investment enterprise but also of any action in the known world, economic or otherwise. Although Hutchison (1937) thought that human decisions take place in a mixed universe between uncertainty and certainty, he was convinced that most decisions are taken under conditions of uncertainty.

The most systematic and comprehensive work that centrally addressed the factors of indeterminacy, risk, and change in the economic theory is *Risk, Uncertainty and Profit* by Frank H. Knight (1921). He used uncertainty while developing his profit theory and also contributed to the entrepreneurship literature by distinguishing between uncertainty and risk. The main purpose of this 1921 study was to argue that profit is the reward for enduring uncertainty. He suggested that the existence of profit and loss could only be accounted for through uncertainty. According to Knight, not all entrepreneurial adventures lead to success, and whether an enterprise will lead to success or failure may not be foretold. Thus, the most crucial decision within an organized activity pertains to the selection of the decision-maker, that is, the entrepreneur (Maria Brouwer, 2002, p. 92). Profit and loss are measures of change that occurs in the values of revenues and costs throughout the processes that an enterprise undergoes. However, it is not possible to foreknow these changes. This is exactly the point where the distinction between risk and uncertainty becomes clear. Whereas risk is a factor that can be brought under control to a certain extent through calculation and insurance, uncertainty is not. Profit emerges as a result of this unforeseeable and incalculable uncertainty. Knights thought that uncertainty, which is an essential component of real life, would lead to socially undesired outcomes and thus make it impossible for "the spontaneous order" to function as described in theory. He theorized profit as an outcome of uncertainty, thereby critiquing the models of equilibrium (Ayşe Buğra, 2013, pp. 252–253).

Knight's work was more of a prologue than an epilogue. The economic woes of the post-1929 period strengthened the conviction that indeterminacy should take a central place in the study of decision-makers' norms of behavior. It did become an essential component in the work of John Maynard Keynes, another prominent economist who produced works in the same period. Keynes fundamental assumption was that we simply cannot foretell, and measure, what the future will bring (Robert Skidelsky, 2003, p. 11). What he wanted to figure out was the kinds of principles that would govern rational choice and behavior when the future is uncertain and unknowable. His final answer was intuition. That is, Keynes saw intuition, rather than sensory experience, as the source of knowledge in a universe dominated by uncertainty (Skidelsky, 2003, p. 57). In the same vein, he regarded economic instability as an outcome of decisions taken on the basis of such knowledge.

Keynes' longstanding ideas were founded upon such an uncertainty. In the economic analysis in *The General Theory of Employment, Interest, and Money* (1936), he argued that the most consequential and fundamental element of all economic activity is uncertainty. It is not possible to detach the roots of Keynes' ideas from the historical period in which he lived. Keynes, who lived between 1883 and 1946, was born into a world in which peace, prosperity, and progress were regarded as the ultimate order of the world, yet he lived long enough to see that such expectations would not come to fruition. From young age, Keynes was interested in the psychology of money and stock market speculation, yet what turned the science of economics into his main occupation was the uncertainty that the world was in (Skidelsky, 2003).

Keynes' understanding of uncertainty, which pervades *The General Theory*, is first seen on his work *Treatise on Probabilities* dated 1921. In this work, Keynes addressed the question of decision-making of the individual facing an unknown future and maintained that the only source of knowledge in an uncertain universe is subjective beliefs and intuitions. These ideas of Keynes, who argued that the main factor defining economic activity is thus uncertainty, were later hijacked by James Tobin, who reduced uncertainty into a measurable risk factor. Although risk and uncertainty are distinct notions, Tobin used them synonymously (J. Barkley Rosser, 2001, p. 545). Keynes, on the other hand, distinguished between the concepts of risk and uncertainty. The neoclassical school views the assessment and allocation of risk as a function of the free-functioning assets market. Neoclassical economics uses an insurance logic to address the allocation of risk. Finance theory assumes all risks are statistically predictable and views the development of financial markets as the best way to deal with risk. Keynes made a distinction between risk, which is calculable and thus insurable, and uncertainty, which is not possible to statistically make sense of. Keynes recognized that financial assets and markets are capable of distributing insurable risk, yet he viewed unanalyzable uncertainties as much more important and argued that financial markets may in fact make things even worse (Duncan Foley, 2010, p. 415).

Keynes recognized the importance of uncertainty and rendered his economic analysis dynamic by including in it the changes caused by individuals' expectations in output and employment. However, Keynes did not describe a clear mechanism as to how individuals formed their expectations in the face of uncertainty. Through his assumption that the existing situation will last forever, Keynes addressed expectations as external to the analysis, which rendered his analysis static. More specifically, his analysis involves a comparative static framework in which conditions that change as a result of changing expectations can be analyzed comparatively. This narrowed down the scope of his analysis significantly (Timur Han Gür, Naci Canpolat, Hüseyin Özel, 2011, p. 117). Moreover, his emphasis on epistemology at the expense of the ontological dimension in his conception of uncertainty especially in Treatise on Probabilities rendered his analysis even less dynamic. Although Keynes made an effort in General Theory to incorporate the ontological dimension, his theory failed to go beyond the problem of temporality and remained within a framework that centered around the issue of lack of knowledge.

Despite Keynes' strong influence on economic thought, the use of the notion of uncertainty as theorized by Knight and Keynes began in the 1980s to dwindle. On his study on the use of uncertainty in economic journals, Geoffrey Hodgson (2011, p. 161) observed that especially after the 1980s uncertainty began to be addressed as a measurable risk factor, gradually replacing its use as an immeasurable one. Such an exclusion of uncertainty from mainstream theories and the increasing prominence of "rational expectations" formed the basis for the post-Keynesian economists' critique of Keynesian economics as a deviation from the mainstream. Post-Keynesian theories also question mainstream economics and its methods in terms of its assumptions about time and uncertainty. Perhaps the most notable among them has been the critique of the rational expectations hypothesis. Also of importance is the post-Keynesian repudiation of the logical time of neoclassical economics, as well as the strong emphasis placed on uncertainty. Ultimately, they argued that real events occur in historical time, a fact that necessitates the recognition of conditions of uncertainty.

George Shackle, a post-Keynesian, developed an analytical framework based on the uncertainty of the future. He maintained that the deterministic approach, which makes it possible to predict economic systems' behavior, will collapse with such a framework (Shackle, 1972, p. 156). Shackle theorized uncertainty both epistemologically and ontologically, that is, resulting both from the lack of information about the future and from the ever-changing nature of reality. Epistemologically, individuals lacking information will bring widespread uncertainty into the market by acting on scenarios that they subjectively form in their own minds (Shackle, 1972, p. 437).

Thinkers who view economies as open systems because of reasons such as the particularities of the historical time, uncertainty of the future, lack of knowledge, humans' cognitive inadequacy, and complexity are certainly not limited to the ones mentioned previously. What follows this panoramic summary is a comparison of the theories of Hayek and Schumpeter, whose dynamic and indeterminist views occupy a central place in the history of economic thought. This comparison also involves a discussion on the philosophy of science, because Hayek (and the economic thought, in general) was influenced by Popper significantly. Similarly, the third section includes Bhaskar's relevant ideas in the analysis as his philosophy of science is in line with the main argument of this study.

2. Epistemological Indeterminism (Quasi-Dynamic Approaches)

The social (and economic) reality is a complex whole that is dynamic and inherently relational. In other words, the social reality is an open system, not a closed one. Closed systems consist of unchanging and recurrent relations and events. When conceived as a closed system, the universe is thought in terms of a mechanical causality in which it is governed by

unchanging laws. Such a mechanical causality is nonexistent in open systems, which by definition are organic and dynamic. In economics, a concept of a closed system is an integral component of equilibrium analyses.

The open-systems approach falls within the dynamic framework, which is one of the analytical frameworks used in economic analysis. Whereas synchronic and diachronic frameworks look for the causes of systemic changes outside the system, the dynamic framework presupposes an evolutionary perspective. That is, changes in economic systems are triggered by the system's internal components, and the norms and parameters of the system are in constant change. Therefore, the system may face long-term disequilibrium conditions, and its future direction cannot be predicted. Unlike synchronic and diachronic models that presuppose closed systems, dynamic models are not mechanical. They are organic models that include emergent structures that result from interactions (Hüseyin Özel, 2009, pp. 79–81).

This section examines the ideas of scholars who failed to propose a dynamic framework, even though they had an indeterminist approach to social analysis and recognized the openness of economic systems. I propose to call their analyses "quasi-dynamic," because they focused solely on the questions of knowledge and uncertainty and failed to free their analyses from the temporal dimension. Therefore, they failed to develop organic models that accounted for new leaps, mutations, and normative changes.

2.1. Karl Popper: The Open Universe

Although in physics Einstein's relativity theory and Heisenberg's uncertainty principle helped move beyond the paradigm based on Newtonian physics, the Vienna Circle brought indeterminism into philosophy. Karl Popper's Open Universe, in which he refuted scientific determinism and developed his theory of knowledge, made a profound impact on his period in which positivism was the dominant paradigm. Popper's work on the sciences and their development led him to an indeterminist position. In particular, his studies on historicism, which had a philosophical presupposition that the objective of social sciences should be the prediction of future human states, were instrumental in his conclusion that the future was "open" as the social sciences lacked such a predictive power.

Adopting an indeterministic approach in natural and social sciences as well and suggesting that the future course of history cannot be determined in advance, Popper first developed this approach in his article entitled "Indeterminism in Quantum Physics and in Classical Physics" (1950a, 1950b). In this article, he argued that many branches of physics, including classical and quantum physics, are indeterministic. He claimed that classical physics bears more resemblance to quantum physics than one might think. Popper's definition of indeterminacy can be summarized as follows: There is at least one event that cannot be predicted in all its details. According to Popper, the factors that prevent the prediction process in quantum physics are also encountered in classical physics. Similarly, Popper argues that individuals in society cannot predict their own future situations. Because individuals are part of the system they are trying to predict. Individuals are both related to the system they are trying to predict and are part of the system they are trying to predict. These interrelationships prevent the "predictability of every event without exception" approach in determinism. In his 1972 work, "Objective Knowledge: An Evolutionary Approach," Popper developed the ideas in his article, "Indeterminism in Quantum Physics and Classical Physics." In "Of Clouds and Clocks: An Approach to the Problem of Rationality and Freedom of Man," in which he defended the idea of indeterminacy, he presented two opposing visions of reality. These two visions are described using the metaphor of cloud and clock. The clock metaphor is used for determinacy; the universe is a giant machine. The cloud metaphor is used for indeterminacy; the universe consists of evolving irregularities; that is, a kind of chaos prevails. In Popper's approach, determinacy means that everything is highly ordered and explainable by physical processes: "All clocks are clouds; in other words, that only clouds exist, though clouds of very different degree of cloudiness" (Popper, 1972, s.213).

2.1.1. Scientific Method and Theory of Searchlight

Popper's open universe approach is intricately linked with his idea of science. He argued that the main problem of knowledge theory is that of how knowledge accumulates or grows, and the best way to explore this question is to examine the growth of science (Popper, 2002). According to Popper, all sciences arise from problems, and they use trial and error to solve these problems. In this method, solutions are proposed for a particular problem, and those solutions that are proven wrong are ruled out. All sciences grow through this recurrent trial and error. Therefore, the scientist should follow a method that is aimed at discovering those phenomena that would falsify, rather than verify, their hypotheses. The growth of scientific knowledge occurs as theories replace one another. New propositions are deduced from this new theory that can be tested through observation and experimentation with the aim of falsifying them. What is of primary importance here is the always incomplete nature of science. That is, according to Popper, science is an ever-growing endeavor that has no ultimate goal (Popper, 2001).

Popper completely rejected induction as a scientific method. Science, in Popper's view, grows through initial generalizations and estimations, which then are thoroughly tested until they are replaced by better ones. In the inductive method, on the other hand, the scientist collects findings through careful observations, combines these findings with other findings until they form a large enough pool that produces law-like hypotheses regarding the causal relationships among these findings, and if these hypotheses are verified, then the new law is found. Popper thought that such an inductive process was impossible and proposed the criterion of falsifiability to draw a line between science and nonscience. Departing from the recognition of an asymmetry existing between verifiability and falsifiability, he argued that generalizations cannot be verified, but they can be falsified; as in the example that no matter how many white swans one sees cannot form a basis for the argument that "all swans are white," the sight of only one black swan is enough to falsify this statement.

Popper also worked on the relativity of knowledge, the object of science. In his article, "The Bucket and The Searchlight: Two Theories of Knowledge" (1972), he pointed out that knowledge can be wrong and is falsifiable through his argument that science begins with the questioning of the existing situation in the face of a problem or a change in expectations. This idea of knowledge is integral to Popper's evolutionary epistemology. The universe is open and indeterminable because knowledge is falsifiable. Popper also put great emphasis on the viewpoint and attention of the scientist. In his theory of the searchlight, he suggested that what a searchlight makes visible is contingent on its position, its configuration, its power, or its color. Furthermore, what it makes visible is also dependent on the part of that object that it illuminates. His analogy is that scientific theories are similar to a searchlight in that they are dependent on the scientists' perspective and attention. Popper proposed that a theory or a hypothesis could be described as the crystallization of a point of view. His main purpose in the theory of the searchlight was to underline the inevitability of the acceptance of only one point of view because of the indefinite number of orientations from which a phenomenon can be examined (Popper, 2001).

In short, Popper argued for the openness of the universe by emphasizing the falsifiable and ever-growing nature of knowledge. For Popper, the very existence of knowledge creates uncertainty in the universe. Although knowledge has the capacity to solve emerging problems, these solutions may create new problems. The knowledge of the universe cannot be defined insofar as it is also part of that universe (Popper, 1982, pp. 106–109).

2.1.2. Scientific Determinism

Another factor behind Popper's theory of the open universe is his ideas on determinism. Popper rejected scientific determinism as an argument for the predictability of the future because of the ever-changing nature of knowledge. He defined three types of determinism: *theological*, *scientific*, and *metaphysical*. Whereas theological determinism is the idea that each and every event that occurs in the universe is determined and known by God, metaphysical determinism refers to the idea that these events are fixed, predetermined, and unchangeable. Scientific determinism, on the other hand, which was Popper's primary concern, presupposes that each occurrence in the world can be predicted and foreseen. More specifically, scientific determinists argue that an occurrence can be predicted rationally and with full certainty as long as the laws of nature and the precise-enough definitions of past events are given. Determinism, in Popper's view, is the idea that everything can be accounted for through highly ordered and physical processes. From this view of determinism emerges the most general definition of indeterminism that can be summarized as follows: "there is at least one occurrence that cannot be predicted with all its details." In other words, indeterminacy refers to a state in which disorder is more prominent than order.

Popper rejected determinism, especially its scientific type, not only for social and human sciences but also for natural sciences. This rejection has an epistemological basis, which is the presupposition that individuals lack the knowledge required for a scientific prediction. That is, it is impossible for individuals to foreknow the future in the present, and moreover, whatever knowledge they have in a given present constantly changes over time. In short, neither can individuals predict the future on the basis of their present knowledge, nor can they fully control or know the consequences of their actions (José Martinez Solano, 2012, p. 118).

Popper rejected the social science approach, which is called "historicism" and which makes definite judgments about the future. Yet, his belief in the existence of universal law in social sciences is firm. Popper, because of his studies on the sciences and the development of the sciences, found himself in an indeterministic position. In particular, because of his research on "historicism," which has a philosophical stance that the purpose of social sciences is to predict the future states of human history, he argued that social sciences do not have such a predictive power and the future is "open." He established the open universe approach with the route he drew in the form of reaching the truth by eliminating mistakes with fallible information and a critical attitude as a result of mistakes.

Popper objects to the argument that there are regularities in the physical world, unlike in the social world. He criticizes the approach that it is not possible to apply numerical methods, and the methods of physical sciences cannot be applied to social sciences because of the peculiarities of social sciences such as change and complexity. He argues that indeterminism prevails in both natural and social sciences because of the lack of knowledge. Exactly for this reason, he argues that it is wrong to separate these two sciences from each other and aims to establish a unity of method. What Popper opposes are historicists, who claim that universal laws and regularities cannot be found in the social sciences because of the complexity of the social phenomenon. What he means by historicism is a style of approach to social science that recognizes that historical prediction is the main goal of the social sciences and that this goal can be achieved by revealing the "rhythms" or "patterns," "laws," or "trends" that underlie the evolution of history. He criticizes the essentialist philosophy on which historians are based, that is, the philosophy of history that aims to find the reality behind the visible part of the phenomenon (phenomena). Historicists seek trends and mechanisms, emphasizing historicity rather than universal laws and regularities. In addition, these trends draw inferences from structures and mechanisms about the direction and path that societies will follow in the future. It is here that Popper intervenes and advocates indeterminism. Any approach that looks for underlying "rhythms" or "patterns," "laws," or "tendencies" is historicist. Indeed, according to Popper, the main mistake of historicism is to confuse these tendencies or patterns with real laws. Unlike trends, laws are absolute and unconditional (William A. Gorton, 2006, pp. 84–86). Popper bases his approach on nominalist philosophy. Accordingly, the purpose of science is only to explain the phenomenon, not to reveal the reality behind the phenomenon. He argues that this traditional metaphysical problem can be rationally discussed by turning it into a methodological problem (refuting it empirically).

Popper's main issue is actually the mechanisms in the form of trends and tendencies that are not valid everywhere and at any time. Popper believes in the existence of universal laws and argues that science is the discovery of them. Popper explicitly mentions that there are sociological laws and hypotheses similar to the laws and hypotheses of the natural sciences (2004, p. 79). Underlying this is the argument that physical states and conditions are similar to social ones (ie, there is no qualitative difference between them), so it is possible to experiment in both areas and to implement similar engineering projects. Indeed, according to Popper, universal laws are necessary, although we can never be completely sure of the universal validity of the laws.

In fact, the falsification criterion he proposes for making science is possible in the presence of these universal laws. In this method, solutions are presented for the problem, and wrong solutions are eliminated. All sciences evolve through this successive trial-and-error process. The scientist should follow a scientific method based on searching for facts that will falsify, not confirm, his theories. Scientific progress occurs when theories are surpassed by other theories. From this new theory, testable propositions are extracted by the deduction method, and these new propositions are tested and tried to be falsified by observation and experiment.

Popper’s indeterminism is inseparable from his views on the nature of time. According to Popper, the amount of knowledge that individuals have will increase as time progresses. Although this increased knowledge will bring them closer to the truth, it is impossible to arrive at the absolute truth. Thus, all knowledge is an approximation to the truth. Because of this accumulative nature of knowledge, there are limits to the acquisition of the entire knowledge in the world and, thus, predicting the future is logically impossible. For all these reasons, Popper argued that the future is open, as it is not fixed but ever-changing and, thus, indeterminate.

Popper, who accepts that every knowledge reached by science is approximate knowledge, but seeks universal law and proposes falsification as a criterion, has proposed an analysis called "situational analysis" as a method in social sciences. The reasoning that leads Popper to the 'situational logic' method takes its main motivation from the effort to establish the unity of method between natural sciences and social sciences. According to Popper, physical situations are just as complex as social situations; we can even go a step further and say that social situations are simpler than physical ones. Since there is a facilitating factor in social situations, not in physical situations, which is the element of rationality. According to Popper, people behave more or less rationally, and this makes it possible to construct relatively simple models of their actions and counteractions and to use them as very realistic predictions (2004, p. 149). If there is an important difference between the natural sciences and the social sciences, it is only that, according to Popper, a method that can be called the "zero method" in the social sciences is possible and necessary. This method, which Popper calls “situational logic.”

> “By this I mean the method of constructing a model on the assumption of complete rationality (and perhaps also on the assumption of the possession of complete information) on the part of all the individuals concerned and of estimating the deviation of the actual behavior of people from the model behavior, using the latter as a kind of zero co-ordinate” (Popper, 2004, pp. 149–150).

There are three periods in Popper's literary life. In his early writings, Popper wrote on deduction and falsification. Popper entered the discussion of economic methodology with the concept of falsification, and he considered falsification as the demarcating criterion between scientific inquiry and other forms of inquiry. In his later studies, Popper suggested the situational analysis/situational logic approach for the social sciences. There are those who think that these two methods of Popper are contradictory. It is argued that this contradiction can be resolved with the concept or approach of “critical rationalism” found in Popper's later works (Boland, 2005). At his period of critical rationality, Popper develops a new concept of the physical world (rather than the “closed systems” of logic) in the explanations of metaphysical research programs: the “open universe.” According to him, just as the incomplete and infinite variety of human knowledge, the universe is partly causal, partly probabilistic partly open: somehow born, it is emergent. This means that our universe expresses a combination of new entities and events that cannot be reduced to previous phases or explained by more fundamental/microphysicochemical processes, and all its properties show order or dispositional. The state of the universe at a given moment as a physical system (potentials, probabilities, or trends) is a summation of regularity. In such a case, a probabilistic explanation becomes more important than a solid logical explanation, while at the same time, the relational powers or tendencies are also explained with holistic concepts (Stokes, 1998, pp. 125–127). However, Popper who is recognized in economics, is actually the Popper in his early period. In Popper's later work, although the subject has changed form, economics still follows a method based on the early Popper. For this reason, in the article, criticism has been directed on Popper's ideas, which are based on the science of economics.

Popper, in his article entitled, “Prediction and Prophecy and their Significance for Social Theory,” defines the task of theoretical social sciences as “to reveal the unintended social effects of purposeful human activities” (Popper, 1990, p. 143). The importance of this task of the social sciences stems from the fact that it brings them closer to the experimental natural sciences and allows the testing of social theories such as physical sciences: Although social sciences do not allow us to make historical prophecies, it allows us to make rational decisions about what we can and cannot do in the face of the problems we encounter in social or political life (Popper, 1990, pp. 143–144).

2.1.3. Critique

Critic of Popper's analysis will be on two main aspects of his approach. The first concerns the deductive method. The hypotheticodeductive method is considered to be fundamental to economics. However, the ontological presuppositions that form the basis for the universal laws or law-like propositions assumed by this method raise questions about its suitability to the social sciences. Such laws and law-like statements of the deductive method require empirical regularities, which exist only in closed systems. The social life, however, involves very few closed systems. Popper's insistence on the deductive method may be presented as evidence of his preoccupation with a system that is indeed closed.

The second point of critique is the criterion of falsifiability, because there are numerous obstacles for its application. First, the number of initial conditions is too high, and therefore, it is impossible to clearly define all of them. Second is the lack of falsifiable "general laws." Although economists often use the term "economic laws," it refers in fact to a comprehensive list of statements (Bruce Caldwell, 1984, p. 490). Popper is actually aware of the fact that no theory can be fully falsified, as he clearly addresses the issue of the impossibility of being fully certain about initial conditions. Therefore, he characterized scientific knowledge as an "approximation" to truth, thereby rejecting scientific determinism. In this respect, no theory can be fully verified or falsified. However, the main problem here is Popper's deductive method of explanation. With his criterion of falsifiability and deductive method, as it will be explained later, Popper remained within the boundaries of "empirical realism."

The open universe approach and indeterminism developed on the basis of Popper's ideas on limited knowledge and fallibility of individuals amount to the "transitive" dimension that Bhaskar particularly criticized (Bhaskar, 2011, p. 140). Bhaskar suggests that there is a need for a revolution in the philosophy of science, and this revolution has to happen in two main areas. Although the first is a transitive dimension that underlines that knowledge is socially mediated, the second is an intransitive dimension that shows that the universe is independent of human knowledge (Bhaskar, 1975, pp. 61–62). Such a revolution is necessary, because it is necessary to move from epistemology to ontology; that is, a move from events and situations to the structures and mechanisms that produce them. An analysis that is conducted on the sole basis of the knowledge of a reality will empirically confine it to a single dimension because of the layered and stratified nature of that reality. In other words, it will amount to rendering closed the universe that is in reality open. Bhaskar thinks of reality as stratified into three levels: real, empirical, and actual, and the openness of the universe comes from the linear and nonlinear interactions among the structures and mechanisms at the real level whose consequences may not be predicted.

Popper based his analysis of the open universe and indeterminism on the absence of perfect knowledge as well as on the factors of change and growth. Thus, his analysis failed to go beyond the dimensions of temporality and knowledge. Even though Popper seems to embrace an open universe approach, he empirically reduced the stratified composition of social reality to a single dimension by limiting reality itself to the knowledge of it, thereby assuming a *closed* system. Moreover, Popper's view of science that is deductive and hypothesis-based along with his demarcation criterion of falsifiability necessitates the assumption of reality as a closed system. The ontological reasoning that Bhaskar put strong emphasis on is absent in Popper's analysis, which led him to propose a misleading source to the question of the unpredictability of systems.

The indeterminable character of social reality stems not from the knowledge of it, but from its nature. There exist forces that are at work in the deep layers of the stratified social reality, even though we do not know them. The idea that the knowledge of reality directly represents reality corresponds to what Bhaskar called "epistemic fallacy," which he defined through the argument that explanations about existence can always be analyzed as explanations about our knowledge of existence. The universe is more than what we know about it; thus, the problem of indeterminacy and unpredictability of the universe should be addressed not through our knowledge of the universe, but through its ontological status. Social reality will not become more predictable and ordered as the human knowledge of it grows. Social reality is open, because it is a complex whole that is constantly produced and reproduced through inherently relational and constantly changing processes. It is therefore plausible to argue that Popper failed to free his ideas from what Bhaskar defined as empirical realism.

2.2. Friedrich August von Hayek: Limited Knowledge

Friedrich August von Hayek is one of the most prominent thinkers behind the neoliberal transformation, which is an economic, political, and social form of organization that has managed to reshape all aspects of life. The most important assertion of neoliberalism is that it is the best among all possible organizational forms. In other words, rather than being the best option among existing alternatives, neoliberalism is presented as the only universal option capable of guaranteeing high welfare and individual freedom. The work of Hayek, who was awarded the Nobel Prize in 1974, largely provided the justification needed for such claims to universality and uniqueness. For Hayek, an uncontrolled "market" system is the "only" path that could guarantee high levels of social welfare, as well as individual freedoms. Such a defense of the free markets, which is at the heart of neoliberalism, originated from Hayek's theory of knowledge. In fact, his theory of knowledge underlies all his work, including his critique of the equilibrium-based neoclassical economics, as well as of collectivist systems that he viewed as against freedoms.

Hayek argued that the most fundamental economic question that societies face was not how to efficiently allocate scarce resources in the face of unlimited wants but how to utilize the knowledge that is distributed across individuals and not given to anyone in its totality. The crucial problem for economic theory is the various ways in which the knowledge on which people base their plans is communicated to them (Hayek, 1945, p. 520). Hayek's theory of knowledge is in fact a theory of the lack of knowledge, and this epistemic view underlies his indeterminist approach. This view, which is similar to that of Karl Popper,

defines Hayek's social scientific methodology. Hayek, whose economic analysis was based on the limited, partial, and local character of knowledge that individuals had, was a proponent of methodological individualism. Hayek initially developed his theory of knowledge in his 1937 article entitled "Economics and Knowledge." He later linked this theory to his anti-determinist thesis to argue that definitive predictions are impossible in the social sciences (Hayek, 1967, pp. 22–42).

2.2.1. Knowledge

Hayek had a standard understanding of equilibrium in his early works. He defines economic theory as together with equilibrium. Although he criticizes the standard economic theory's concept of timeless and static equilibrium, Hayek nevertheless argues that every sensible economic theory should use a concept of equilibrium. He even built his critique of socialism on this standard understanding of equilibrium. In other words, according to Hayek, socialism can only be possible with an understanding of equilibrium in which central planners have full knowledge of the market. Socialism cannot be a successful system, because such a situation cannot exist.

In Hayek's later works, it is seen that he abandoned this understanding of timeless and static equilibrium based on complete knowledge. Caldwell (1988) describes Hayek's transformation as a move away from the study of technical economics. Hayek recognized the restrictive function of the equilibrium approach in economic analysis and transformed his ideas. According to Hayek, the problem of coordination, which is the main problem, cannot be solved with the concept of equilibrium. For this reason, Hayek moved away from the standard meaning of equilibrium and switched to an understanding of equilibrium, which is subjectively understood as the consensus of knowledge that takes place in different forms in everyone. In his article, "Economics and Knowledge" (1937), Hayek turned to a new definition of equilibrium that includes knowledge. Economics and Knowledge represents a turning point. The Sensory Order (1952), on the other hand, means the subject of the study is now clarified. But he did not abandon the idea that economic theories should include a concept of equilibrium. In this article, equilibrium is sought both for the individual and for society. According to Hayek, for an adequate definition of equilibrium to be made, it must be taken into account that knowledge is subjective and dispersed among individuals. According to Caldwell, it is Hayek's involvement in the socialist calculation debate that helps him realize the centrality of the problem of coordination and its links to certain assumptions about knowledge (Caldwell, 1988). Steven Horwitz (2005), on the other hand, argues that the reason for the evolution of Hayek's thoughts is that he was on the losing side of both arguments he entered in the 1930s. One of these discussions was with Keynes and the other with socialist calculation. The reason why he lost the debate, according to Horwitz, was the method and content of Austrian economics. After the discussions, Hayek began to ponder why his arguments, which were quite clear and understandable to him, were not understood by the parties that were controversial.

Hayek moved away from traditional economics research to embark on a series of integrative studies in areas such as political theory, legal science, social science methodology, and natural law philosophy. Hayek's first effort was to present a series of critical studies of socialism. He then set about finding the framework that could best solve the coordination problem. This framework, according to Hayek, was the theory of spontaneous order, which included a set of economic, political, and legal institutions. In the end, he decided that the best solution to the coordination problem was a market system in a democratic state protected by a strong constitution (Caldwell, 1988, p. 532). In short, Hayek moved away from the study of equilibrium economics and turned to a broader study of the formation of institutions to answer the fundamental question of economics: how a spontaneous order might emerge to solve the problem of coordination (Caldwell, 1988, pp. 532–533).

According to Caldwell, the connection between the main themes in Hayek's thought and Hayek's later work in political philosophy is quite simple. When his work on the mind combined with the idea of spontaneous order embedded in complex social phenomena, Hayek turned to classical liberal politics defined by a constitutionally constrained government. The limits of the human mind imply that in a world of fundamental uncertainty we must rely on rules and institutions to guide our actions, and the limits of our ability to know the details of the human mind imply that we must set rules to prevent human beings from acting in ways that require knowledge they cannot have. To quote Horwitz, "Constitutional rules are the overt expression of our recognition of the limits of our reason" (Horwitz 2000, p. 37). All this together led to Hayek's works such as *The Constitution of Liberty* (1960) and the three-volume *Law, Legislation and Liberty* (1973, 1977, 1979) (Horwitz, 2005, p. 83).

Hayek's view of knowledge and indeterminacy related to it (1937, 1945) arises from the idea that knowledge used by individuals is subjective, dispersed, tacit, and constantly changing. He argued that most of the knowledge required for the functioning of the economic system is not scientific or technical, but rather is distributed among individuals mostly oriented toward comprehending the conditions of time and space. Because of people's positions, this knowledge possessed by different individuals is partial and local. Thus, each individual has certain advantages over others by having knowledge that others do not. This unique knowledge that an individual possesses can only be useful with the individual's participation (Hayek, 1945, p. 522). However, even the ones who have it are not consciously aware of this tacit knowledge. It is therefore impossible for a central system of planning to singlehandedly acquire all this knowledge of time and space. The market, on the other hand, tends to use this tacit knowledge through a "discovery procedure." It is then channeled into the entire economy in the form of the unintended consequences of individuals' self-seeking behavior.

Hayek thought that this partial and local knowledge is underestimated because those who possess some exclusive knowledge related to time and space are underrated compared with those who have more technical and theoretical knowledge. He argued that the reason why this knowledge of the temporal and spatial conditions is underestimated is because not enough importance is given to change. For Hayek, economic problems are always and only a result of change. Partial knowledge

concerning time and space is therefore of great importance. This is where Hayek's critique of central planning lies, because he believed what is needed is not a central planning mechanism but decentralization. The rationale behind his advocacy of decentralization is that decisions must be taken by those individuals who have the knowledge about time and space as well as about how they change and what resources are needed to adapt to this change.

Hayek's indeterminism is an anthropological concept, because it is concerned mostly with individual action and individual points of view. This indeterminist approach also provides the basis for Hayek's methodological individualism. It could thus be argued that Hayek favored methodological individualism as the fundamental assumption for the study of human practice.

The main reason why Hayek embraced indeterminism is the presence of limitations for the acquisition of knowledge about social phenomena that he thought are more complex than the objects of study of the natural sciences. For Hayek, social phenomena are more complex than natural phenomena, because the breadth of information that defines the pattern or regularity for them is much higher. It is extremely difficult to obtain and/or control these data in its entirety. He argued that an effort to understand or evaluate a regularity of a certain type is dependent on whether the structure defined by this pattern is permanent or incidental. Consistent structures are self-perpetuating (Hayek, 1967, p. 27). It is much more difficult to grasp empirical regularities in social phenomena than in physical phenomena. In other words, Hayek does not deny that social phenomena have empirical regularities similar to physical phenomena, but the acquisition of knowledge about these regularities is not possible, and thus, an anthropological indeterminacy prevails.

Because of the impossibility of data collection on complex social phenomena, it is also impossible to grasp the details of the entire reality, even though it is possible to determine empirical regularities. According to Hayek, social scientists are interested in both the recurrence of abstract patterns, and the prediction that a pattern of a certain kind will manifest itself in defined circumstances is a falsifiable and empirical statement. It is of great importance to know about the conditions in which a pattern emerges as well as what the preservation of this pattern depends on. These conditions are determined by a high number of variables. However, knowing that a phenomenon is determined by certain conditions does not necessarily mean that we can also know all the conditions that determine all the behaviors of the phenomenon at a specific moment. Thus, determinacy is impossible in the social sciences because of the impossibility of obtaining the required knowledge. For Hayek, even if the principle by which the human mind functions is known, it does not mean that all the factors that require a human to do a certain thing at a certain time are also necessarily known. An individual's personality is always a unique and immeasurable phenomenon, and individuals' acts are generally uncontrollable and unpredictable, because it is not possible to obtain the knowledge of all the factors that affect these acts (Hayek, 1967, pp. 28–37).

2.2.2. Spontaneous Order and Price Mechanism

The epistemological limitation described above that Hayek based his entire analysis on led him to the idea of "spontaneous order." His belief in spontaneous orders comes from his conviction that social knowledge is inherently different from the knowledge in the natural sciences. The distinguishing feature of spontaneous orders is that they are the unintended consequences of individual actions rather than products of human design. It is not possible for individuals to consciously grasp the benefits of the institutions and rules that define such orders. Through his work on knowledge, Hayek provided an epistemological foundation to this approach (Steven Horwitz, 2001, p. 87).

The critical rationalism that Hayek developed along with Popper was a forceful critique directed against the Cartesian approach, which prioritized reason and purported that the nature of social scientific knowledge is the same as that of natural scientific knowledge. Hayek argued that the constructivist rationalism's view that "Man's reason alone should enable him to construct society anew" is fundamentally wrong (Hayek, 1982a, p. 10). In the critical rationalist approach, the basic premise is that the current level of civilization and order has been achieved as a result of unintended consequences of intentional human action. For Hayek, the biggest mistake of Cartesian rationalism is the belief that it is possible to construct a society. This belief is what gives way to central planning or collectivist systems. Hayek suggested that humans are not capable of acquiring the knowledge of spontaneous systems because they are extremely complex for human perception. Cartesian rationalism's assumption that society is an intelligent human design, however, leads to the belief that when the market system is broken it can be fixed through a number of adjustments.

According to Hayek, the social order emerged through an evolutionary process. The notion of spontaneous order refers to this evolutionary process that produced the level of civilization and social institutions that the humanity achieved. Hayek called this spontaneously emerged order through an evolutionary process "Cosmos" and the planned order "Taxis." Cosmos is a system that results from the *unintended consequences* of many individuals' independent actions, and it benefits all individuals in unintended and unpredictable ways. Among his examples for Cosmos are the market system, money, and the common law, whereas for Taxis he lists ordered systems that come into being through planned activities such as a firm or a bureau (Hayek, 1982a, p. 37). A market is a spontaneous order rather than an organization designed with the aim of allocating certain instruments. Thus, the market, which is a highly complex structure that brings together numerous actors, cannot be governed by a single scale of objectives. Instead, it serves each individual's distinct, variable, and incommensurable aims.

In a market system, there is a high number of participants, each of whom has a different knowledge yet does not know what others know. Thus, there is a need for a highly advanced and complex system for the coordination of this scattered knowledge. Hayek thinks that what fulfills this function is the price mechanism. Prices function as signals for individuals who

seek to satisfy their needs. This system coordinates the knowledge of time and place scattered among individuals. The market's function is not to achieve equilibrium, but to transfer knowledge through its price mechanism, as it is a communicative tool in Hayek's analysis. The price mechanism is a system that has developed without anyone designing it. Individuals guided by it are generally unaware of why they do what they do (Hayek, 1945, p. 527).

According to Hayek, market participants, who operate in an uncertain universe due to the scattered, local, and tacit nature of knowledge, unconsciously serve purposes that are ultimately beneficial for the society by seeking their self-interest rather than orienting themselves toward an ultimate aim. Hayek argued that the most immediate objective of an individual is to acquire instruments needed for unknown future needs. This way, the individual will use his or her knowledge about the opportunities provided by prices for his or her self-interest, thereby benefiting from the distributed knowledge in the most efficient way. This whole process is made possible by the market's spontaneous order (Hayek, 1982b, p. 25).

For Hayek, there is no central mechanism that would rapidly and efficiently collect all the detailed information about the changing factors affecting the supply and demand of various goods and services. What assumes this function is a competitive price mechanism, which enables entrepreneurs to attune their activities to those of others by monitoring price changes (Hayek, 2001, p. 52). The critical factor for Hayek on this issue is competition. The competing entrepreneur in Hayek, just like in Walrasian equilibrium, assumes the task of ensuring the spontaneous order. Rather than playing a dynamic and efficient role, the entrepreneur's competition is akin to a *deus ex machina*. How is it possible that competition, which often creates disequilibrium, leads to spontaneous order? Hayek's response is that the order will sustain itself as long as there is no intervention from the outside. Yet, he does not explain how the order emerges initially. The hypothesis on which Hayek's analysis is based is that of the unintended consequences of intentional actions. However, this hypothesis is no more than a metaphysical one that assumes that there always needs to be a balance and order in social and economic life, rather than explaining how such an order in the market system emerges (Özel, 2009, pp. 100–102).

2.2.3. Critique

The indeterministic approach in Hayek's analysis could be critiqued from three main fronts: the view of knowledge, empirical regularities, and the Panglossian approach. Like Popper, Hayek addressed indeterminacy from an epistemological perspective, yet he failed to consider that reality is more than our knowledge of it, and it is stratified. For Hayek, social scientists deal with the recurrence of abstract regularities, as well as with the prediction of these regularities that are of a certain type and that appear under certain circumstances. Yet, it is impossible to predict these regularities because of the epistemological limitation, which he defined in his analysis of individualism as the limited capacity of human beings to perceive them. However, knowledge has "intransitive" objects that exist and move independent of it. Therefore, the analysis should be performed not at the level of knowledge but at the level of these intransitive objects (structures and mechanisms found in the deeper layers of reality). Hayek argued that science is about recording empirical regularities, yet such empirical regularities are possible only in closed systems. The social world, however, consists of open systems. The reduction of the real, empirical, and actual levels into one single level leads to a confusion between reality and its appearance. Hayek's failure to address this ontological dimension in his indeterminist approach led to the misinterpretation of the source of the problem of indeterminacy. The openness of social systems cannot be defined through the partiality, locality, or complexity of knowledge. Social and economic reality is layered and stratified, and it cannot be limited to the knowledge of it. A description of open systems at the level of knowledge will confine reality to the empirical level and implicitly assume a closed system.

An important conclusion drawn from this theory of knowledge is that the only mechanism that could solve the problem of coordination is the spontaneous order of the market system. Individuals will act in a way that will benefit other members of society without deliberate intention. This idea that intentional human acts will produce unintended good results is based on the argument that the market is a system that emerges through an evolutionary process to produce optimal results. However, this view excludes the nonoptimal circumstances, crises, instabilities, and imbalances that exist in the real world. Although indeterminist theories do not involve stability or equilibrium, Hayek's analysis does not envision any coordination problem in a way that is similar to determinist theories.

With the introduction of the evolutionary approach, many phenomena pertaining to the real world began to be included in economic analyses that could circumvent the orthodoxy, such as irreversibility, long-term development rather than short-term marginal adjustments, qualitative changes along with quantitative ones, conditions of disequilibrium as much as those of equilibrium, and behavioral patterns in which mistakes are made and no objective of optimization is pursued. However, the question of what evolutionary approach to use in economics or in social theory is a highly complicated one because of the gravity of its potential consequences. According to Hodgson (1993, p. 168), Hayek's evolutionary approach is the Spencerian or Panglossian adaptational perspective in which the evolutionary process is believed to produce the most optimal results. Hodgson suggests that the proponents of laissez faire used Herbert Spencer's "survival of the fittest" idea to prove themselves right. This idea provided a strong basis to the view that the existing world is the best possible world, and thus, an order without intervention is the best possible order. Instead of this adaptational perspective, however, a better economic analysis should adopt Schumpeter's dynamic evolutionary approach that views evolution as a process with leaps and equilibrium as intermittent. The process of dynamic coordination is, by nature, an evolutionary process with constant leaps. Thus, dynamic processes necessitate Schumpeter's understanding of development, in which a given system's norms are changing and the end point of the process is unknown. In this respect, such a development will produce instability, uncertainty, and disequilibrium.

In short, it offers a framework that accounts for the dynamic and nonlinear interactions between the individual and the market (Özel, 2009, p. 83).

The most contentious part of Hayek's analysis is his insistence on an inclination toward equilibrium that he argues exists in economic systems despite his strong indeterminist approach. Hayek argues that equilibrium, which is assumed to already exist, will continue to exist as long as there is no outside intervention. Equilibrium is conceived as something that is both already existing and self-correcting. However, such a definition can only hold in an environment that is static and free from time and change, in short, *closed*.

3. Ontological Indeterminism (Dynamic Approaches)

This section addresses the dynamic framework, which is one of the three main analytical frameworks in the history of economic thought that are aimed at solving the problem of coordination produced by the market mechanism. Unlike the synchronic and diachronic models that require closed systems, dynamic models that require open systems are not mechanical. These models are capable of producing new structures through the interactions among the elements they contain. Thus, these models are organic (Özel, 2009, p. 81).

In this section, the works of Roy Bhaskar and Joseph Schumpeter will be examined. The reason these two thinkers are analyzed together is because they both emphasized open systems. Bhaskar, who addressed reality as a multilayered and stratified phenomenon, thereby proposing that social reality is composed of open systems, argued that such open systems cannot yield empirical regularities, and positivism, which suggests otherwise, is not suitable for social scientific methodology because it assumes reality as a closed phenomenon. On the other hand, the biggest contribution to the transition from the deterministic approach to economic systems to an indeterministic one was made by Joseph Alois Schumpeter. Schumpeter's indeterminism can be interpreted through the notion of "discontinuity," which he saw as a feature of innovations that he addressed as the source of economic development, a question that he sought to answer throughout his career. Schumpeter proposed that economic systems involve mutations and leaps, their norms are not stable, and this is why their future path cannot be foreseen.

3.1. Roy Bhaskar: Open System

Philosophically, Roy Bhaskar's critical realism involves important ideas regarding both the nature of social reality and indeterminism, which is the main question of this study. Bhaskar's main aim is to argue for a non-positivist naturalism that hinges on a realist view of science. Bhaskar identified three main elements on which positivism rests: empirical realism that derives from Humean causality; epistemic fallacy that assumes that that which relates to reality can be reduced to knowledge; and, finally, methodological individualism (Bhaskar, 1975, p. 16; Özel, 2006, p. 2). Bhaskar insists that priority should be placed on ontology as he suggests that there is a need for a Copernican Revolution in philosophy of science, because knowledge is socially produced, yet the world that is known continues its existence independent of that knowledge as well as of the knowing human. There exist objects of science in the social sciences that are different from that which is perceivable but more important for scientific discovery, that is, objects that cannot be perceived through senses but are affective. Therefore, ontological reasoning should be brought into the scientific sphere (Vefa Saygın Öğütle, 2013, pp. 253–255). What ontology means here is having a specific idea of "what" the object that is scientifically explored is, because it is impossible to do science without having a presupposition about "what" the world is.

3.1.1. Critical Realism: Transcendental Realism and Critical Naturalism

Critical realism is a notion derived from *transcendental realism* and *critical naturalism*. The main argument of critical realism is that the world's existence is independent of and bigger than human perception. Although the world, or the social reality, should not be confused with our experience of it, a science of the social world is still possible.

Bhaskar identified three main traditions in the philosophy of science: empiricism, idealism, and transcendental realism. Represented by Hume and his followers, empiricism sees as the objects of science atomistic events, which consist of given phenomena and constant conjunctions. In idealism, on the other hand, the objects of scientific knowledge are the *ideals* of the natural order. These objects are artificial and not independent of human activity (Bhaskar, 1975, p. 15). Finally, in transcendental realism, the objects of science are the "structures and mechanisms" that produce phenomena, whereas knowledge is a social product produced through scientific endeavor. Bhaskar suggested that the paradox resulting from these two aspects of knowledge (it being both a social product and completely independent of human activity) must be resolved, because he thought that propositions about being cannot be reduced to propositions about knowledge. He called this an "epistemic fallacy." As a result, Bhaskar identified the need for two dimensions when talking about science: the intransitive (ontological) and transitive (epistemological or historical-sociological) dimensions (Bhaskar, 1998b, p. xii). He referred to those objects of science that exist without a need for humans' *intransitive* objects of science. On the other hand, *transitive* objects of science are the raw materials that science uses, such as the preexisting theories, phenomena, paradigms, and models for a school of science (Bhaskar, 1975, p. 21).

Intransitive objects of science are the structures and mechanisms that are independent of our knowledge of them. They are not unknowable; they are only independent of human perception and knowledge, and they are the objects of scientific endeavor. It could be suggested, departing from the fact that the intransitive objects are prescientific theories, models, and paradigms, that knowledge production cannot be conceived independent of knowledge-like material. Knowledge production

is conducted through these transitive objects, which are social products that function as instruments for the discovery of the world's intransitive objects (Bhaskar, 1975, p. 22).

Bhaskar argues that the science of a world governed by laws that are independent of humans is possible only with transcendental realism. In transcendental realism, nature exists even if science does not, and the object of science is the structures and mechanisms of nature. The idea of independent structures and mechanisms is absent in both empiricism and idealism. Bhaskar thinks that this absence is a result of the ontological assumptions these two views of science share, which is an empiricist ontology (Bhaskar, 1975, p. 27). Briefly, Bhaskar's transcendental realism has three main ontological dimensions (Bhaskar, 1998b, p. xii).

Intransitivity: The Western scientific tradition falsely reduced the question of "what is" to that of "what we know," and this is an "epistemic fallacy." Science is a social product, but the mechanisms that sciences define function before being discovered by it and independent of it. Transitive and intransitive dimensions must be separated. Existence may involve human products such as knowledge or experience, yet it cannot be reduced to them. The domain of "the real" is separate from and larger than the domain of "the empirical."

Transfactuality: Laws of nature operate independently of the closedness of the systems in which they operate. The domain of "the real" is separate from and larger than the actual level (which involves events) and the empirical level (which involves sensory experiences). If the prevalence of open systems is accepted, laws should be analyzed not empirically but transfactually. Constant conjunctions are not discovered but produced. Laws function independently of their definitions as well as of the circumstances in which they exist. Theories explain laws through the structures that underlie them.

Stratification: Stratification exists both in nature and in science, which is the reflection of nature. Distinctions between phenomena and structures that produce them as well as between open and closed systems are signs of the world's stratified and differentiated nature.

Another constituent element of Bhaskar's critical realism is critical naturalism. Bhaskar argues that naturalism is different from reductionism and scientism. Although the former assumes a true identicality in its object of analysis, the latter refuses the idea that there is a significant difference between the ways of analyzing social and natural objects, no matter if they are identical or not. Against these two forms of naturalism, Bhaskar advocates an anti-positivist naturalism with a realist view of science. Although this scientific method involves the techniques of both natural and social sciences, it recognizes the fundamental difference between their objects of analysis. Bhaskar argues that it is the object's nature that determines how the potential science of that object will be (Bhaskar, 1998a, pp. 1–2).

According to Bhaskar, the object of the experimental activity should not be events and their constant conjunctions as in the positivist approach, but be the structures and creative mechanisms that exist outside of these event patterns and form the basis for causal laws. The Humean explanation equates causal laws to experiments. It reduces them to empirical regularities, which are further reduced to sensory experiences. Causal laws appear in the form of empirical invariance only and necessarily under closed conditions. (The keystone of positivism is Humean laws that presuppose the closed-systems ontology.) Bhaskar, however, argues that sensory experience alone does not account for the entire knowledge and underlines the existence of "open" systems that do not have any constant formations. An ontological distinction is necessary between causal laws and event patterns. When causal laws are accepted to be constant relations, the question of what governs phenomena in open systems that lack such relations becomes pertinent. Bhaskar insists that we need to recognize that constant relations are not unchangeable like causal laws. This ontological distinction is imperative to understanding experimental activity. However, both positivism and hermeneutics fail to recognize this ontological distinction (Bhaskar, 1998a, pp. 9–12). Positivism views the empirical exploration of causal laws as the purpose of science (Peter T. Manicas, 2006, p. 37). The conclusion drawn from such an analysis of scientific activity is the following: the objects of scientific research are "intransitive" objects that cannot be reduced to event patterns and exist independently of human beings. The purpose of science therefore should be producing knowledge about the mechanisms that produce phenomena in nature, that is, intransitive objects. In the realist view of science, the essence of scientific activity is to move away from seeking knowledge of open phenomena at any level to the knowledge of structures that produce them (Bhaskar, 1998a, pp. 12–15).

There is also an important historian in economics field who draws attention to misleading face of "events" that is worth mentioning. Fernand Braudel is a historian belonging to Annales school. Annales school of history has declared war on the understanding of not only dealing with events, which continues in historiography. The revolutionary turn in the use of history in the sociological analysis that Braudel initiated is closely linked to Braudel's opposition to the concept of structure and event in traditional historiography based primarily on the 19th-century Rankean narrative of events. For Annales historians, time is first and foremost "historical time" in the most general sense. Annales schools try to reveal the intellectuality of structures, geography, climates, and many other human interactions in history. Braudel developed a new approach to the perception of time in historical studies. In Braudel's (2009) 3-layered historical time, which can also be considered as a method proposal, the first and top layer is short term. This short term is the eventual history that deals with the changes that take place in a moment; this history that shows the time as if it is running fast can also be described as microhistory. Medium term (cyclical phase/conjuncture), on the other hand, constitutes the second layer where developments are handled over longer periods. It deals with time periods of 25 to 50 years. This history mostly includes studies on economy and production relations. Longue durée is the bottom layer of this method. This history beyond the cyclical history is a structural history. This is the treatment of a large period (longue durée). In this context, Braudel has a perspective of revealing the traces and roots of a social event

that takes place in the present, going back decades and centuries, through the layers ordered from the shortest time closest to the farthest point to a long time. Society is a field in which both history and sociology work, and this society is no longer considered only with its present, nor only with its recent or distant past. Now all times are together. According to Braudel, "Among the different historical temporalities, the longue durée stands out as a troublesome, complicated, often surprising figure… For the historian, to include it would be to accept a change of style and attitude, an up- ending of ways of thinking, a new concept of the social. It requires getting to know slower temporalities, almost immobile ones. Only when that happens, and not before will it be legitimate to free oneself from the inexorable march of historical time, to leave it behind, and then to return to it with new eyes, with new uncertainties, with new questions. In any case, on the basis of these layers of slow history, one can rethink the totality of history, as though it were located atop an infrastructure. All the stages, all the thousands of stages, all the thousands of explosions of historical time can be understood from these depths, from this semi-immobility. Everything gravitates around it" (Braudel, 2009:181). Therefore, it can be said that the long term (and the geohistory on which it is based) is, according to Braudel, indispensable both personally and metaphorically for a holistic understanding of social life. In short, Braudel urges historians to abandon the fast-paced, misleading, and superficial history of events and to descend into the depths of a slow-flowing but persistent history in a systematic and structural manner. As it can be understood from here, Braudel develops a structural understanding of sociohistorical analysis. Therefore, if a real social history study is to be carried out, it is necessary not to be contented with superficial appearances, namely, bubbles, and to reveal the nature of the relationship between them by focusing on the structural processes that operate under these bubbles. For Braudel, structure means "an organization, a degree of coherence, rather fixed relations between realities and social masses" (2009, 178). What matters for Braudel is the back-and-forth movement from event to structure and then from structures and models to event (2009). In his works, Braudel observes an existing dialectic between the past and the present. Each layer of the historical process interacts with both its predecessors and later ones. In other words, history includes explaining and understanding the present from the past. Braudel's three-layered historical time is intertwined. This points to Braudel's suggestion to be careful in the face of a short time, which he describes as "unreal." However, Braudel is not unaware of the importance and temporality of events for understanding changes in structures. In this sense, Braudel does not adhere to a structure-obsessed global history approach. Braudel presents a global historical sociological perspective surrounding the symbiotic relationship between events and structures.

3.1.2. Determinism

Bhaskar suggested that the "specter" of determinism was still haunting many branches of science, and the problems it entailed were still relevant. He argued that determinism was far from being a rational and reasonable argument and that the laws of causality, descriptive models, and thesis of a symmetry between description and prediction that characterize the orthodox philosophy of science were indefensible.

Bhaskar identified three main types of determinism that are entirely different from one another. The particular concept of "cause" is also conceived differently in each of these respective types. The first of these is "ubiquity determinism," which assumes that every event has a real *cause*, which is defined as a material, an object, or an agent that produces an effect. Such a concept of cause characterizes transcendental realist philosophy of science. Another type of determinism is "intelligibility determinism," which maintains that every event has a clear and intelligible *cause*. This cause is an *event*, and pertinent to idealist philosophy of science. The final type, at which Bhaskar's main critique is directed, is "regularity determinism." In this type, the same type of events has the same type of causes. The "cause" here is defined as the set of conditions that regularly accompanies an event. This concept of cause is associated with the classical empiricist philosophy of science. This final type of determinism, that is summarized as "whenever this, then that," is possible only in closed systems (Bhaskar, 1975, p. 70). While Bhaskar rejected regularity determinism, he proposed in its place ubiquity determinism, the main proposition of which is "every event has a real cause."

Under regularity determinism, the future is predetermined. Such an approach can be valid only in closed systems characterized by constant conjunctions. Furthermore, this approach assumes symmetry between prediction and explanation. However, ubiquity determinism rejects the idea that an event having a cause means that it is predetermined. The view of causality, the prediction condition of which is each *x* event will cause a *y* event, is not possible because of "emergent" forces, and thus, these systems are open. For Bhaskar, reality comprises open systems, which do not exhibit regularity determinism (Bhaskar, 1975, pp. 70–71).

Regularity determinism is an epistemological thesis, which maintains that our knowledge of the world can be cast in a certain form. This logically presupposes that the world is such that our knowledge of it can be cast in that form. Regularity determinism argues that it is possible to predict what would happen and the way it would happen if certain highly restrictive conditions were satisfied. The ontological claim of regularity determinism is that the world is such that these conditions are satisfied. Because we can never know whether these conditions are satisfied, we can never refute regularity determinism in this way. Bhaskar suggests that this refutation is possible metaphysically, the only way of which is transcendental realism. His argument is as follows: If the world were as claimed by regularity determinism, science would be impossible. Because we know that science is possible, the world must be such that these critical conditions are not satisfied. In short, the ontological untruth of regularity determinism is a condition of the possibility of science (Bhaskar, 1975, p. 106).

Throughout his discussion of determinism, Bhaskar argued that there is a distinction between open and closed systems, a distinction that almost the entire philosophy of science ignored. Closed systems are necessary conditions of certain theories,

and when the distinction between open and closed systems is comprehended, these theories collapse. For example, Humean law of causation is based on closed systems. Although this theory has been critiqued from many fronts, Bhaskar's particular critique focused on its acceptance of constant conjunctions between events as laws. If atomistic events constitute the world, then the relations between them must be constant for a general knowledge to be possible. This is a condition for closedness. In other words, for us to be able to obtain knowledge about regularities, the relations between atomistic events must be constant. If these are not generally constant, then atomistic events alone cannot provide an ontological basis. Positivism rendered the purpose of science the search for causal laws in an empiricist way (Manicas, 2006, p. 37). Bhaskar used the concept of "actualism" to refer to the doctrine of the reality of causal laws. According to this doctrine, relations between events are laws. This idea predicates on the assumption that "that which is actual is real".

The real world is more than what we know about it. Thus, the real world consists of different levels that are not fully accessible. There are three different levels: the *real level* that consists of structures and mechanisms that are not directly accessible, the *actual level* that is composed of *events* and directly accessible, and the *empirical level* that is characterized by sensory experiences that is also accessible. The real level is the one where generative mechanisms are at work. The purpose of realist science is to uncover these generative mechanisms. However, we can access reality only at the empirical and actual levels. What we can say of reality at the empirical level depends on the nature of generative mechanisms at the real level. Generative mechanisms and explanatory structures must be addressed in a different way from the events they produce at the actual level. Furthermore, events must also be addressed in a way different from the sensory experiences at the empirical level. These three levels are separate from one another. The social reality does not comprise events, and therefore, the object of social sciences is not events. Instead, it is the structures and mechanisms that produce these events. These structures and mechanisms may be at work even if we are unable to observe them, and the ultimate purpose of science is to uncover them (Özel, 2012, pp. 15–16).

Bhaskar addressed the relations between these three levels through the notion of "emergence." Especially after the 1980s, the interest in concepts of emergence has surged in physics, sociology, biology, and informatics (Dave Elder-Vass, 2010, p. 13). The term "emergence" was first used in 1875 by George Henry Lewes as he critiqued Hume's view of causality. Lewes proposed a distinction between two types of results: *resultants* and *emergents*. This distinction suggests that an emergent result cannot be predicted based on our knowledge of its elements, and it cannot be broken into its elements (Keith Sawyer, 2001, pp. 553–554).

In Bhaskar's work, the view of emergence is developed as an antithesis to reductionism. The concept of emergence allows for the analysis of reality in a stratified way and makes it possible to address these different strata. It suggests that the causal power of an emergent object is not the sum of the causal powers of its components. The realist approach in social sciences views social structures and mechanisms in this way. Here lies the stratified ontological nature of reality (Öğütle, 2013, pp. 92–98). *Emergence* suggests that higher levels are produced by lower levels; that is, the real level leads to the emergence of the actual level, which then leads to the emergence of the empirical level. In other words, the empirical level is a subset of the actual level, which is a subset of the real level. Whereas the real level has the largest domain, the empirical level has the smallest (Bhaskar, 1975, p. 56). Bhaskar defines emergence as follows: the relationship between two terms such that one diachronically, or perhaps synchronically, arises out of the other, but is capable of reacting back on the first and is in any event causally and taxonomically irreducible to it, as society is to nature or mind to matter (Bhaskar, 1994, p. 73). Emergent entities are relational; they do not feature among their constitutive elements yet are impossible to exist without them (Margaret S. Archer, 1982, p. 475).

With the acceptance of the universe as an open system, it is no more possible to reduce something to its constitutive elements, as unpredictable new things emerged and will continue to emerge (Öğütle, 2013, p. 263). The view of emergence is of great importance as it provides a foundation for an understanding of the ways in which causal forces operate in the world (Elder-Vass, 2010, p. 40). Here lies Bhaskar's indeterminist perspective. The concept of emergence makes it possible to address the world as stratified along the real, actual, and empirical levels and maintains that higher levels emerge from lower levels that are irreducible to each other. This way, it points to open systems in which unpredictable new things emerge, thereby refuting regularity determinism in which empirical regularities are accepted as causal laws. Hence, prediction and explanation are asymmetrical, and what matters in the social sciences is explanation rather than prediction.

3.1.3. Conclusion

Bhaskar's ideas on determinism that he saw as the recording of empirical regularities, his rejection of closed systems, and his emphasis on open systems are of great importance for economics. Inconsistency and dynamism in social and economic systems arise from the ways these systems function as open systems. Therefore, a search for the reasons of these discontinuities should start with an ontological quest for what social reality is. Bhaskar defines social reality as comprises open systems that do not exhibit empirical regularities, and this point is what distinguishes him from the thinkers whose ideas were examined in the previous section. On the question of the impossibility of prediction in systems, Popper and Hayek based their analyses on the limitations of human knowledge, whereas Bhaskar focused his analysis on emergent forces that make it impossible to observe empirical regularities. The view of causality that presupposes that every event *x* will lead to an event *y* does not hold because of emergent forces, and this is why systems are open.

The distinguishing feature of Bhaskar's analysis is his careful distinction between ontology and epistemology. For Bhaskar, in a world in which we do not distinguish between knowledge and object, ontology and epistemology, or transitive

and intransitive domains, that is, the known world, it has become a natural instinct to escape from ontology. The tacit ontology in the social sciences has been undergirded by Humean laws of causality, which falsely presuppose that the world is an unchanging, unstratified, and undifferentiated system that comprises constant conjunctions between events.

The superiority of Bhaskar's theory comes from his analysis of open systems that recognizes the layered and stratified structure of reality and focuses on emergent forces. The epistemic fallacy in the works of thinkers who addressed the question of indeterminacy from an epistemological perspective is their insistence on the limitations of human knowledge as the prime cause of indeterminacy and their presupposition that explanations about existence can always be analyzed as explanations about our knowledge of existence. Although these thinkers who define indeterminacy epistemologically seem to be underlining the openness of social and economic systems, they in fact are dealing with closed systems. These are those systems in which the three levels of reality are reduced to one. In other words, all of these thinkers rendered the system closed by reducing reality (the real level) to knowledge (the empirical level). Unlike them, Bhaskar addresses indeterminacy as resulting from open systems and emergent forces that hinder the acquisition of empirical regularities.

3.2. Joseph A. Schumpeter: Discontinuity as a Source of Economic Development

The first step that led to the transition from the deterministic approach to economic systems to an indeterministic one was taken by Joseph Alois Schumpeter. The question that occupied him throughout his career was what drove economic development, and he thought about it through notions such as discontinuity, disequilibrium, and indeterminacy. Innovations, which he addressed as the source of economic development, are of a discontinuous and unpredictable character. They disrupt the existing equilibrium and bring about new ones. Thanks to their distinct logics of functioning from those of the economic systems from which they originate, innovations replace those systems with new ones, thereby steering the economic system toward a new and unpredictable equilibrium. Through innovation, the entrepreneur creates instability in the market and uncertainty for the rest of market participants. Although a return to the previous equilibrium is impossible after these innovations, the future equilibrium is unknown. Schumpeter argued that this mechanism of innovation that is inherent to the economic system was where the answer to the question of unpredictability lied. What makes Schumpeter's analysis superior to Hayek's is its ontological mode of inquiry.

3.2.1. The Static/Dynamic Dichotomy and Economic Development

For Schumpeter, who associated economic development with disequilibrium, a static state is naturally inadequate. However, for a dynamic analysis to be possible, the starting point should be the static state. Schumpeter was convinced that a dynamic analysis is needed for the theoretical modeling of the process of economic development. He began this analysis with Leon Walras' general equilibrium model. Although Schumpeter found Walras' model to be theoretically perfect, he thought that it could be applied only to a static economy since the theory itself was static. While Schumpeter acknowledged that the Walrasian model was highly useful under static conditions, he proposed that the crucial prerequisite for comprehending how capitalism worked was a presupposition of capitalism as an evolutionary process. Therefore, Schumpeter found Walras' model to be inadequate for a dynamic analysis yet also indispensable for the construction of such an analysis. He saw Walras' success in static analysis as an example to follow in his own dynamic analysis. In this sense, it could be argued that Schumpeter is closer to Walras on the subject of equilibrium, but to Marx on the issue of change and disequilibrium (Derya Güler Aydın, 2011, p. 191).

Schumpeter used the concept of "circular flow" to describe static economies, because such economies do not change and involve recurring processes. If there is a change of information in this circular flow, the system's agents adjust to this change through a process that leads to a new and "determinate" equilibrium. For example, a process of development arising from changes in information such as a population rise or capital rise remains within the circular flow. Such a flow involves only quantitative changes and excludes innovations (Yuichi Shionoya, 1997, p. 71). On the other hand, a radical change that brings about a qualitative or structural transformation amounts to a break with the circular flow. For Schumpeter, this notion of circular flow is a reference point to account for the qualitative and structural changes instigated by innovation (Brouwer, 2002, p. 89). Schumpeter distinguished between the concepts of static and dynamic and used the former to refer to all states that do not involve innovative behavior. This was his starting point, because he thought that a theory of innovation and evolution must begin with the definition of its opposite (Esben Sloth Andersen, 1991, p. 35).

According to Schumpeter, economists long believed that it was enough to show factors such as population rise or capital increase to account for economic development. However, these factors' impact is never in a single way. For example, there may be situations in which a population increase has no impact other than decreasing per-capita income. In such situations, it is necessary to uncover the operating mechanisms of the system that involves these factors. Schumpeter divides into two the reactions of economies to the conditions in which they operate: adaptive and creative reactions. The former is at work when an economy or an industry adjusts itself to the changes in its data in ways described in conventional theory, whereas it is a creative reaction if this economy or industry adjusts in an unconventional way. Creative reaction has two fundamental characteristics. First, a creative reaction can be understood *ex post* but cannot be predicted *ex ante*. It is impossible to predict this reaction by applying the usual rules derived from existing realities. Second, a creative reaction completely alters the future path of events as well as these events' long-term consequences. In other words, there are no bridges between situations with and without creative reactions. Creative reactions constitute an element of entrepreneurial activity in economic systems, although Schumpeter saw them as valid also for the universal historical theory, because creative reactions are a significant component of the historical process as they irreversibly transform social and economic conditions (Schumpeter, 1947, p. 150).

The distinction between growth, which is incremental change, and development, which is discontinuous change, is of great importance. In his article entitled, "Development," which was written in 1932 yet remained undiscovered until 1993, Schumpeter calls attention to the dangers of two concepts that come to mind on the issue of development. These are the concepts of progress and evolution. The danger that Schumpeter draws attention to is that both of these two concepts imply an adjustment to existing conditions, that is, a continuous and predictable change. Schumpeter, on the other hand, views development as resulting from discontinuous changes. Schumpeter's view of evolution is consistent with the concept of "punctuated equilibrium" developed by Niles Eldredge and Stephen Jay Gould (1972). This concept suggests that radical changes might occur, and new species might appear as evolution proceeds in long and stable periods, and such changes and new species might disrupt the long-standing stability. In this view, evolution is understood to be an unpredictable, irreversible, and emergent process in which leaps and punctuations take place. This is because there is a potential for novelties and mutations to appear suddenly and incidentally. There is no equilibrium, and even if there is, it should be understood as the "absence of structural change" (Cemal Güzel and Hüseyin Özel, 2011). Similarly, in Schumpeter's analysis, the process of dynamic coordination is by its nature an evolutionary process that involves constant leaps. The concept of economic development implies changing systemic norms and uncertain outcomes. Thus, such a development is characterized by instabilities, uncertainties, and disequilibrium. In short, Schumpeter's view of economic development offers a framework that takes into account the dynamic and nonlinear interactions between individuals and the market (Özel, 2009:83).

Although Schumpeter acknowledged the use of Darwinian and Mendelian evolutionary approaches for explaining incremental changes such as growth, he viewed them inadequate for accounting for the innovations resulting from radical changes. In other words, he found them inadequate not because they were not scientific or because of their approaches to biology, but because they failed to account for discontinuity (Schumpeter, 2005, p. 110). These theories cannot explain unpredictability and indeterminacy that Schumpeter viewed as prime sources of economic development. In Schumpeter's analysis, discontinuity is the building block. On Marshall's quoted passage *natura non facit saltum*, Schumpeter responded that the evolution of culture and knowledge would be possible through leaps (Shionoya, 1997, p. 65).

To explain Schumpeter's evolutionary process, the notion of "self-organization" that hinges on the concepts of disequilibrium and no linearity should be used. Self-organization is a dynamic process that involves innovation and change resulting from competitive selection, which is a concept that replaced natural selection in contemporary evolutionary biology (Güler Aydın, 2008, p. 120). Schumpeter's concept of evolution should be viewed as a guide toward an understanding of reality as a whole consisting of emergent processes, dissipative structures, self-organization, indeterminacy, and punctuated equilibrium. It offers a way of understanding the process of economic (and also historical and social) evolution as a punctuated equilibrium that consists of constant and routinized innovations (Bahar Araz Takay and Hüseyin Özel, 2008). According to Schumpeter, the main characteristic of the capitalist social structure is its dynamic structure. This characteristic stems from the fact that "economic life" is a changing "social" environment (Itır Ozer Imer and Derya Güler Aydın, 2018, p. 480).

3.2.2. Innovation and Creative Destruction

In Schumpeter's system, the steady state characterizes such a system: Individuals in the system act according to habitual past experiences. The orientation toward perfect competition and equilibrium is dominant. There are no stock and futures markets. There are only two social classes: the worker and the landlord. Money, on the other hand, functions only as a simple medium of circulation. Economic processes are constantly self-generating, and changes are absorbed without disruption to the system. It is assumed that in each period of the cycle, firms repeat their demand for factors of production and repeat their supply quantities. Revenues of factors of production are transferred directly to consumer goods. The production process is synchronized, and each supply creates its own demand. Money is unimportant and neglected in this process. In this cyclical stagnant flow, there is neither profit nor loss (Riccardo Bellofiore, 1999, p. 1010).

Schumpeter's model of cycles and development uses a system of successive approximation to a "real economy," which means starting with a simple model and then becoming increasingly complex as the model tries to approximate a more realistic view of capitalism. He starts with an economy of unchanging structures of production and circulation (the "circular flow"), followed by the introduction of changing methods, markets, and credit; followed by the use of credit for general accumulation; and finally new production methods of differing durability (Bellofiore, 1999, p. 1010). Schumpeter's first approximation to real economy is as follows. The system becomes dynamic when Schumpeter adds innovation and credit to the stagnant flow. Innovations are defined as "other things" or "production of the same thing in a different way." Innovation, which Schumpeter identified as the prime force that triggers economic development, is defined as the commercial or industrial application of something new. This can take the form of manufacturing of a new product, a new manufacturing method, a new market, a new raw material source, or new forms of organization. The agent behind these innovations is the entrepreneur (Schumpeter, 1934, p. 66). These innovations presented by the entrepreneur are discontinuous changes. On the other hand, innovations are dependent on bank loans. Thus, the three main components of Schumpeter's theory of economic development are *innovation*, *entrepreneurs*, and *credits*. Innovation and invention are not the same thing. Innovation is the commercial application of the invention. Entrepreneurs do not always have sufficient financial resources to innovate their inventions, that is, to put them into commercial application. This is where banks and the credit mechanism come into play. Thus, purchasing power increases, and this increase increases the demand for labor and land, as well as money wages and rents (Bellofiore, 1999, p. 1011). According to Schumpeter, each domain of social life has its own mechanism, agents, innovation, and instruments. This analogy can be extended from the economic domain to other social domains. The person identified as a leader brings about innovations using

certain instruments, thereby bringing down the older structure and steering the system into a new direction. In the economic field, this leader is the entrepreneur (Shionoya, 1997, p. 38).

Managers of old firms suffer from the transfer of resources to these new entrepreneurs and their purchasing power being reduced. As the loans given to these new entrepreneurs are transferred before the entrepreneurs put the new goods on the market, an inflationary process begins because the money supply has shown an endogenous increase. Entrepreneurs earn profits with their innovations, while banks that provide financing earn interest because they take risks. New firms will be able to pay off these loan interests when they launch their new goods and start making monetary gains. However, old companies will have difficulties and will be replaced by new companies. Because the first entrepreneurs to innovate broke the societal resistance to innovation, imitation behaviors of other firms follow. Imitators trigger the secondary innovation wave (Bellofiore, 1999, p. 1012).

The economic system cannot gradually adapt to the qualitative change and moves away from equilibrium. The partial imbalance brought about by the innovations by the entrepreneurs, with the uncertainty it creates, turns into a general imbalance in the form of a radical upheaval of prices and quantities. Then, dynamic competition and entrepreneurial activity decline and give way to adaptive behavior and static competition. The economic system once again approaches a new cyclical flow where profit and interest disappear (Bellofiore, 1999, p. 1012). Schumpeter's first approximation to real economy approach is a two-stage cycle of prosperity (movement from equilibrium caused by innovation) and stagnation (a process of diffusion and reabsorption that eventually leads to a new equilibrium). In this simple two-stage first approach, the business cycle represents the core of the capitalist process. Discontinuous innovation and credit creation are part of the dynamic movement of capitalism in a two-stage cycle.

Schumpeter speaks of another four-stage cycle in which “recovery” leads to “prosperity” and “recession” to “depression.” This is “second approximation to real economy.” These cycles not only take into account innovation, but also include capital accumulation, speculation, and excessive borrowing. These factors cause the cycles to cause high levels of uncertainty and instability (Bellofiore, 1999, p. 1012).

Schumpeter lists the stages of the business cycle as follows. Innovation occurs when the economy is in equilibrium. Schumpeter calls this innovation “a historical and irreversible change in the way of doing things,” and these innovations occur in the production function and cannot be decomposed into small steps (Schumpeter, 1935, pp. 2–10). Entrepreneurs who create these innovations need money to finance them. Banks meet this financing by creating loans. This newly created credit supply causes additional purchasing power, raises the general level of prices and interest rates, and causes inflation. At the same time, the entrepreneur will demand the workforce he or she needs from other sectors. This demand will increase labor wages. With this innovation, the economy moves away from the equilibrium state, and an expansion is experienced. At the same time, these innovations lead to a revival in other industries. This phase is called prosperity. It is followed by recession. The competition between entrepreneurs who aim for innovation with a profit motive gives capitalism its dynamic character. The firm that first implements the innovation will earn rent for a short period. However, the tendency of other companies to imitate these innovations because of their desire to get a share of this profit will cause the innovation to become widespread and become ordinary after a while, and the profit will decrease. The spread of innovations means the slowdown of economic development. At this stage, the loans received are repaid. After the recession period, which is a contraction period, comes the depression period. The depression period begins with psychological factors such as speculation and the inability to predict the future. During this period, prices and interest rates fall. In his analysis of business cycles, Schumpeter was inspired by Juglar's idea that “the only cause of depression is prosperity” and argues that this stagnation phase is a reaction to the welfare phase (Schumpeter, 1939, p. 144). The crisis is the process of adapting itself to the new conditions of the economy, which deviated from the balance during the welfare period. In this period, innovations reappear, and the process begins again.

In the third approximation to real economy, innovations emerge in bunches. When a new production function is successfully implemented, that is, when the process of doing something in a new way is completed, the most fundamental problem is solved. Now it is easy for other people to imitate and even develop this innovation. Innovations are not isolated events; other companies will follow these innovations after they emerge; that is, innovations emerge in bundles (Schumpeter, 1939, p. 98). Schumpeter mentions three cycles of different lengths. The first of these is the 45- to 60-year Kondratieff cycle, which is a major cycle. Another is the medium-term, 8- to 11-year Juglar cycle. The last is the short-term 3- to 5-year Kitchin cycle. When all three cycles are in decline at the same time, major depressions occur with the resultant cumulative uncertainty and negative expectations. To break the vicious circle of expectations, government action may be necessary (Bellofiore, 1999, p. 1012).

In his quest for the source of innovation, Schumpeter dismissed as external factors not only major shocks such as wars, revolutions, and natural disasters, but also changes in factors such as trade policy, monetary and banking laws, payment habits, or weather conditions. In doing so, Schumpeter identified creative actions, which set into motion historical and irreversible transformations in ways of doing things, as factors inherent to the economic system (Schumpeter, 2005, p. 111). Although he defined innovation as “changes in the method of supplying goods,” he proposed that it must be understood from a much wider perspective, because innovation is anything that can be defined as a “new way of doing things,” which range from a new product or a new way of producing existing products to a new market, a new raw material, a new mode of scientific management, or new forms of business organizations. In short, Schumpeter defined innovation as a completely new production function.

For Schumpeter, it is not adequate to put forward a detailed description of environmental factors for the explanation of how innovation occurs, because innovations cannot be explained by the effects of the environment in which they emerge. Nonetheless, they transform their environments and their conditions; that is, they bring about a new environment that will react in a different way to a potential innovation. Thus, innovations can be seen as adaptations, yet these never occur in a passive manner. Therefore, it is not possible to understand innovations from the perspective of a theory of adaptation (Schumpeter, 2005, pp. 112–113). Innovations pave the way for indeterminate situations. For Schumpeter, who used the analogy of an artistic creation that now belongs to a new universe completely different from the one in which it originated, indeterminacy should always be recognized and taken into account even in situations dominated by determinacy.

"Creative destruction" is the concept used by Schumpeter to describe the processes triggered by the entrepreneur's innovations that result in the replacement of the economic system with a new one. For Schumpeter, the essence of capitalism is change rather than stability. The capitalist system is characterized by constant regeneration that results from its internal dynamics. This process of "creative destruction" is central to capitalist development. Thus, for Schumpeter, all capitalist entrepreneurs have to adjust to this development (Schumpeter, 1992, p. 82).

This process is where the capitalist system's instability lies. Schumpeter's perspective rejects the idea of perfect competition that emphasizes the role of competition in producing equilibrium. For him, perfect competition has a very limited scope of application. The competitive relationship between profit-seeking entrepreneurs has a dynamic character. According to Schumpeter, the perspectives that focus on the equilibrating role of competition ignore the possibility that entrepreneurial competition may lead entrepreneurs to embrace such innovations that could trigger a structural change in the market (Özel, 2009, p. 145). The entrepreneur and the innovations inherent to the system that the entrepreneur brings about through a process of dynamic competition bring down the old structure and bring about a new one. This process of creative destruction creates instability in the system. Thus, Schumpeter's analysis involves deviations from the equilibrium, as well as discontinuities and uncertainties. What lies behind the market system's instability is this process of creative destruction that results from dynamic competition.

The aim of Schumpeter's theory is to analyze the internal dynamics of capitalist economies. His model explains the working mechanism of development in capitalist economies, yet leaves out concrete outcomes, because its aim is to account for spontaneous, discontinuous, and qualitative transformations. In other words, Schumpeter's aim is to understand history rather than predicting the future. Thus, there is no point in questioning the predictive power of his theory, as the past and future are in an asymmetrical relationship, and the future is not a reflection of the past (Stan Metcalfe, 2011, p. 5).

3.2.3. Conclusion

Joseph Alois Schumpeter is an economic theorist who maintained that capitalism is a dynamic system that is in a constant process of evolution. This dynamism results from the system's internal elements, and it creates disequilibrium and instability. For Schumpeter, economic systems are constantly oriented toward an unknown equilibrium due to innovations that are inherent to them. Innovations occur in an unpredictable and discontinuous manner, thereby hindering the possibility of foreseeing the system's future path. Innovations, which irreversibly alter the way the economic system they originate in functions, steer the system toward a new and indeterminate equilibrium through a process of creative destruction.

What sets Schumpeter apart from the thinkers addressed in this study as the proponents of quasi-dynamic approaches is that he tackled the problem of unpredictability and indeterminacy in the behavior of economic systems without having any presuppositions such as the absence of knowledge about the future, the time factor, or uncertainty. In Schumpeter's analysis, unpredictability and indeterminacy arise from the internal functioning mechanisms of economic systems. Innovations that originate from within the economic system irreversibly destroy the old equilibrium, yet the new equilibrium cannot be foreknown. It could thus be concluded that Schumpeter's analysis contains ontological questions about what the economic system is, as well as answers to these questions. Despite the appearance that the inclusion of variables such as knowledge, time, or expectations renders dynamic the economic analysis, studying change dependent on certain parameters points in fact to a comparative static perspective. What renders the economic system dynamic is the change triggered by its internal elements. In Schumpeter's analysis, these internal elements are innovations that transform the parameters of the system. It is thus fair to conclude that Schumpeter took the biggest step in the transition from the deterministic approach to economic systems to an indeterministic one.

4. Conclusion

Economics was much earlier than natural sciences to address social and economic life as open systems. Early economists who recognized the uncertain and unpredictable character of the future because of its contingent nature, as well as to the absence of its knowledge, were the first to open the door to an indeterminist approach to the way economies function. A review of the economics literature on the concepts of uncertainty and indeterminacy reveals that greater attention has been given to the epistemological dimension. Their emphasis on epistemological uncertainty, which is created by the limited capacity of human beings to adequately acquire and process knowledge required to make rational decisions, limits their attention to knowledge and ways of acquiring it and prevents them from having a solid understanding of the social reality from which this knowledge originates. The problem, however, is not only that the future is uncertain and unpredictable because of the absence of knowledge about it. In other words, the problem goes beyond the confines of time and knowledge. The real problem is that indeterminacy exists because of the nature of reality itself. The question that needs to be asked then is not what

we know and do not know, because reality is more than our knowledge of it. Therefore, the question needs to be oriented toward the nature of reality. The social reality is stratified in a way that makes it impossible to reduce it to the level of events or to the level of human experience. It is also open and differentiated in a way in which it is impossible to extract regularities. In short, the social reality consists of dynamic, interconnected, and complex aggregates. In this sense, the reason behind the dynamism and discontinuity of social systems is not humans' limited knowledge to ensure order. Social systems are dynamic and complex wholes that are by their nature in constant flux. Therefore, the *openness* of social systems should be understood ontologically on the basis of their nature, rather than epistemological on the basis of the degree of knowledge about them.

Popper and Hayek put forth their theses on indeterminacy through the limitations in knowledge. The reason these two thinkers are examined in the same section in this study is that they both had a similar ontological approach. Both Popper and Hayek did not address the question from a perspective other than those of time and knowledge. Both viewed indeterminacy as resulting from the change in knowledge, as well as from our incapacity to obtain all the knowledge. This study argues that Popper and Hayek failed to analyze reality in a stratified way. It also argues that these thinkers who theorized indeterminacy as a matter of knowledge failed to distinguish between appearance and reality and to go beyond the confines of the empirical domain. An understanding of reality as a complex and dynamic phenomenon reveals that the problem of indeterminacy persists even when the issue of limited knowledge is resolved. The problem thus is not so much of "what we do not know," but of "what kind of a reality it is that we are facing." In other words, the main problem is not about appearances but about essences. Therefore, an inquiry on the essence of the social reality must precede the issue of our knowledge of it.

My criticism here is that it is not possible to obtain information about the universe with the inadequacy of human capacity, and on the deduction, method adopted by Popper and Hayek as the method of obtaining this information. Although Popper and Hayek acknowledge indeterminacy in the social and physical sciences, they ignore the stratified and differentiated nature of reality, as they insist on universal laws and facts. The main indeterminacy stems from this ontological status. The universe, the world, and reality are stratified. As soon as the stratification approach is adopted, deduction as a scientific method is inadequate and misleading. In addition, with stratification, the search for universal law will lose its meaning. We will encounter historical concepts such as trends, tendencies, and structures.

Because epistemological approaches to indeterminacy remain within a static framework, an ontological perspective is needed to transition to a dynamic framework. In other words, an inquiry into the reasons for discontinuities in economic systems should direct its attention to the inner dynamics of these systems. The first thing that needs to be done is determining the nature of the social reality that is the ultimate object of analysis for economics. The pioneer works that facilitated such a transition to a dynamic framework are those by Bhaskar in philosophy of science and by Schumpeter in economic thought.

For Bhaskar, the social reality is layered and stratified. Explanatory structures and generative mechanisms are found at the real level, which is inaccessible to us, which is beyond the actual and empirical levels that we can access. Furthermore, these structures and mechanisms interact with each other. This points to the existence of open systems. Closed-systems analyses reduce these three distinct levels into one. On the other hand, open-systems analyses are characterized by the concept of emergence, which is in direct opposition to that reductionism. This concept suggests that the causal power of an emergent object is not the sum of the causal powers of its components. Thus, the functioning of the upper levels cannot be reduced to that of the lower ones. The realist approach in the social sciences views social structures and mechanisms as emergent beings. This is where the stratified ontology of reality lies.

Bhaskar rejects determinism through the concept of emergence. The view of emergence maintains that the reality is stratified across the real, actual, and stratified levels; higher levels are produced by lower ones, and these levels cannot be reduced to one another. This view points to open systems in which unpredictable novelties emerge and makes it possible to refute regularity determinism that sees empirical regularities as causal laws. Regularity determinism, which is summed up by the phrase "every event *x* will lead to an event *y*," is possible only in closed systems that involve constant conjunctions. When it is pertinent, the future is predetermined and fixed. However, such a view of causality is not plausible because of emergent forces. The type of determinism that Bhaskar embraced, ubiquity determinism, neither fixes the future nor *closes* the reality. Ubiquity determinism presupposes that every event has a real cause, which is conceived as a material, object, or agent that produces an effect, and this cause does not need to be clear or comprehensible.

On the other hand, Joseph Alois Schumpeter occupied himself throughout his career with the question of what causes economic development, and he sought the answer in understanding the complex nature of reality that he faced. He is the one who took the first step toward a transition from deterministic to indeterministic approaches to the study of economic systems. Schumpeter's object of analysis was the mechanisms lying behind economic development, and he identified innovations as the driving forces of economic development. Innovations are unpredictable and discontinuous, and they are inherent to the system. Hence, indeterminacy formed the main axis of Schumpeter's analysis of development, the distinguishing feature of which was its attention to systems' inner characteristics. Schumpeter's theory involves deviations from equilibrium, as well as discontinuities and uncertainties. To uncover the sources of these discontinuities, Schumpeter went beyond the dimensions of time and knowledge. His answer was innovations, which, as inner components of economic systems and as triggers of development, are of a discontinuous and unpredictable character. Innovations give a new direction to the functioning of the economic systems from which they originate and steer the system toward a new, unforeknown equilibrium. This character of innovations is what renders Schumpeter's analysis a dynamic one. In Schumpeter, innovations alter the parameters or norms of the economic system and trigger mutations and leaps. The disequilibrium created by such changes makes it impossible to

predict the future path of the system. In short, Schumpeter addressed the question of indeterminacy from an ontological perspective.

What this article actually trying to emphasize is; theories which are considered under the umbrella of ontological indeterminism, -analyses on ontological status of reality, those starting out from asking what reality is- have left behind those which look for universal laws and analyses at the level of visible phenomena, they instead looked for structures, powers and mechanisms. Universal laws cannot be derived if reality is considered as an open system. This epistemological approach, in which ontology is neglected, limits the scope of analyses to the visible. It can be said that, epistemological approaches could not escape from the clutches of empirical realism as Bhaskar defined. Social reality is more than what we know about it, and it is not the lack of our knowledge but its inherent nature that makes it indeterminate.

This article offered a comparative analysis of both philosophical and economic arguments for the unpredictability of economic systems' behaviors or, in other words, arguments for the study of social and economic life as composed of open systems. It discussed, on the one hand, those theories that addressed the question of indeterminacy and unpredictability within a framework with a focus on the limitations/absence of knowledge. On the other side of the debate are those theories that viewed the social reality as comprising stratified and layered open systems. Going beyond the dimensions of time and knowledge, these theories managed to construct a solid ontological understanding of social reality or, in other words, to distinguish between appearance and reality. This study shares the view of the world as more than what we as humans perceive of it and different from our experience of it and concludes that indeterministic theories are better suited for a *realistic* study of economic systems. Because of their inattention to the dynamism inherent to economic and social processes, theories that adopted an epistemological approach to the study of indeterminacy failed to offer a robust method of examining open systems, even though they recognized systems' openness.

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