THE FALL AND RISE OF THE CONCEPT OF UNCERTAINTY IN THE HISTORY OF ECONOMIC THOUGHT

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Abstract

Uncertainty is one of these central concepts towards which economists have formed diverse and contradictory views. Traditionally, mainstream economists ignore the fundamental role of uncertainty and fully embrace individual rationality. This related to the closed-system ontology adopted by them, whereby uncertainty is viewed as a source of disturbance and treated as an external shock. But the financial and economic crises have reopened the debate about the consequences of such neglect. The article, in turn, is an attempt to tell the story of economic debates of uncertainty's ups and downs. It resorts to the history of economic thought as an analytical tool to trace the evolution of the concept of uncertainty and the arguments presented by schools of economic thought, whether in defense or rejecting the centrality of this concept. Moreover, discussing uncertainty brought to the fore other related concepts such as '*animal spirit*' and irrationality and thus paved the way for aspects recently addressed in the behavioral economics.

Keywords: History of economic thought; Uncertainty; *Animal spirit*; Rationality; Ontology.
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1. Introduction

Over the past years, the world has witnessed many crises, tensions and extraordinary events that have made various aspects of political, economic and social life subject to high levels of uncertainty. In a study by the National Bureau of Economic Research (NBER), for example, Baker et al. (2020, p.7) confirmed that the recent COVID-19 pandemic "has created an enormous uncertainty shock–larger than the one associated with the financial crisis of 2008-09 and more similar in magnitude to the rise in uncertainty during the Great Depression of 1929-1933". In parallel, economists' approaches to this uncertain reality have expressed diverse and often conflicting visions, reaffirming the fact that uncertainty is still one of the central controversial concepts on which there is no consensus. For Köhn (2017, p.8), uncertainty can be seen as the "Janus-face in economics". This metaphor, which is inspired by ancient Roman mythology, expresses two opposing sides that summarize the visions put forward about the concept of uncertainty. On the one side, uncertainty is seen to have a decisive role in explaining economic behavior in a world where the problem of knowledge cannot be overcome. While on the other side, the theory of rational choice and subjective probability beliefs are seen as a solution to the problem of knowledge and thus has the possibility of containing uncertainty. Between these two sides, it is the latter that dominates the mainstream thought. However, the mainstream stance on uncertainty becomes very problematic if we consider the numerous events that have revealed the inability of mainstream models to contain uncertainty, especially since the 2008 global financial crisis. This, in turn, raises many questions, foremost of which is what drives most mainstream theories to continue not taking the concept of uncertainty seriously?

According to Lawson's (2006, p.493), "[w]e all adopt ontological stances, and the acceptance of any method of analysis carries with it certain ontological preconceptions". This indeed applies to the mainstream approach where a number of concepts and beliefs that frame its interpretation of the behavior of the economic system play an essential role in shaping its attitude to uncertainty. Take, for example, the principle of individual rationality, the adoption of which leaves no room for deep discussions about the concept of uncertainty. The implications of this can be seen in most mainstream approaches which, while claiming to include uncertainty in their macroeconomic models, often confuse uncertainty with quantifiable risk (Davidson, 1991). Such confusion is related, as Dow (2014, p.3) asserts, to the closed-system ontology adopted by the mainstream, whereby "structure, changes in structure and inter-relations within

the structure are all knowable within quantifiable probability distributions", while uncertainty that cannot be measured is viewed as a source of disturbance and treated as a shock. Therefore, uncertainty in such methodological framework "is treated as a given outcome of an exogenous constraint on full information". Once the uncertainty is reduced to an external shock, it becomes a temporary deviation and part of the normal business cycle rather than a failure in the performance of the economic system. And under market-efficient and self-correcting assumptions, which claim that the economic system will return to a stable state despite deviations, the concept of uncertainty becomes subject to further marginalization.

The reality, however, has proven that the perceptions given by the mainstream economists about the market mechanism and the economic system were not accurate. The mistake made by these economists, as Krugman (2009, p.01) points out, is that they " turned a blind eye to the limitations of human rationality that often lead to bubbles and busts; to the problems of institutions that run amok; to the imperfections of markets- especially financial markets- that can cause the economy's operating system to undergo sudden, unpredictable crashes; and to the dangers created when regulators don't believe in regulation". Their disregard for the fact that individuals often make irrational decisions, and their overestimation of the ability of economic models to predict risk and contain uncertainty, was a consequence of the dominance of neoclassical ideas on mainstream approaches. This was an intellectual failure, as Skidelsky's (2010, p.17) argued, adding that "rarely in history can such powerful minds have devoted themselves to such strange ideas". Herein lies the root of the problem.

All the aforementioned indicates that reconsidering the concept of uncertainty opens the door to a discussion that goes beyond economic and financial shocks and leads us to a deeper issue related to the ontological nature of mainstream thought in today's economy. It also leads us to ask how far it is still acceptable to continue to ignore concepts such as uncertainty, *animal spirit*, and irrationality simply because they are difficult to represent in mainstream mathematical models. The article seeks to highlight and discuss such aspects through the lens of the history of economic thought, as it "belongs to those tools, which are important to keep the engine of changes visible and to learn to understand directions of change" (Bögenhold, 2020, p.82). This makes it possible to recognize the concept of uncertainty, not as a mere shock, but as part of the stream of changes that economic thought has undergone. Moreover, an exploration of the concept of uncertainty leads us to rich and indispensable discussions centered on Keynesian

thought. This has its valid justifications, especially in view of the contributions made by Keynes in this regard. Keynes' view of fundamental uncertainty showed that economic activities are not necessarily governed by rational decisions and that economic fluctuations cannot be explained in isolation from *animal spirits* (Akerlof and Shiller, 2010). As Palley (2017, p. 89) reminds us, "the best way to understand Keynes's contribution is to place Keynesian economics within the history of economic thought", because this helps to understand "why Keynes' revolution in economic theory was derailed and redirected back toward classical macroeconomics which Keynes sought to discredit". Despite this, the article is not limited to the Keynesian perspective, but also deals with the views of his predecessors such as David Hume and Adam Smith. There is no doubt that addressing their visions presents several challenges, perhaps the most prominent of which is that it places the discussion in a broad historical context, the richness of which the article cannot adequately cover. However, the purpose of establishing this historical extension and linking it to relevant modern literature is that it contributes to tracing the evolution of the concept of uncertainty and helps to understand the context and motives that led mainstream economists to ignore this concept. It will also, as Dow (2009) noted, allow for an interdisciplinary investigation as economics interact with many disciplines that have long been considered separate from it, such as psychology and sociology. Furthermore, a study of the history of economic thought will allow us to realize, contrary to the dominant belief, that the latest in economics is not necessarily the best. Accordingly, what was mentioned before by Marx and Engels (1998, p. 26) could presumably be true: "The ideas of the ruling class are in every epoch the ruling ideas, i.e., the class which is the ruling material force of society, is at the same time its ruling intellectual force. [...]. The ruling ideas are nothing more than the ideal expression of the dominant material relationships, the dominant material relationships grasped as ideas; hence of the relationships which make the one class the ruling one, therefore, the ideas of its dominance". Thus, after these waves of misguided ideas promoted by economists and backed by the dominant political class of the world, it is incomprehensible not to stop at the intellectual failure of prevailing economic methods. Thus, the article joins the ranks of those calling for broad revisions of many well-established ideas, which, although proven to be unrealistic and misleading, are still upheld by mainstream economic thought.

The article is structured into five sections following this introduction. The second section present the view of Hume and Smith, the leading thinkers of the 1700s, regarding the concept of uncertainty. The third section covers Knight's classic risk-uncertainty distinction and also

focuses on Keynesian thought in which the concept of uncertainty occupies a central position. Then after, the fourth section addresses schools of economic thought that ignore the concept of uncertainty in particular the Rational Expectations Revolution. The fifth section discusses how the shortcomings of economic models have helped revive the debate about the role of uncertainty in understanding economic behavior. In this regard, the contribution of behavioral economics is highlighted. The final section summarizes the conclusions.

2. Uncertainty: the shift from the center of the economic discourse to its margin

The works of David Hume and Adam Smith, the most influential thinkers of the Scottish Enlightenment period, demonstrate that they were fully aware of the limits of human knowledge and the existence of uncertainty. They even considered uncertainty as the most important challenge facing economic thought. At a time when religious and moral beliefs had a strong presence in all fields, the influences of Montesquieu's Spirit of the Laws (1793) made both Smith and Hume interested in researching what would constitute the laws governing human nature (Köhn, 2017). It was remarkable that the approach taken by Scottish Enlightenment thinkers differed from that of the French and English Enlightenment. The Scottish Enlightenment was under the influence of Descartes' philosophy that asserts the priority of human reason and that knowledge can be obtained by deductive logic, while the French and English Enlightenment thinkers were affected by Bacon's experimental philosophy and his inductive method (Dow, 2009). Taking this difference into account provides a better understanding of Hume's philosophy in particular. He explored human nature in depth during his stay in France, where he wrote his *Treatise of Human Nature*, which Dow (2009, p.4) described as Hume's "early grappling with the rationalism of the French Enlightenment". In this book, Hume (1738) distinguished between three types of human reason, namely knowledge, proofs, and probabilities. He defined each of them as follows:

> By knowledge, I mean the assurance arising from the comparison of ideas. By proofs, those arguments, which are derived from the relation of cause and effect, and which are entirely free from doubt and uncertainty. By probability, that evidence, which is still attended with uncertainty (Hume 1738, cited in Köhn, 2017, p.18).

This quotation clearly demonstrates that Hume linked uncertainty to probabilities, in contrast to knowledge which he presumed as devoid from uncertainty, and the proofs that he considered subject to a causal relationship (cause and effect). In addition to relating the different types of

human reason with different levels of uncertainty, Köhn (2017, p.19) mentioned that in Hume's philosophy "only few arguments are based on knowledge, while in most cases probabilities get used to build arguments". In this way, Hume recognized the existence of uncertainty in different economic situations.

Smith also recognized the concept of uncertainty, and that human knowledge is limited. He was skeptical about probabilistic knowledge and "his dislike for the use of probability calculus was rooted in his doubt about the most fundamental assumption underlying conventional theories of probability", which considers economic events to be random (Köhn, 2017, p.20). Accordingly, he argued that what should guide individuals in situations of uncertainty is wise human reasoning and the use of moral rules, not probabilities. Smith's view of the behavior of decision-makers under uncertainty derives from his observation of their behavior in two situations, in the lottery, which represents individuals' choice of uncertainty over certainty, and in insurance when they choose certainty over uncertainty. He concluded that individuals are 'risk lovers', they underestimate their chances of losing while overestimating the uncertain gains. Smith relied also on this conclusion in other arguments such as in his discussion of the choice of a profession (Blaug, 1997). It is also noted that Smith analysis of individuals behavior is characterized by rationality with the absence of any indication of non-economic motives, i.e., *animal spirit* (Akerlof and Shiller, 2010).

It was clear that Hume and Smith understood the extent and the limits of human knowledge as well as the cognitive challenges that individuals face, like that of the induction problem. Their views were also consistent with regard to probabilistic knowledge and the limits of its application to economic reality in which events do not occur randomly. Therefore, classical economics, Köhn (2017, p.21) concluded, "was aware of the problem of uncertainty for both epistemological and ontological reasons and virtue ethics, instead of probability calculus, were used to handle the problem".

Accordingly, one might think that the course of subsequent developments was in harmony with the findings of the greatest thinkers of the Age of Enlightenment, but this was not the case. The developments that followed the contributions of Hume and Smith went in another direction of what they had proposed regarding the problem of knowledge and uncertainty. And, the probabilistic method, which is said to have limited application to economic reality, has undergone wide developments. This shift is attributed to several contributions

centered around the utilitarian principle that Jeremy Bentham introduced in 1781 in his book *Introduction to the Principles of Morals and Legislation*. These contributions were mainly represented by the work of Jevons (1863, 1871), Menger (1871), and Walras (1874), who developed the theory of marginal utility. They also relied on Hume's arguments in which he advocated the ideal and abstract mathematical reasoning as an accurate method of analysis (Köhn, 2017; Dow, 2009). In this way, the marginal revolution and the presuppositions of complete information brought the problem of uncertainty out of the economic discourse.

3. Uncertainty as a fundamental economic concept

As mentioned in the previous section, the marginal revolution has shifted economists' focus away from the concept of uncertainty. But in 1921, John Maynard Keynes and Frank Hyneman Knight presented, separately, what could be seen as a turning point toward bringing the concept of uncertainty back into the economic debate. This section sheds light on their contributions.

Knight, an American economist and one of the founders of the Chicago School, analyzed in depth the theory of value and distribution, as it was the subject of his doctoral thesis entitled *A Theory of Business Profit*. After receiving his Ph.D. in Economics from Cornell in 1916, he made a major revision of his thesis, which in 1921 turned into his famous book *Risk, Uncertainty and Profit*. Subsequently, the influence of this book expanded significantly, especially after it was reprinted, at the request of Lionel Robbins, as part of the *London School of Economics (LSE) Scarce Tracts in Economics and Political Science* series (Emmett, 2021). Knight's book included the first appearance of the Knightian curves of diminishing return, along with his prominent distinction between risk and uncertainty[1] (Stigler, 2008). Uncertainty, Knight (1921, p.20) emphasized, "must be taken in a sense radically distinct from the familiar notion of Risk". In his view, the difference between them lies in the quantitative characteristic of risk, which uncertainty does not possess. Knight (ibid., p.20) explained his view as follows:

> It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all. We shall accordingly restrict the term "uncertainty" to cases of the non-quantitive type. It is this "true" uncertainty, and not risk, as has been argued, which forms the

[1] The general uses of the terms risk and uncertainty differ from those used by researchers. The definition in the Oxford English Dictionary of both risk and uncertainty indicates that the former is a "situation involving exposure to danger", while the latter is "the state of being not able to be relied on, not known or definite". Whereas researchers differentiate between different types of uncertainty and view risk as variance (or standard deviation) that may include gains, not just losses (Park and Shapira, 2017, p.3).

> basis of a valid theory of profit and accounts for the divergence between actual and theoretical competition.

The last sentence in the above quote makes it clear that Knight relied fundamentally on the distinction between risk and uncertainty in forming his theory of profits, in which he argued that profits are a reward to uncertainty bearing, while measurable ambiguity (i.e., risk) is a component of production costs (Blaug,1997). Knight illustrates the relationship between profits and uncertainty in many passages of his aforementioned book, for example in Chapter 10, he confirmed that "profit arises out of the inherent, absolute unpredictability of things, out of the sheer brute fact that the results of human activity cannot be anticipated and then only in so far as even a probability calculation in regard to them is impossible and meaningless" (Knight, 1921, p.310). Knight's interpretation of profits in this way was not well received by G. P. Watkins, who laid out his criticisms in 1922 in a lengthy review published by the *Quarterly Journal of Economics* (Emmett, 2020). In contrast, this aspect, in which uncertainty appears as a condition for making profit, is the focus of Brooke's (2010) attention. For him, this aspect represents the second interpretation of uncertainty in Knight's classic book. Besides the difference based on the extent of measurability, the distinction between risk and uncertainty referred to by Knight, Brooke (2010, p.223) asserts, "is between subjective and objective beliefs about the future". That is, risk situations are only those in which the distribution of potential outcomes is known, while uncertainties involve all other situations in which future expectations are formed based on subjective beliefs. Thus, risk refers to future expectations that entrepreneurs form under the assumptions of perfect competition. Uncertainty, however, does not imply a complete absence of information, as entrepreneurs are able to make profit by relying on their subjective expectations of future.

These interpretations of Knight's distinction between risk and uncertainty have sparked widespread controversy. The most notable one came from Friedman, one of Knight's students, who openly expressed his opposition to Knight's distinction by saying:

> In his seminal work, Frank Knight drew a sharp distinction between risk, as referring to events subject to a known or knowable probability distribution and uncertainty, as referring to events for which it was not possible to specify numerical probabilities. I have not referred to this distinction because I do not believe it is valid. I follow L. J. Savage in his view of personal probability, which denies any valid distinction along these lines. We may treat people as if they assigned numerical probabilities to every conceivable event (Friedman,1976, p. 282, as cited in LeRoy and Singell,1987).

Friedman was not alone in questioning Knight's distinction between risk and uncertainty. The reliance of LeRoy and Singell (1987) on insurability as a criterion for distinguishing between risk

and uncertainty has led to an underestimation of the latter. They claimed that economists could treat all cases that can be insured as risks and confine uncertainty to those cases that cannot be insured. According to this logic, and since the uninsurable issues are limited nowadays, the concept of uncertainty becomes marginal. But Emmett (2021) considered such an analysis reductive and that Knight himself would not have accepted it. In addition, LeRoy and Singell (1987, p.402) in their assessment of Knight's book argue that it is possible, in several parts of Knight's book, to observe that Knight "did not always have a firm grasp on the market failure idea", especially when he linked both risk and uncertainty to 'imperfection in competition'. They also added that he discussed some obvious points at length while ignoring other important ones, as in the problem of the principal-agent that he did not address when discussing 'the salaried manager' in Chapter 10 of his aforementioned book. Also, Stigler (2008, p.7335) pointed out that "Knight's argument is subject to severe limitations. Because he avoids almost all questions of *quantity*, he often bases his argument on polar cases". On the other hand, although Knight indicated that it is possible to calculate the objective probability of many uncertainties in economic life, he recognized at the same time that there were other situations in which measurement could not be applied. But this argument has been refuted by Ramsey (1931), de Finetti (1931), and Savage (1954) who defined the probabilities in the absence of statistics (Wakker, 2008). Samuelson (1963, p.6) also criticized Knight's notion in an article entitled *Risk and Uncertainty: A Fallacy of Large Numbers,* which he concluded with the following words:

> In every actuarial situation of mathematical probability, no matter how large the number in the sample, we are left with a finite sample in the appropriate limit law of probability there will necessarily be left an epsilon of uncertainty even in so-called risk situations.
>
> As Gertrude Stein never said: Epsilon ain't zero. This virtual remark has great importance for the attempt to create a difference of kind between risk and uncertainty in the economics of investment and decision making.

Samuelson did not welcome the distinction between risk and uncertainty on the basis of a probability distribution, pointing out that this distinction does not express the time factor, which made risks appear to be fixed. In line with him, Taleb[2] (2007) also made similar criticisms of

[2] Taleb (2007, p. 128) mentioned the following "[…] Frank Knight, who rediscovered the notion of unkown uncertainty and did a lot of thinking but perhaps never took risks, or perhaps lived in the vicinity of a casino. Had he taken economic or financial risks he would have realized that these "computable" risks are largely absent from real life! They are laboratory contraptions!".

Knight's uncertainty, saying that his distinction between risk and uncertainty does not express the dynamism of economic activity.

Another line of criticism indicates that although several literatures have addressed Knight's distinction between risk and uncertainty in order to gain a more in-depth understanding of their respective roles in economic activities (Davidson, 1988), some, however, even when they invoke Knight's distinction, continue to ignore the role of uncertainty at the expense of risk. This is what LeRoy and Singell (1987) particularly noted in the neoclassical literature, arguing that it provides an incomplete explanation of Knight's work because it focuses the debate on the extent to which agents create subjective probabilities. Although Knight did not deny the existence of subjective probabilities even with uncertainty, the focus on this aspect is far from what he intended when distinguishing between risk and uncertainty. Yet, Bénassy-Quéré et al (2010) indicated that Knightian uncertainty is often not taken seriously for policy analysis purposes and remains limited to financial asset pricing and game theory. It remains to be noted what Emmett (2020) referred to as a decline in Knight's interest in topics related to risk, uncertainty, and profit, as his later works reveal a greater focus on the study of institutionalism and the history of economic thought. *Risk, Uncertainty and Profit*, as Emmett (2021, p. 15) noted, "was, after all, the foundation for a career, not its capstone".

In 1921, in addition to Knight's contribution, Keynes also revived the debate on the concept of uncertainty through his book *Treatise on Probability*. Their views converge in asserting that individuals face uncertainty in most of their economic decisions. This common ground between them makes it "legitimate to speak of Knightian and Keynesian uncertainty in the same breath" (Feduzi et al., 2014, p.4). Had he been a live, this argument, however, might have not been well received by Knight, who was a bitter critic of Keynes, as Patinkin[3] (1979, 1973) noted. In his later works, Keynes dealt with uncertainty in depth, considering it a central pillar for understanding economic activity.

[3] Patinkin (1979, p. 226) mentioned the following "I have had the opportunity of examining Knight's copy of the General Theory-the one which he presumably read in preparation for writing his review-and it is filled with pencilled marginal notes of vehement dissent. Thus, on Keynes' statement in the preface that "It is astonishing what foolish things one can temporarily believe if one thinks too long alone, particularly in economics,"6 Knight commented "best statement in the book"-and we know of whom he was thinking. The expletive "Nonsense!"-replaced on occasion by even stronger terms-frequently appears in the margins". See also (Patinkin, 1973).

Keynes' early discussions of the concept of uncertainty was in his *Treatise on Probability* (1921), which he developed after graduating from Cambridge in 1906. Particularly during his spare time while working in the India Office, a position he got after achieving the second place on the civil service examination (Davidson, 2009). This book, in which Keynes addressed the problem of induction and the absence of knowledge, shows how much he was influenced by Hume's writings. At the same time, it includes points of difference between the two, particularly their arguments about probability which Keynes considered to be "a matter of logic rather than mere observation or sentiment". Moreover, Hume believed that the individual in his pursuit of knowledge is driven by passions, while, for Keynes, the motivation was both emotions with cognition. In general, "Keynes's philosophy arguably allows more scope than Hume's for deductive reasoning" (Dow, 2009, p.13; Dow, 2014).

Keynes's writings on uncertainty reflect his deep philosophical understanding of the economic system, a large part of which crystallized in the context of his critique of George Edward Moore's ethics, as well as in his interactions with the ideas of his fellow Bloomsburys (Backhouse and Bateman, 2006). He advocated an analysis of the economic system as a whole, explaining its complexities and exposing the fallacy of composition, an aspect that agent models did not take seriously (Hoover, 2019). In this sense, Keynes was "an organicist rather than an atomist", and his interpretation of the relationship of the individual parts to the system as a whole was consistent with the Hegelian belief, hence the basis for his rejection of the methodological individualism of orthodox economics (King, 2002, p.182). Thus, Keynes' analysis of the behavior of individuals under conditions of uncertainty and his interpretations of economic phenomena were not limited to the logic of mathematical models only, but also to intuition (Harcourt and Kerr, 2003, Hoover, 2019). In doing so, Keynes joins his teacher Alfred Marshall in questioning economic conclusions that rely excessively on mathematics (Leijonhufvud, 2006; Hoover, 2006). In the words of Backhouse and Bateman (2006, p.15), "Keynes was a Marshallian in his use of formal techniques as a means for handling ideas that were too complex to be captured completely within the mathematics". Moreover, Backhouse and Bateman (2006) relate Keynes' interest in the role of uncertainty and expectations in economics to his adherence to Cambridge business cycle theory, the influence of which is evident in his early work. Although Keynes, while serving as a member of the Macmillan Commission in the 1930s, deviated from the Cambridge arguments, causing a rift between him and Pigou, and later Hubert Henderson, he eventually returned to focus on uncertainty and expectation.

Uncertainty, Keynes argues, is not measurable because it is related to a sudden event that cannot assign any probability to it at all. Minsky (1976, p.66) quoted the following passage that shows Keynes's definition of the concept of uncertainty:

> By "uncertain" knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable… there is no scientific basis on which to form any calculable probability whatever. We simply do not know. Nevertheless, the necessity for action and for decision compels us as practical men to do our best to overlook this awkward fact and to behave exactly as we should if we had behind us a good Benthamite calculation of a series of prospective advantages and disadvantages, each multiplied by its appropriate probability, waiting to be summed' (*QJE,* pp.213-14).

Although many economists have defined the concept of uncertainty based on Keynes's (1921) *Treatise on Probability*, Dequech (1997) argues that this work lacks a clear definition of this concept. He came to this conclusion by comparing Keynes's concept of uncertainty in his both earlier and later works. The same point is brought out by Arestis and Sawyer (2006, p.440-443) who noted that two concepts of uncertainty are often distinguished in Keynes's (1921), namely "(i) uncertainty as probable knowledge based on slight information and (ii) uncertainty as absence of probable knowledge". The first concept, they stated, concerns situations where probable knowledge is derived from insignificant or incomplete information. For this reason, this type is associated with the weight of the argument, which plays a fundamental role in "convincing individuals that the probability relation is a reliable guide to action". The second type of uncertainty represents "the most radical form of uncertain knowledge" and includes two cases. The first is the inability of individuals to establish a probabilistic relationship because human reasoning, in some situations, can be limited. In such cases, the possibilities are unknown, resulting in "vague knowledge". Whereas the second case is when it is not possible to perform a numerical or comparative probability calculation for reasons unrelated to human reasoning forces. This led to many interpretations of the concept of uncertainty in Keynes' early works because, in his quest to formulate his theory of probability, he produced a theory of two dimensions, the first is concerned with probability relations while the second is relevant to the concept of the weight of argument. In this way, he established "a general theory of knowledge that includes the cases of certainty, risk" and two types of uncertainty (Arestis and Sawyer, 2006, p.443; Lawson, 1988).

The centrality of the concept of uncertainty in Keynesian thought was remarkably crystallized in *The General Theory of Employment, Interest and Money* (1936), in which he addressed the shortcomings that made the economy fail to provide full employment and equal distribution

of wealth. In this work, the concept of uncertainty played a central role in explaining many of Keynes' arguments about the nature of the economic system. In parallel, he referred to several related concepts such as *animal spirits* and irrationality, which were later ignored by many economists.

The distinction between risk and uncertainty is of great importance for understanding many of Keynes' arguments regarding the nature of economic system. It also reveals his skepticism about the ability of risk management tools to predict and the market to self-correct. In Chapter 11 of his *General Theory*, Keynes (1936) addressed the concept of risk and its impact, particularly on investment. He mentioned two types of risks, the first is related to the side of the borrower who has the risk of not receiving the expected return, while the second type is related to the risks associated with the lender, whether resulting from voluntary default, such as a moral hazard or a risk that may arise involuntarily, such as insufficient margin of security. Besides, he indicated other risks that may affect the lender-borrower relationship, such as changes in the value of the monetary standard. Whatever the type of risk, Keynes states that they are all measurable and that their relevant probabilities are known and thus can be described by a certain form of probability distribution. In contrast, uncertainty cannot be measured or predicted[4].

Furthermore, Keynes argued that the concept of uncertainty is linked to interest rates and plays a role in the stability of investments (Patinkin, 1979), as well as in explaining why wages and prices fail to adapt immediately. This concept formed the basis on which Keynes relied on in many of his arguments, which led Hyman Minsky (1976, p.57) to say that "Keynes without uncertainty is something like Hamlet without the Prince". At the beginning of chapter 12, Keynes (1936) identifies two components that represent the expectations of prospective yields, the first of which depends on known or current facts that involve a partial state of certainty that makes forming a kind of a short-term expectation possible. Alongside this component, there is another which Keynes called long-term expectation as it closely related to changes in future events that contain a high degree of uncertainty and are therefore difficult to predict.

Back in 1929-1932, Keynes' explanation of the causes of the Great Depression was linked to global saving glut, mainly due to the role of the United States. Once again, he returns to the concept of uncertainty to explain why someone may choose to hold wealth. The reason as he

[4] Keynes (1937, p.213) clearly demonstrated this difference in his article *The General Theory of Employment*.

stated is "the existence of uncertainty as to the future of the rate of interest" because there will be no desire to hold cash as a store of wealth if future interest rates can be expected and since this is not possible, there will always be a risk of failure to convert debt into cash (Skidelsky, 2010, p.96). Keynes gave great importance to the aspect of uncertainty that characterized long-term expectations by saying "it would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain" (Keynes,1936, p.148). Minsky, in turn, understood this importance and he, in his hypothesis of financial instability, reformulated Keynes's interpretations of market behavior under uncertainty. Later, the idea of uncertainty became controversial, and the literature contained multiple interpretations of the concept. According to Lawson (1988) the reason for this controversy is due to the fact that uncertainty has long been considered identical to probabilistic knowledge, while Keynes gave it a different perspective when he linked it only to cases in which probabilistic knowledge is absent. Also, by taking this concept into account, Keynes rejected Say's law and noted that the supply does not create its own demand. This rejection, which has created much confusion, constitutes, as Leijonhufvud (2006) asserts, the rationale for Keynes' aggregate demand management policy. His arguments about uncertainty, expectations, and historical time reveal the fragility of static equilibrium assumptions and their failure to capture the nature of the economic system (Lee, 2009). This is why, according to Skidelsky (2010, p.83) "Keynes's break with the classical school was at root epistemological" since his concept of uncertainty is a clear rejection of classical models claim about the ability of market's self-correction. Moreover, it shows the inefficiency of risk management tools in forecasting.

Another important aspect highlighted by Keynes in his *General Theory* is related to the concept of '*animal spirits*'[5], through which the relationship between individual behavior and uncertainty can be traced. According to Shiller (2021, p.2), Keynes formulated the concept of *animal spirits* more clearly than others, although Knight, for example, was also aware of the nature of human behavior, especially when he noted "we act upon estimates rather than inferences, upon 'judgment' or 'intuition', not reasoning for the most part" (Knight, 1921, p.223). Keynes presents *animal spirits* when he stated the following:

> Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive,

[5] This concept is explored in more detail in the fifth section as it forms the basis for behavioral economics.

> the full consequences of which will be drawn out over many days to come, can only be taken as a result of *animal spirits*—of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities (Keynes, 1936, p.161).

This concept explains why Keynes did not believe in individual's rationality which he saw as an unrealistic reflection of people's actions. This aspect of Keynesian thought contrasts sharply with the approach of the mainstream economists who adhere to the principle of rationality because it undoubtedly legitimizes the use of economic models that they claim reflect the behavior of society (Skidelsky, 2010; Dow, 2004). As a result, Keynes' awareness of the role of uncertainty and *animal spirits* led him to conclude that the market mechanism is not effective, adding that state intervention contributes to correcting market failure. At the time, after the Great Depression it was not difficult to accept the idea of market failure. However, Keynesian thought was also attacked by Friedman. In their book *Monetary History of the United States*, Friedman and Schwartz (1963) underestimated the role of the *animal spirits* which the Keynesian economy considered to be the cause of economic volatility. Instead, they drew attention away from the role of individuals to the inept monetary policy. Friedman was a leading figure in the anti-Keynesian trend that reinforced with growing views on the inability of Keynesian economic ideas to explain the stagnation that had broken out during that period. Back in 1957, Friedman criticized the Keynesian consumption function, where he argued that the fiscal policy of having a much lower impact on equilibrium income, if the marginal propensity to consume out of transitory income, is small (Mankiw, 2006). And in his permanent- income hypothesis, Friedman (1959, p.351) stated that "the economy is much less sensitive to changes in investment than it would if consumption were adapted to be measured rather than permanent income the short-run investment multiplier is decidedly smaller than the long run multiplier".

Friedman has long been skeptical about the effectiveness of government intervention in the economy. He developed the monetary theory which argues for the importance of the role of money supply in determining the aggregate spending in the economy with an emphasis on long-term effects, such as "the eventual inflationary consequences of sustained stimulus to aggregate demand, and the inability of government demand management policies to affect real incomes or employment" (Woodford, 1999, p.15). In parallel, monetarists have developed mathematical and statistical models to support their arguments.

One of the factors that increased Friedman's credibility was his arguments regarding the stability of the Phillips curve, particularly those he presented in his presidential address to the

American Economic Association in 1967. This had important implications for many macroeconomic models that used this curve, including that of Keynes. In contrast to the 1960s, when it was accepted that the relationship formed by the Phillips curve was stable, Friedman's argument was that this trade-off between inflation and unemployment would not hold in the long run. Friedman argued that the study of Samuelson and Solow (1960) that shows a stability of the Phillips curve was based on time-period data where inflation expectations were already stable. Since it is difficult to predict inflation in the short term, it may seem to reduce unemployment, but this is not the case in the long term. He added that the changes in that expectations will not affect the unemployment rate as assumed and the rise in inflation will not lead to a decline in the unemployment rate (Woodford, 1999). Friedman's argument became true by the end of the 1960s, with the rise in unemployment and inflation rates together and the entry of the world's countries into the phase of 'stagflation' that continued throughout most of the 1970s. But, Mankiw (2006) rejects Friedman's argument, noting that most of the literature ignored the fact that Samuelson and Solow did not consider the Phillips curve as a constant trade-off between inflation and unemployment, and they even pointed out that these trade-offs varied in the short and long terms**.**

Friedman's efforts are among many contributions that led to the decline of Keynesian policies that had been so well received for the nearly a quarter of a century, often referred to as the Golden Age of Capitalism. By the late 1960s and with a series of events in the 1970s (the collapse of Bretton Woods system in 1971, OPEC oil embargo of 1973), the glow of the Keynesian revolution had diminished considerably. The growing belief in the ineffectiveness of Keynesian approach and the necessity of activating alternative policies made the voices calling for market liberalization more welcoming. Accordingly, the decline of Keynesian thought and the growing belief in market efficiency, led to a further disregard of the concept of uncertainty and *animal spirits*. The next section discusses how this shift, counter to the Keynesian view of uncertainty, is central to the explanation of many of the currently prevailing arguments about the market mechanism and the role of the state.

4. The dominance of the concept of rationality

In his article *Rational Expectations and the Theory of Price Movements* (1961), John F. Muth put forward the rational expectation's hypothesis. He argued that the nature of the economic

activity pushes individuals to form future expectations on an ongoing basis. In order to avoid the mistakes of the past, future expectations became subject to continuous process of adjustments based on the results obtained. Therefore, Muth (1961, p.316) concluded that "expectations, since they are informed predictions of future events, are essentially the same as the predictions of the relevant economic theory". That is, the concept of rational expectations assumed that outcomes do not differ systematically from what people expect them to be. Based on Muth's argument, the assumption that the individuals are 'rational' has come to imply that the information available to the public has been utilized in an efficient manner and therefore individuals, when formulating their future expectations, will not make systematic errors. To Blaug (1997, p.684) this "does not imply that expectations are never mistaken-foresight is not perfect because the economy is subject to random unpredictable shocks- but that the probability distribution of the subjective expectations of price variables will always have the same 'mathematical expectation' as the objective distribution; a rational forecast or rational expectation has the property that its expected error is always zero".

Muth's view, however, was not taken seriously until the 1970s, after Robert Lucas and Thomas J. Sargent adopted the principle of rational expectations, which led to the second wave of New classical economics, the so-called the *Rational Expectations Revolution*. Lucas and Sargent also adopted Friedman's arguments against the Phillips curve, that was long been considered as one of the appropriate ways to complete the Keynesian model. Their view contributed to the collapse of the consensus view in macroeconomics that prevailed until the early 1970s and in turn, helped to build the theory of the Real Business Cycle that formed the third wave of the New Classical economy developed in the 1980s (Mankiw, 1990).

In 1976, Lucas published his book *Econometric Policy Evaluation: A Critique* where he considered the weakness of Keynesian models to be due to the fact that they did not take rational expectations seriously. The *Rational Expectations Hypothesis (REH)* developed by him ruled out the possibility of activating Keynesian policies arguing that government spending will eventually lead to inflation. According to Arestis and Sawyer (2006, p.479) Lucas claimed that the "lack of information or other source of price rigidities would allow the existence of a short-run trade-off and the possibility that governments could exploit, for political gain, the advantages of lower levels of unemployment". Actually, the promotion of the rational expectation's hypothesis is considered one of the main neoclassical achievements. Rationality has soon become popular and

unquestionable since it did not conflict with other mainstream believes, as Snowdon and Vane (2005, p.315) put it "in a world of rational expectations, perfect price flexibility and full information relating to the money supply, the neutrality of money is guaranteed". Indeed, the assumption of rationality has been adopted as the basis for many models used that are used in the analysis of monetary policies, particularly, the Dynamic Stochastic General Equilibrium (DSGE) models (Bénassy-Quéré et al., 2010). This did not only establish a new era governed by methodological considerations different from its predecessors, but rather a revolution, as De Vroey (2016) says. For him, revolution as "a breach of consensus within a profession" applies only to two instances in the history of macroeconomics namely the Keynesian revolution and the 'Lucasian' or DSGE revolution (De Vroey, 2016, p.379).

Under the assumption of rationality and symmetric information, the results produced by the models come in line with individuals' future expectations, then uncertainty is no longer a problem but rather becomes very marginal, simply because uncertainty lies outside the ergodic assumption in which statistical patterns in the past provide perceptions of possible outcomes in the future. This assumption is indispensable in the rational expectations' hypothesis in which "the objective probability environment […] presumes not only that probability distributions regarding historical phenomena have existed, but also that the same probabilities which determined past outcomes will continue to govern future events" (Davidson, 1991, p.132). In this way, the concept of uncertainty came to be dealt with in a framework assuming that future expectations are based either on objective probabilities or on subjective perceptions, and thus the distinction between probabilistic risk and uncertainty has disappeared from mainstream thought. Moreover, by maintaining the idea of rationality, individuals become as if they are fully aware of the economic structure and government policies, and thus the role of the latter become unsignificant because "any action taken by the government in the form of either fiscal or monetary policy would quickly be included and accounted for within the individual's information set, resulting in a new decision" (Hunt and Lautzenheiser, 2011, p.487; Davidson, 2009; Rosser, 2001). In this way, mainstream economists concluded that the market's ability to self-correct is usually better than the results that can be achieved through state intervention. They promoted the belief that the market could overcome its failures and achieve approximately Pareto optimal results without the need for corrective intervention (Palley, 2017).

Against this new economic perspective, the followers of Keynesian thought faced critical challenges, particularly at the methodological level. As mainstream economics has given great importance to mathematical models and econometric methods, mathematical analysis has become the main criterion for publication in leading journals (King, 2002). This was one of the signs of a shift in the way economic issues were addressed. In the midst of this shift, it was remarkable that a number of Keynesians, driven by a desire to bridge the intellectual distance between Keynesian economics and mainstream economics, had themselves contributed to the marginalization of the concept of uncertainty and *animal spirits* (Akerlof and Shiller, 2010). In this regard Palley (2017, p.98) draws attention to what he describes as the "intellectual missteps" of the New Keynesian school. New Keynesianism, which became part of the neoclassical synthesis, sought to reconcile Keynesian macro theory with neoclassical microeconomic theory and neoclassical growth theory. However, its response to the macroeconomic approach developed by the Chicago School, as Palley (2017) confirms, did not succeed in reviving Keynesian thought, but rather in weakening it. Because the New Keynesians "in accepting the theory of rational expectations, which revives in mathematical form the classical theory which Keynes rejected, they have sold the pass to the New Classicals. Having swallowed the elephant of rational expectations, they strained at the gnat of the continuous full employment implied by it, and developed theories of information failures to allow a role for government" (Skidelsky, 2010, p.17). This is especially true of the second generation of New Keynesians who were instrumental in the development of DSGE models (De Vroey, 2016).

Nevertheless, it cannot be said that such a disregarding approach to the concept of fundamental uncertainty found acceptance among all Keynesians. In contrast to the New Keynesian view presented above, post-Keynesians have continued to emphasize the central role of uncertainty and its profound impact on investment and financial stability. Their efforts in this regard supported their arguments against rational expectations theory. This is evident, for example, in their discussions of the conditions under which economic decisions are made, which demonstrate that the latter are not necessarily subject to probabilistic calculations (Stockhammer, 2006). Although the Keynesian concept of uncertainty is present in Kalecki's investment theory as well as in Robinson's critique of the concept of equilibrium and in her defense of the liquidity preference, it was Shackle who most highlighted the implications of uncertainty in economic Theory (King, 2002). Shackle (1949, p.163) draws attention to what he called 'crucial experiments', that is, those in which "the person concerned cannot exclude from his mind the

possibility that the very act of performing the experiment may destroy forever the circumstances in which it was performed". By this he means the circumstances, often those accompanying decisions that involve a long -time horizon, that lead to experiences that cannot be repeated and whose negative results cannot be compensated. Since this applies to most investment decisions, analyzing them using measures of probability and risk becomes irrelevant. Such arguments made Shackle a permanent opponent of neoclassical synthesis. As with Shackle, Loasby and Vickers' arguments about the unidirectional nature of time also stress the consequences of denying the ontological nature of Keynesian uncertainty and its essential role in investment decisions in a constantly changing reality. Hence, it can be understood how the post-Keynesians, through the concept of fundamental uncertainty, opposed the theory of rational expectations and questioned its assumption that economic system is governed by ergodic patterns. In particular, the credit for relating the discussion of uncertainty to nonergodicity of time series goes to Paul Davidson. Davidson rejected neoclassical conclusions, which conceived of future expectations as consistent with what prevailed in the past. For him, regardless of the information and experience gleaned from the past, our future expectations will always be governed by uncertainty. Thus, Davidson based his critique of rational expectations theory on his analysis of ergodicity, showing that it emerges implicitly from Muth's assumptions and that it does not really reflect economic reality (Rosser, 2001). In addition to the important contributions made by the early post-Keynesians at the methodological level, King (2002) also notes that the interest of their second generation in Keynes's philosophical writings has contributed greatly to keeping the concept of uncertainty, as well as expectations, alive in economic discussions. Such key Keynesian concepts formed the basis of the arguments advanced by post-Keynesians in their critique of the neoclassical synthesis and its concept of equilibrium. In short, post-Keynesian views on the concept of uncertainty, although their approaches differ, are consistent in their opposition to rational expectations theory. This position, in turn, overshadows post-Keynesian views on the role of the state in stabilizing the economy. And opens the discussion about the feasibility of using models that adapt rational assumptions in analyzing monetary policy. In this connection, Milani (2007) pointed out the limited capacity of these models in analyzing monetary policies because their results are often not consistent with the behavior of economic variables, especially with regard to inflation. Instead, he suggested replacing rational expectations with the adaptive learning rule. Such criticisms of mainstream approaches have become the subject of serious debate, especially after the 2008 financial crisis.

5. Behavioral economics and the revival of the concept of uncertainty

The acceptance of the rationality concept, especially during the 1970s, led to the deterioration of the Keynesian economy at the expense of another line of thought, where the concept of the uncertainty and animal spirit has had no place in the interpretation of economic behavior. The turning point, though, was the economic crisis that hit the world in 2007-2008, which revealed the depth of the gap between reality and the assumptions underlying economic models governed by rational decisions. It became clear that "the individual as a rational, calculating maximizer, as portrayed in neoclassical marginalism, has never been an accurate reflection of the behavior of most people in a capitalist society" (Hunt and Lautzenheiser, 2011, p.277). That is, the mathematical models are unable to contain the complexities imposed by the state of uncertainty in the economic system, because they outweigh those found in engineering and statistical models. This reality increased doubts about the mainstream approaches and, as a result, called for a revision of rational models (Onatski, 2008) leading to revive many overlooked concepts, including uncertainty and animal spirits. As the recognition of these concepts is in stark contrast to the market mechanism assumed in the dominant thought, this matter placed the mainstream thought at the center of the confrontation that targeted its basic ideas. Not to mention that these concepts require contributions from other social sciences, particularly psychology, to explain the economic motives of human behavior, something that is not welcomed by a wide range of macroeconomists (Akerlof and Shiller, 2010).

In fact, calls for a reconsideration of the mainstream economic approach began to crystallize through the so-called behavioral economy, which was rarely taken seriously due to its interrelations with psychology, cultural and other social factors that are often neglected by the modern economy. In addition, the course of behavioral economics is reviving ideas that Keynes had believed in. In this regard, Thaler and Ganser (2015, p.200) stated "This is unfortunate, because had he been alive, Keynes might have made the debate more even-handed. He was a true forerunner of behavioral finance". This argument is drawn from Keynes' deep awareness of the concept of animal spirits as a fundamental pillar of economic behavior and as a result of his acquaintance with the works of his predecessors. In this context, Farmer (2008) cites the work of Robin Matthews (1984) in which the latter indicated that Keynes, in his reference to *animal spirits*, was greatly influenced by Hume's thought. He also refers to the fact that Keynes was

familiar with the work of the English economist Henry Thornton (1802) who discussed the essential role that state of confidence plays in credit markets.

Nevertheless, the roots of the term 'animal spirits' go back even further. This term was commonly used in human anatomy in ancient and medieval times, it is mentioned extensively by Galen, philosopher of the Roman Empire. Also, we find it in the works of Robert Burton's *The Anatomy of Melancholy* (1632) and René Descartes' *Traité de l'Homme* (1972 [1664]). The existence of three types of spirits was the common belief at the time: the heart was considered a source of the *spiritus vitalis*, the *spiritus naturalis* comes from the liver, and *spiritus animalis* come from the brain. But while the animal spirit in its ancient Latin form referred to the mind, in modern economics it refers to "a restless and inconsistent element in the economy. It refers to our peculiar relationship with ambiguity or uncertainty. Sometimes we are paralyzed by it. Yet at other times it refreshes and energizes us, overcoming our fears and indecisions". Recently, five different aspects of animal spirits have been distinguished, namely: confidence, fairness, corruption and antisocial behavior, money illusion, and stories (Akerlof and Shiller, 2010, p.3-7, 178).

Although it is not within the scope of this article to discuss the various aspects of behavioral economics, mentioning it here is to indicate a line of thought that challenges the prevailing ideology that believes in the rationality of individuals. Behavioral economy, according to Thaler and Ganser (2015), provides an important aspect that contributes to the improvement of many economic and political decisions. They argue, for instance, that it helps to understand self-control problems, which is essential to analyze the behavior of individuals in saving. Although this analysis is usually done based on the standard theories of saving, such as those advanced by Friedman or Modigliani, behavioral economy allows the study to include several variables, such as age and life expectancy, which are not covered by the above theories. In the same context, Akerlof and Shiller (2010) called for a reconsideration of the prevailing concept of *animal spirits*. For them, relying solely on confidence indicators, makes our understanding of the role of animal spirits incomplete because what these indicators may reflect are consumers' expectations regarding current and future income, while animal spirits are too broad to be reduced to changes in confidence and in income. Recently Shiller (2021, p.2) claimed that it is possible to apply an epidemic theory to understand changes in *animal spirits* because ideas, he says, "can be contagious, so that they spread from person to person just as diseases do".

Finally, it is worth mentioning that Nobel Prize award drew the attention to the importance of the behavioral economy through its recognition of the work of economists in this field, despite the fact that many economists are still far from this approach. After Richard Thaler winning the Nobel Prize in Economic Sciences for his contributions to the behavioral economy in 2017, Robert Shiller[6] (2017) wrote "Richard Thaler is a controversial Nobel prize winner – but a deserving one", he clarified that this controversy is due to the fact that the behavioral economy shows that the expectations produced by mathematical models, based on rationality, are wrong and misleading. This view represents a clear break from the prevailing ideological grounds.

6. Conclusion

In different and sometimes contradictory ways, various schools of economic thought have addressed many economic issues. At each phase, certain ideas and theories dominate the course of the world's economies, while others are excluded or even disappear. One of the prevailing ideas that have been shaken in the wake of the 2008 financial crisis is the ability of economic models to contain uncertainty. Likewise, the recent COVID-19 pandemic brought to the fore the impact that uncertainty can have on economic life.

Given the complexity of the economic system, it is difficult for economists to confidently assert the effectiveness of a particular economic approach without the other. Yet and for decades, the ideas promoted by mainstream economists were considered to be taken seriously and beyond doubt. But things change with every crisis and turmoil and it becomes unjustified to continue relying on certain ideas after being proven inaccurate. Here, in the context of the search for solutions and alternative approaches, the history of economic thought as an analytical tool plays an important role as many lessons can be learned by going back to the history of the rise and fall of ideas and schools of economic thought. Whereas "our academic understanding of economics is incomplete if we do not respect history and understand the social embeddedness of economic institutions and social behaviour", as Bögenhold (2020, p.73) put it.

[6] Robert Shiller was awarded the Nobel Prize in Economic Sciences jointly with Eugene Fama and Lars Peter Hansen in 2013 for his contributions in analyzing financial market volatility and asset price. https://www.nobelprize.org/prizes/economic-sciences/2013/summary/

This article, in turn, is a brief attempt to tell the story of the ups and downs of the concept of uncertainty from economic discourse and debate. It explores how the problem of uncertainty in economics has been addressed, not only within the Keynesian perspective but rather the way in which economists and various schools of thought have dealt with the problem of uncertainty. This allows to trace the evolvement course of the concept of uncertainty. For example, the debate between Keynesian and classical theory shows how they treat knowledge about the future differently. Smith, and Hume, assumed that individuals are capable of making rational decisions, and therefore the focus of classical theories was on the allocation of resources. In contrast, Keynesian theory considers the economic future to be very uncertain and thus has a different view of how individuals will behave in the absence of complete knowledge. Moreover, discussing uncertainty brought to the fore other related concepts such as *animal spirit* and rationality and thus paved the way for aspects recently addressed in the behavioral economics. By tracing the evolution of the concept of uncertainty, we also trace the motives that led mainstream economists to reject the centralization of this concept, and what led them to believe in market mechanisms over State intervention.

Consequently, the concept of uncertainty should not be confined to explaining financial and economic crises, but rather to address the main problems in the mainstream economic ontology, so that finding better alternatives becomes possible. Indeed, the ideas power is always there in spite of the time passage and the vested interest supported by economists and politicians. It is inspiring how Keynes was well aware of the role played by ideas when he was writing his *General Theory*. Keynes (1936, p. 383) ended this book with these words "…after a certain interval; for in the field of economic and political philosophy there are not many who are influenced by new theories after they are twenty-five or thirty years of age, so that the ideas which civil servants and politicians and even agitators apply to current events are not likely to be the newest. But, soon or late, it is ideas, not vested interests, which are dangerous for good or evil".

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