Induction as Keynes' method

Fábio Henrique Bittes Terra
(IE-UFU)
Fernando Ferrari Filho
(FCE-UFRGS e CNPq)

Abstract
The question of method probably raises some of the most controversial discussions on the work of John Maynard Keynes: some authors argue that Keynes used various methods, while others advocate Keynes adopted the historical-deductive method and, still, there are those who argue that Keynes mostly used induction reasoning. In this sense, this paper aims to explore the latter of these methods in Keynes' work. This paper does not claim to give an original contribution in terms of Keynes' philosophical and methodological thoughts; on the contrary, its main purpose is to condensate in a paper-length material the debate on induction in Keynes' works, something done so far in book-length contributions, such as Carabelli (1988), O'Donnell (1989) and Davis (1994). This will be done by first considering Keynes' thoughts related to induction in his *Treatise on Probability* and, afterwards, the paper explores how his first insights on the topic appear in his most important economic books, namely *A Tract on Monetary Reform*, *Treatise on Money* and *The General Theory of Employment, Interest and Money*.

Keywords: Keynes, Keynesian Theory, Method.

JEL: B2, B4, E12.

1. Introduction

The debate about John Maynard Keynes' method revived in the 1980s as a result of both the publication of the *Collected Writings of John Maynard Keynes* and the subsequent growth of the Post-Keynesian Theory. Yet, Keynes' method is still a controversial topic in the interpretations of his ideas and conceptions, given the diversity of positions as to what his method was. Without intending to simplify the controversies, the debate can be summarized into three main areas of discussion: (i) in terms of unit of analysis, did Keynes use an atomistic or an organicist viewpoint? (ii) Is it possible to observe continuities or discontinuities in Keynes' philosophical foundations throughout his main writings? and (iii) Which method did Keynes use?

Each of these questions has generated their own research agendas in their specific issues. Commonly cited in discussions as to whether Keynes was an atomist or an organicist, for instance, are the controversies between Bateman (1989) and Davis (1989-1990), who regard him as an atomist, and Carabelli (1985, 1988), Rotheim (1989-1990) and Winslow (1986, 1989a, 1989b), that consider him an organicist. As to whether his philosophical footings show continuity or rupture, O'Donnell (1989, 2002) argues prominently for

continuity, while Bateman (1989, 1991) sees discontinuities in the philosophical principles underpinning Keynes' worldview, whereas Carvalho (1992), Gerrard (1992) and Dostaler (2007) point to both ruptures and continuities.

In turn, this paper examines the latter topic mentioned above, that is, it discusses the method Keynes used. We argue that Keynes' method is related to the theory of knowledge he developed in his *Treatise on Probability* (TP), which is anchored in induction – or, deemed alternatively, inductive logic or reasoning. Moreover, we argue that Keynes used induction both to describe how the economic agent thinks and to apprehend and theorize the economic system. Thereafter, we portray evidences that the inductive logic stated by Keynes in his TP was present in some of his most important economic writings, namely his 1923 *Tract on Monetary Reform* (Tract), 1930 *Treatise on Money* (TM) and 1936 *The General Theory of Employment, Interest and Money* (GT). In that way, the analysis spans practically three decades of Keynes' intellectual production, given that the TP, although published in 1921, was written between 1906 and 1908. The evidence will be presented chiefly by way of citations and explicit references to Keynes' writings, as it is conventional in history of ideas researches.

It is worthy saying that this paper does not claim to furnish an original contribution on Keynes' induction. This topic was previously developed by authors such as Carabelli (1988), O'Donnell (1989) and Davis (1994). The contribution we grant to the relevant literature is to condensate a debate earlier done in a book-length dimension in a paper-length material. Furthermore, we not only lay the debate on Keynes' interpreters, but we mainly rescue Keynes' original writings both to show how he had regarded induction and to display the way he used it in some of his main economic writings. As Davis (1994) shows, Keynes did receive several philosophical influences that were crucial to set his *weltanschauung*. However, this paper will not cover these influences. It attains itself in making an intestine debate on Keynes' theories only. Finally, if Keynes' economic proposals regained prominence recently because of the economic crises, accessible pieces about the fundamentals of his thoughts are important. This is the contribution of this paper.

In addition to this introduction, the paper comprises another four sections. The second reviews the relevant contributions on Keynes' method. The third examines the epistemological and philosophical conceptions expressed by Keynes in the TP. The fourth highlights passages and arguments that corroborate the hypothesis that, in economic terms, induction is an important component to describe how Keynes conceived the economic agent

and it is a relevant tool Keynes' undertook to theorize economic phenomena. The last section offers the final remarks.

2. The literature on Keynes' method

The diversity of epistemological and methodological positions in Economics is not different from what is seen in the Philosophy of Science as a whole, as shown by Blaug (1975, 1999), Corazza (2003), and Shackle (1965). In this regard, Fonseca (2003) points to method as one of the cornerstones of the empiricist Malthus' critique of the rationalist Ricardo, while Germer (2003) shows how Marx's method was essential to his critique of the Classical Political Economy. Yet, Keynes' critique of the method employed by Ricardo and his followers is a constant in the GT, "Ricardo offers us the supreme intellectual achievement, unattainable by weaker spirits, of adopting a hypothetical world remote from experience as though it were the world of experience and then living in it consistently" (Keynes, 1964: 192).

Analyses of method in Keynes also advance various arguments. Shackle (1965), one of the first authors to address the issue, compares Keynes' method to a kaleidoscope in *Keynesian Kaleidics*. He argues that Keynes examines moments of equilibrium in the variables, but in an environment where human behavior exerts untimely influences on the course of the economy, up to the point where such equilibriums are precarious, non-self-regulating and occur out of full employment. So, to Shackle (1965), Keynes' kaleidoscopic method brings together (i) the analysis of moments of equilibrium, (ii) the condition that the point of equilibrium in question is unstable, and (iii) the unpredictable human behavior.

Kregel (1976) highlights points of equilibrium, expectations and dynamics as fundamental analytical elements in explaining Keynes' method – and its inherent kinship to the method of the Post-Keynesians. He identifies three modes in which Keynes undertakes his analyses in the GT, all of them centered on how expectations behave in the short- and long-term. Firstly, static equilibrium is the equilibrium condition that arises from constant expectations. In such a situation, *ex-ante* and *ex-post* do not exist, and the supply and demand curves are unaltered; accordingly, the point of effective demand is given and, unless full employment has already been attained, it would not be. In short, the system does not move. Secondly, stationary equilibrium entails that frustrations of short-term expectations will occur, without however contaminating long-term expectations. By trial and error, the point of effective demand, which corresponds to the entrepreneurs' best expectations, is attained. Unmet hopes modify positions along the supply and demand curves, but do not shift the curves themselves, and so entrepreneurs would move along them until reaching the point of

effective demand at which their expectations are fulfilled. Thirdly, in the shifting equilibrium model, short- and long-term expectations are interdependent. Short-term frustrations cause expectations to be realigned, impacting on what to expect in the long term and making the point of effective demand movable over time.

The role of expectations makes 'dynamics' and 'time' important factors in economic analysis, and both Carvalho (1992) and Shackle (1965) indicate these elements as part of what Keynes inherited from Marshall. Carvalho (1992) explains that Marshall was concerned with the laws governing the system's movement, which regards how the structure of the economy changes over time. Thus, on the one hand, Keynes worked with the notion of partial equilibrium, in which causality functions provide solutions for each time period, according to how some variables influence others. On the other hand, on the expectation-based approach, Keynes considered the interaction between the short and long terms, so that employment and product are determined when short-term expectations are met and long-term expectations are stable and investment short-term fluctuations come from the volatile long-term expectations. Accordingly, Shackle (1965) argues that individuals, deliberately and prospectively, make decisions to expand their capital stocks and thus they cause the system dynamics, as shown for instance by the adjustments between the short and long-term supply curves. Carvalho (1992) highlights other methodological influences bequeathed by Marshall on Keynes, such as the analytical instruments represented by the supply and demand functions (that is, Marshall's scissors), and the need for theory to be developed with reference to what can be deemed the 'average' human behavior.

However, the methodological positions mentioned above have more to do with the techniques used to treat the object rather than with the method used to apprehend it. Therefore, the following question remains: how did induction contribute to Keynes circumscribe his object of study to the point of establishing expectation, time, dynamics, supply and demand functions and positions of equilibrium as underpinning fundamentals to understanding the economic phenomena?

To O'Donnell (1989: 327), "methodologically, he [Keynes] accepted both deduction and induction in economics and sought to embrace both formal and non-formal modes of reasoning". However, unlike the *ad hoc* nature of the method indicated by Corazza (2009) to explain why Keynes accepted both deduction and induction, O'Donnell's underlying argument is that Keynes, in his aversion to extremes in theoretical positions, charted an intermediate course: "in virtually all spheres, whether in philosophy, economics or politics, Keynes is typically an exponent of a 'middle way'" (O'Donnell, 1989: 325). This perhaps

reflects an influence from Marshall that is close to what is signaled by Carvalho (1992), towards taking the common man as the yardstick when theorizing.

This makes room for the argument advanced by Carvalho (2003: 177) that the method of the GT placed Keynes as "an economic agent and [at the same time] as an inquirer into the economy". Thus, he argues that the methods of Classical Political Economy and those of Neoclassical school are rejected, because, unlike them, "the Keynesian object (...) is not individual behavior as such, even if it derives from uncertainty, but the interaction of individuals in their activities of producing and distributing goods and accumulating wealth" (Carvalho, 2003: 180). What matters to Keynes is not just the world itself, but also how it is perceived. In short, Carvalho (2003) is highlighting empiricism, experience, as essential to Keynes' construction of economic theory.

Carabelli (1985) sees Keynes' method in the TP as matching the epistemology of the economic scientist and that of the economic agent. However, she does find in Keynes – as does Souza (2003) – a posture that is at once anti-empiricist, anti-rationalist and anti-positivist and, therefore, conflicts with the hypothesis of Keynes' use of induction and deduction as O'Donnell (1989) argues. To Carabelli (1985), Keynes has his own method, whose foundations are encountered in the TP, and which rests on how probability is defined, i.e., as a relation that is above all cognitive, organic in nature, uses inductive logic and ordinary language instead of formal logic, and is prone to uncertainty and change over time. Even arguing that Keynes uses a method of his own, she does not summarize it in a concept or a nomenclature and, accordingly, what remains is just the notion that "this mixture of anti-empiricism and anti-rationalism was the core of Keynes' peculiar epistemological position and makes Keynes' position difficult to describe in simple terms" (Carabelli, 1985: 151).

There are positions contrary to Carabelli's (1985) argument that the TP contains the bases of Keynes' method. For instance, Carvalho (1988) regards the TP as an effort to discuss the foundations of decision-making by way of induction and that, accordingly. Moreover, in the GT, Carvalho (1988) sees Keynes devoting himself to examining how individuals make decisions in contexts of inescapably incomplete information, where the role of conventions in the economic system is essential. Gerrard (1992) corroborates this point of view, maintaining by that the Keynes of the TP is concerned with more speculative matters, while in the GT he is focused on practical matters.[1]

[1] This point relates closely to discussions as to the continuity or otherwise of Keynes' philosophical positions over the course of his oeuvre. For further discussion, see: Bateman, 1989, 1991, and O'Donnell, 1989, 2002.

It is clear from the various above mentioned positions that Keynes' method is a topic of controversy and ongoing discussion. Both affirmative and negative answers can be found to any of the following questions: Was Keynes a follower of Marshall? Was he an empiricist? Has he had his own method? Given that context, this paper explores the role that induction played in Keynes' work, from the TP through to the GT.

3. Induction in Keynes' TP

It is no exaggeration to say that the TP is a work of epistemology, i.e., about how knowledge can be obtained and what validity it has. About that, Keynes makes it clear in the book's early pages what the distinctive feature of his work is in relation to the state of the art of the subject:

> "In most branches of academic logic, such as theory of the syllogism or the geometry of ideal space, all the arguments aim at demonstrative certainty. They claim to be *conclusive*. But many other arguments are rational and claim some weight without pretending to be certain. In Metaphysics, in Science, and in Conduct, most of the arguments, upon which we habitually base our rational beliefs, are admitted to be inconclusive in a greater or less degree" (Keynes, 1921: 2).

Thus, in the TP, Keynes lays the foundations of a theory of knowledge in which probability plays a central role. However, his conception of probability is not an accounting of frequencies of events from which to perform calculations resulting in more or less probable inferences. Keynes' probability relates premises to arguments that stem from them, and which inspire a greater or lesser degree of belief. Keynes (1921: 4, italics in original) points out that

> "with the term "event", which has taken hitherto so important a place in the phraseology of the subject, I shall dispense altogether (…) it will be more than a verbal improvement to discuss the truth and the probability of *propositions* instead of the occurrence and the probability of *events"*.

In turn, knowledge is obtained by a process whose starting point is direct acquaintance. Direct acquaintance stems from individuals' experiences, which involve (i) using the senses, (ii) understanding meanings, and (iii) perceiving data deriving from facts.

Therefore, direct acquaintance constitutes experience by the use of senses, understanding and perception,[2] and the intuition that results from this is key to obtaining direct knowledge.

Another important element of Keynes' theory of knowledge is propositions. They are of two kinds, namely premises and arguments (or conclusions). Premises are direct knowledge, whereas conclusions are the outcome of reasoning from the premises. In other words, in their experiences, individuals achieve direct knowledge, from which they are able to reason other knowledge, which Keynes (1921) calls indirect, "therefore, I distinguish between direct and indirect knowledge, between that part of our rational belief which is based on direct knowledge and that part which is based on argument" (Keynes, 1921: 13).

If, metaphorically, reasoning is the bridge between premise and argument, then logic is the intrinsic structure of that bridge, and probability is the creed one has in this logical relation. So, probability deals with the degree of rational conviction an individual holds in the conclusions s/he reasons from a set of known propositions. Thus, "[o]f probability we can say no more than that it is a lower degree of rational belief than certainty; and we may say, if we like, that it deals with degrees of certainty" (Keynes, 1921: 15).

The degree of rational belief is sustained by the weight of the argument.[3] The greater the number of instances one has, the more s/he believes in the conclusion s/he reasons. In this scenario, Keynes' probability refers to individuals having a greater or lesser degree of rational belief in their arguments. The probability relationship stems from individual experience and, for that reason, is subjective[4] and relative.[5] Even when what is involved are logical axioms, which are expected to be more objective, there is subjectivity, because "I think, that this too [the logical axiom] is relative to the constitution of the human mind, and that the constitution of the human mind may vary in some degree from man to man" (Keynes, 1921: 17).

Generally speaking, this is the epistemological content of the TP. It served as the basis that Keynes gave to explain how knowledge is acquired. Still, there is a question that remains unasked: what is the method that enables reasoning along with Keynes' epistemology, that

[2] Keynes (1921) considers memory as also being a source of knowledge; however, for memory to become what it is, it was previously experience, understanding or perception.

[3] Note that, while the TP features the duality 'probability' and 'weight', the corresponding pair in the GT is 'expectation' and 'state of confidence'.

[4] One clarification is needed at this point: in the TP, Keynes makes it clear that logic is not subject to human caprice and, therefore, is objective. Put simply: logic is an objective thing in itself, and independent of the reasoning subject. However, criticizing the TP, Frank Ramsey argued that the logic Keynes had proposed was subjective. In Ramsey's obituary, Keynes had accepted Ramsey's criticism, arguing that the logic presented in the TP was subjective, or human. For further discussion, see Keynes (2010) and Winslow (1986).

[5] This discussion interfaces intensely with the atomism-*versus*-organicism line of research into Keynes' primary unit of theorization and analysis. For further details, see: Bateman (1989, 1991), Carabelli (1985), Davis (1989-1990), Rotheim (1989-1990), and Winslow (1986, 1989a, 1989b).

allows proceeding from direct acquaintance to direct knowledge and thence to indirect knowledge? In short, what is the method of knowledge? Keynes (1921: 250) states that "inductive processes have formed, of course, at all times a vital, habitual part of the mind's machinery. Whenever we learn by experience, we are using them".

Keynes (1921) considers that induction comprises two separate techniques: analogy and pure induction. Analogy is the reasoning that compares evidences' similarities and dissimilarities among objects. This can be at the level of evidence leading from direct acquaintance to direct knowledge, or from known objects to unknown ones (arguments/conclusions). By knowing the similarities and dissimilarities between particular objects it is possible to go beyond them, that is to say, to generalize. In turn, pure induction is the generalization that emerges from the accumulation of known evidences added to direct knowledge[6]. So, accordingly to Keynes (1921: 316):

> "I have thought it best, therefore, to use the term *pure induction* to describe arguments which are based upon the number of instances, and to use *induction* itself for all those types of arguments which combine, in one form or another, pure induction with analogy."[7]

To summarize, induction is partly analogy and partly pure induction. Analogy is strengthened by pure induction, if there is a multiplicity of evidences from non-uniform experiences that aggregate dissimilarities and reduce the likelihood of alternative possible generalizations amongst objects. The more (i) negative and positive analogies are perceived and (ii) particular cases are added to individuals' experience, the greater will be the weight of their argument, thus leading them to stronger rational belief in their arguments. Thus,

> "The object of increasing the number of instances arises out of the fact that we are nearly always aware of *some* difference between the instances, and that even where the known difference is insignificant we

[6] However, little is gained from a multiplicity of instances under uniform conditions. If a hundred identical experiments are conducted it is likely that they would not produce different evidence up to warranting alternative generalizations. It is better to examine objects under different conditions in time and place, so as to bring out their dissimilarities and then eliminate instances that are not essential to the generalization Keynes (1921).

[7] Blaug (1999) also argues that there is a double meaning to the term 'induction', however not related to the method of generalizing from particular cases, but to the possibility of demonstrating the generalizations so achieved. On the one hand, in its use in logic, induction is the argument that can be demonstrated and thus it gains the status of certainty; on the other hand, the colloquial sense of the term stems from its everyday use which, however, is not concerned with arguments endowed with certainty.

> may suspect, especially when our knowledge of the instances is very incomplete, that there may be more. Every new instance *may* diminish the unessential resemblances between the instances and by introducing a new difference increase the Negative Analogy. For this reason, and for this reason only, new instances are valuable" (Keynes, 1921: 269, italics in the original).

By entailing conclusions from particular evidences, inductive reasoning always involves uncertainty, as in the familiar 'two swans' problem: just because experience shows that all swans seen to date have been white, that is not to say that all swans are white. Keynes (1921), however, sees no problem in this, because his probability deals not with the truth of the relationship between premises and conclusion, but with its reasonableness. As mentioned before, in the TP, probability deals with degrees of certainty in knowledge. Knowledge, even when uncertain and not final, is logical and valid, and lacks only demonstrative truth.[8]

When individuals induce, the direct knowledge from which their conclusions derive is considered to be true. However, the truth condition of the premises is a requisite for it to be possible to conclude from them, but nothing entails that such truth is beyond question. On the contrary, consistent with his methodological standpoint, Keynes argues that

> "there is nothing novel in the supposition that the probability of a theory turns upon the evidence by which it is supported; and it is common to assert that an opinion was probable on the evidence at first to hand, but on further information was untenable. As our knowledge or our hypothesis changes, our conclusions have new probabilities, not in themselves, but relatively to these new premises" (1921: 7).

Moreover, Keynes (1921: 282) declares that "[t]he usefulness of induction depends, no doubt, upon the actual content of experience". However, Keynes' manner of conceiving induction, and particularly the role played on it by analogy, does not restrict its content to matter-of-fact sensorial experience, but allows its use on a more abstract level, leading to obtaining experience through understanding abstract meanings. Given that, induction can be used in various scientific disciplines, including the moral sciences, such as economics.

[8] In Keynes' words (1921: 284), "[b]ut is it certain that Newton and Huyghens were only reasonable when their theories were true, and that their mistakes were the fruit of a disordered fancy?".

Therefore, "I do not mean to suggest by the use of the term *inductive* that these methods are necessarily confined to the objects of phenomenal experience" (Keynes, 1921: 251-252). So, Keynes' induction is fully able to deal with economic phenomena, because it both advances a theory of knowledge capable of explaining the individual logic of reasoning, which imbues human's subjective "motives, expectations, psychological uncertainties" (Keynes, 1973: 300), and allows the theory to evolve over time by including new knowledge, as via induction "we cannot hope to make completely accurate generalizations" (Keynes, 1964: 247).

It is important to point out a rupture in Keynes' *weltanschauung* concerning his TP belief in the atomist hypothesis and his later work, in which he advocates the organic unity principle. While in the TP Keynes had assumed atomism as a mean to grant robustness and validity to the inductive method, in his *Essays in Biography* (Keynes, 2010), he stated that the whole is greater than the sum of its constituent parts and an individual action impacts the whole in a unpredictable dimension.

Yet, this rupture does not nullify the inductive logic of the TP. The adoption of organic unity principle imposes, as a consequence, the worsening of the uncertainty faced by the individual in his reasoning through inductive means. Under organic unity, reality transformation is indelible and the changes may be surprising and peremptory. Individuals' summarization of instances can oscillate unexpectedly, implying that lower chances are available to gather good evidence from which induct conclusions. Thus, the organic unity makes individuals more uncertain because their degree of rational belief in their arguments may vary suddenly, since the premises upon which they are anchored change constantly.[9]

One further argument we may add emerges from combining Keynes' (1921) induction with Davidson's (1994) theory of the non-ergodic reality. The evidence that agents rely on to guess something of the future is not located upon any fully knowable average point either on time or place. Even in the special case where this does occur – that is, in a situation of ergodicity – induction from particular cases does not warrant certainty in the knowledge that is achieved. As Keynes (1921) states, even the regularity of certain phenomena, such as the sun's rising every morning, is at most an inductive correlation and not certain knowledge of all objective phenomena. New evidence, even if falling within the average of the sample, can give rise to completely new arguments that entirely alter the former *status quo*. Thus, "what we commonly seem to hold with conviction is the belief that the sun will rise *to-morrow*,

[9] One can speculate that Keynes' belief in organic unity within the use of inductive method is one of the reasons – besides his life experience – that explains his lost of faith in human razonable reasoining to achieve social welfare, as he illustrates by means of the financial investor behavior in the Chapter 12 of the GT.

rather than the belief that the sun will *always* rise so long as the conditions explicitly known to us are fulfilled" (Keynes, 1921: 298, italics in the original).

In order to reach a conclusion about the importance of induction in Keynes' economic works published after the TP, we will search evidence that, in the course of his writings, he put into practice what he had set out in the TP. To that end, the next section proceeds in that direction. As mentioned before, the analytical approach addresses three of Keynes' works of economics, the Tract, TM and GT.[10]

4. The evidence of induction in Keynes' main economic works

Evidence that Keynes used the epistemology and methodology he had set out in the TP can be seen in two dimensions: (i) in terms of his theorizing the behavior of economic agents and (ii) in his method as a theoretician. Incidentally, the former dimension is the more commonly discussed in the literature; however, it is in the latter that the role of the inductive method is more noticeable in Keynes, as one of the ways he apprehends the phenomenon to be understood. Nonetheless, the two dimensions combine in themselves the expression of what Carvalho (2003) identifies as the researcher in the skin of the economic agent. The theoretician participates in reality as an agent, and then manages to theorize what s/he has experienced.

Let us start with how, to Keynes, the economic agent thinks. In the economic system, time is a fundamental variable, as it is over time that the decisions of economic agents materialize, including those to enlarge their wealth. As knowledge is uncertain, there is no way of knowing what form such materialization would take, whether it will be advantageous or not. As a result, agents create expectations, not certainties, about the future. That is the application of the Keynes' probability, as attested by Keynes' words in the GT: "by 'very uncertain' I do not mean the same thing as 'very improbable'. *Cf.* my *Treatise on Probability*" (Keynes, 1964: 148), and "the state of long-term expectation, upon which our decisions are based, does not solely depend, therefore, on the most probable forecast we can make. It also depends on the *confidence* with which we make this forecast" (Keynes, 1964: 148).

Also, it is important to recall that Keynes' induction is central to his treatment of the businesspeople expectations in Chapter 12 of the GT and in his later discussion of econometrics and Tinbergen's method, in which he criticizes Tinbergen because, according to him, it is not possible to apply "the multiple-correlation method to" Economics, because,

[10] In the references, see Keynes (1971a, 1971b, 1964), respectively, for the Tract, TM and GT.

"unlike the typical natural science, the material to which it is applied is, in too many respects, not homogeneous through time" Keynes (1973: 295-296).[11]

In the Tract, by virtue of their particular habits, agents reserve money stocks and thus influence price levels. In the TM, expectations are expressed both in the natural interest rate, which equates savings and investment, and in the bull and bear behavior of agents in the financial market, as well as in the relationship between the discount rate and agents' expected gains. Also prominent in the GT is the opposition between the marginal efficiency of capital, liquidity preference, and the consequent interest rate, which depends on agents' uncertain knowledge of the future. Thus, the dynamics of the economy depends on how, over time, agents absorb the information necessary to make decisions under uncertainty.

Nonetheless, note that analogy and pure induction are fundamental to agents' decision making. In the TM, equality between savings and investment depends on equivalence between the market interest rate and the natural rate. Therefore, agents' behavior and the ensuing economic dynamics are influenced by the analogy that agents draw between the natural and market interest rates. Of the latter, they know its present, but not its future, behavior. Whether they bring more or less money into financial circulation will depend on the expectation that they are forming, between the present and the future. In the GT, as shown by Hesse (1987), the marginal efficiency of capital and the liquidity preference are anchored in thinking, by analogy, that future conditions would be similar to the known current conditions.

As already seen, pure induction emanates from the accumulation of evidence accessible to individuals. In the case of businesspeople looking for information upon which to decide to expand his stock of productive capital, they would know the value of the minimum wage, the rate of unemployment, the level of prices and the degree of competition, along with other factors. Added to these, economic policy will also be interpreted as providing evidence about the business environment. For that reason, policy should act, on the one hand, to stabilize the economic cycle automatically and, on the other hand, to structure an institutional environment favorable to business, as argued by Ferrari Filho and Terra (2011). Meanwhile, the conventions mentioned by Keynes in the GT also represent 'knowledge' (by the way, it is built on unstable variables), in which entrepreneurs' animal spirits are anchored. In all these forms, directly known evidence accumulates in such a way that investors' arguments regarding the future gain weight and, accordingly, yield a state of greater confidence.

[11] In this sense, it is Worth remembering that Keynes (1973: 297) regarded that "economics is essentially a moral science (…) [t]hat (…) employs introspection and judgments of value".

Just as agents deal with the uncertain outcome of their actions, so do the economic authorities. Monetary and exchange policies, for instance, endeavor to influence agents' behavior and, thus have nothing but indirect impact on economic activity. No wonder that in the Tract and the TM – books that investigate particularly the factors that cause price levels, and, consequently, currency values variations – Keynes is skeptical about what results can be achieved by monetary policy. In the GT, where the variable "price" is secondary to the variables "employment" and "product", Keynes seems to be even more skeptical towards monetary policy than in his previous books. Thus, he writes, "for my own I am now somewhat skeptical of the success of a merely monetary policy directed towards influencing the rate of interest" (Keynes, 1964: 164). For that reason, Keynes' preference is for fiscal policy, whose impact on aggregate demand is immediate, as shown by Ferrari Filho and Terra (2011). In any case, as it functions as direct knowledge for individuals, Keynes asserted since the Tract, "the remedy would lie, rather, in so controlling the standard of value (…). Even if such policy were not wholly successful, either in counteracting expectations or in avoiding actual movements, it would be an improvement on the policy of sitting quietly" (Keynes, 1971a: 35).

It is noticeable, therefore, that the epistemology Keynes developed in the TP is clearly present in his examined economic works. It is now the time to look for evidence that makes it possible to place the role of inductive method in Keynes' apprehension of the economic phenomena. In this connection, there are various notable allusions to induction based on experience in the course of the Tract, the TM and the GT. Thereafter, inductive reasoning has various functions, but all of them refer to collecting evidence in order to approach some economic phenomenon.

Thus, induction based on particular experience serves as a source of research problems, as in the Tract, where "the fluctuations in the value of money since 1914 have been on a scale so great as to constitute, with all they involve, one of the most significant events in the economic history of the modern world" (Keynes, 1971a: 1). Moreover, induction from particular experienced evidence inspires categorizations for modeling behaviors, as in the TM remark, "the second category of savings deposits comprise what, in language borrowed from the stock exchange, we will call the 'bear' position" (Keynes, 1971b: 223).

It is also the foundation from which Keynes launches and validates hypotheses, as in the case of the four conditions of stability that prevent intense cyclic movements in the economic system. In Keynes' words, "now, since these facts of experience do not follow of logical necessity, one must suppose that the environment and the psychological propensities

of the modern world must be of such a character as to produce these results [economic stability rather than extreme depression]" (Keynes, 1964: 250). Induction from experience is a constant resource Keynes uses all over Chapter 18 of the GT, "yet experience shows" (Keynes, 1964, 252), or "our third condition accords with our experience of human nature" (Keynes, 1964, 252), and finally "thus our four conditions together are adequate to explain the outstanding features of our actual experience" (Keynes, 1964: 254).

Still in Chapter 18 of the GT, it is possible to observe that there also is strong evidence of induction, when Keynes confirms the general nature of his theory, but just after examining the causal relations underlying various particular phenomena, such as: What causes employment? What causes effective demand? What causes consumption? What causes investment? What causes the rate of interest on money? Why money and not some other asset? What can be generalized from investigating each of these variables? The answer is induced from each of these variables, as their causal relations are becoming known; thereby, it enables generalizing, i.e. the re-statement of the 'General' Theory.

Reasoning by analogy is also present, particularly in the more abstract discussions, especially in the way that, in the GT, Keynes questions the second postulate of Classical Economics. That classical postulate holds that reductions in nominal wages entail lower real wages and lead to increase employment. Thus, by analogy, do price variations, given nominal wages, lead to reductions in real wages and lead to increasing employment? This analogy is false, because one does not see workers leaving their jobs because of raising prices. Keynes, therefore, moves on to pure induction, adding it to analogy. This enables him, on the one hand, to solve a problem in the Classical theory and, on the other hand, to find solutions to the theoretical problem. In this context, analogy allows Keynes to conclude that,

> "now ordinary experience tell us, beyond doubt, that a situation where labour stipulates (…) for a money-wage rather than a real wage, so far from being a mere possibility, is the normal case. Whilst workers will usually resist a reduction of money-wages, it is not their practice to withdraw their labour whenever there is a rise in the price of wage-goods" (Keynes, 1964: 9). [12]

[12] Moreover, as if these factual observations claimed by Keynes on the topic of workers behavior were not enough, there still are the following ones: "but, whether logical or illogical, experience shows that this is how labour in fact behaves" (Keynes, 1964: 9); "moreover, the contention that the unemployment which characterizes a depression is due to a refusal by labour to accept a reduction of money-wages is not clearly supported by the

Another significant analogy in the GT is expressed in the approach to the phenomenon of interest (Keynes, 1964: Chapter 13). As claimed by the Classical theory, as the rate of interest is the reward for waiting, accordingly, all waiting should be rewarded. By analogy, why does waiting with money not pay interest? The Classical theory's inability to answer that question corroborates that it cannot be general, because it does not deal with all the vicissitudes of the economic system. Lastly, analogy makes understandable the relationship among productive investment, interest rate, and money. All these objects are similar in nature in that they are all means of reserving future purchase power over the product; however, they differ in qualities such as risk, carrying cost and liquidity premium. Thus, by examining their similarities and dissimilarities, it can be concluded that they are alternatives to one another. Then, knowing the characteristics and influences of each of these objects, Keynes (1964) modeled the determinants of employment and product.

Lastly, one final feature of Keynes' epistemological position is important to highlight. Despite abundant evidence of inductive method used to set a rational individual economic behavior, Keynes did not consider that most individuals employed inductive reasoning reasonable. This is a claim he undertook in his *My Early Beliefs*, in which he argues that human reasoning, "both other people's and our own (…) [are] disastrously mistaken" (Keynes, 2010: 447). He continues saying that there are "insane and irrational springs of wickedness in most men (…) [so that] civilization was a thin and precarious crust erected by the personality and the will of a very few, and only maintained by rules and conventions skillfully put across and guilefully preserved" (Keynes, 2010: 447).

This is important given that any the discussion of 'practical affairs' cannot ignore this 'irrationality'. This idea of the relevance of irrationality in human affairs also appears in his analysis of capitalism as the claim that "the essential characteristic of capitalism (…) [is] the dependence upon an appeal to the money-making and money-loving instincts of individuals as the main motive force of the economic machine" (Keynes, 1972: 293). This claim underpins his conception of the three fundamental psychological factors of the GT, such as, propensity to consume, liquidity preference, and expectation of future profit. Moreover, Keynes describes, in Chapter 12 of the GT, the financial market values determined by psychological expectations based on "conventions" as "[a] conventional valuation which is

---

facts" (Keynes, 1964: 9). Lastly, "these facts from experience are a *prima facie* ground for questioning the adequacy of the classical analysis" (Keynes, 1964: 9, italics in the original).

established as the outcome of the mass psychology of a large number of ignorant individuals" (Keynes, 1964: 154).

In the view of all the evidence exposed in this Chapter, there is little doubt that induction was an important Keynes used to build his works up. Consequently, he not only advocated its validity as a mean of attaining knowledge, but applied it in developing his theories about the economic phenomena. In addition, and consistently with his epistemological position in which knowledge by induction is inconclusive and therefore new evidence can lead to new conclusions, his objects and theoretical conceptions changed partly over time. The most notable example is the quantity theory of money, which Keynes had viewed as valid, at least in the long term, in the Tract, but repudiated in the GT. After all, "a scientific theory cannot require the facts to conform to its own assumptions" (Keynes, 1964: 276), and therefore each time knowledge is incorporated, theories adapt, so as to pursue "the factors whose changes *mainly* determine our *quaesitum*" (Keynes, 1964: 247, italics in original).

5. Final remarks

As it has been seen here, Keynes sought to validate induction not only as scientific method, but also as an intuitive pathway by which subjects achieve knowledge. The role of the induction is perhaps one of the most important facets of the Keynesian theoretical revolution, because it is fundamental to the theory's movement from a contemplative nature to a practical one. This is even more important if reality is subject to disequilibria and change, as is the case of the economic system.

When Keynes appealed to formal language in the Tract, TM and GT, this must not be seen as any approximation to the Neoclassical and New-Classical axiomatic deduction. He had not done so to theorize, but to portray the theory he previously developed. It is a method of presentation, not a manner of apprehending phenomena. In this sense, it is worth quoting Keynes,

> "the conclusions are, of course, obvious and may serve to remind us that all these equations are purely formal; they are mere identities; truisms which tell us nothing in themselves" (1971b: 125).
>
> "I do not myself attach much value to [formal] manipulations of this kind; and I would repeat the warning, which I have given above, that they involve just as much tacit assumption as to what variables are taken as independent (…) as does ordinary discourse, whilst I doubt if they carry

> us any further than ordinary discourse can. Perhaps the best purpose served by writing them is to exhibit the extreme complexity of the relationship between prices and the quantity of money" (1964: 305).

These quotes illustrate the importance that Keynes had given to ordinary or common language to the detriment of the formal language advocated by his empiricist contemporaries in Cambridge, including Bertrand Russell and Ludwig Wittgenstein (the latter, in his early phase). The use of ordinary language is yet another way for the theoretician to keep his feet on the ground, in touch with what he is theorizing about, with the notions and meanings used by common people, which is fundamental to knowing what is being explained and, if necessary, to act on it. On this point Keynes argued since the TP that

> "those writers, who strain after exaggerated precision without going the whole hog with Mr. Russell, are sometimes merely pedantic (...) There is much to be said, therefore, in favour of understanding the substance of what you are saying *all the time*, and of never reducing the substantives of your argument to the mental status of an *x* or *y*" (1921: 19, italics in original)

Marshall's influences regarding the supply and demand curves and the use of elasticities also relate more to how the theory is presented than to how the object is apprehended. However, it is important to emphasize that Keynes' TP method was more relevant in shaping his own economic methodological approach. Generalization of entrepreneurs' decisions takes the form of the product supply price, which can be illustrated by a supply curve. The same is true for individual spending decisions when expressed in the aggregate demand curve. The corresponding formative decisions are not in the curves, however, but in the elasticities, which demonstrate the relations among the variables, once these are known.

To conclude, from the foregoing, it can be said that the induction Keynes developed in the TP is indeed present in his later economic writings. Just as important, his underlying epistemological and methodological foundations are not restricted to influences he received or appropriations he made of methods developed and employed by other people. Keynes had accepted the trouble to conceive an intellectual apparatus of his own, which enabled him to develop his economic studies and offered him rich and functional explanations for the

trajectory of the economic system. It is his epistemological and methodological presuppositions that make uncertain knowledge valid, and this is a fundamental component in explaining the behavior of a monetary production economy. Therefore, uncertainty is not a presupposition of Keynes' economic theory, but a consequence of his theory of knowledge, because knowledge is mainly reached inductively and induction cannot be certain most of the times (Keynes, 1921). Thus, Keynes' use of induction in Economics means that he did not significantly change his TP insights related to the induction in his later economic works.

References

Bateman, B. W, 1989, "'Human logic' and Keynes' Economics: a comment". *Eastern Economic Journal,* 15, 1, 63-67.

_____. "Das Maynard Keynes Problem", 1991, *Cambridge Journal of Economics*, 15, 1, 100-111, 1991.

Blaug, M., 1975, "Kuhn versus Lakatos, or paradigms versus research programmes in the history of economics". *History of Political Economy*, 7, 4.

_____. 1999, *Metodologia da Economia*. São Paulo, EDUSP.

Bresser-Pereira, L.C., 2012, "Why Economics should be a modest and reasonable Science". *Journal of Economic Issues*, XLVI, 2, 291-301.

Carabelli, A., 1985. "Keynes on cause, chance and possibility". *In:* Lawson, T.; Pesaran, H. (eds.). *Keynes' Economics: methodological issues*. Armonk: M. E. Sharpe, 151-180.

_____. 1988, *On Keynes' Method*. London: Macmillan.

Carvalho, F. J. C., 1988, "Keynes on probability, uncertainty and decision making". *Journal of Post-Keynesian Economics*, 11, 1, 66-81.

_____. 1992, *Mr. Keynes and the Post Keynesians*. Aldershot: Edward Elgar.

_____. 2003, "Características essenciais do método de Keynes na Teoria Geral". *In:* Corazza, G. (org.) *Métodos da Ciência Econômica*. Porto Alegre: UFRGS, 175-188.

Chick, V., 1998. "On knowing one's place: the role of formalism in Economics". *The Economic Journal*, 108, 451, 1859-1869.

_____. 2004, "On open systems". *Revista Brasileira de Economia Política*, 24, 93, 3-16.

Chick, V.; Dow, S., 2001, "Formalism, logic and reality: a Keynesian analysis". *Cambridge Journal of Economics,* 25, 6, 705-721.

Corazza, G. (org.), 2003, *Métodos na Ciência Econômica*. Porto Alegre: UFRGS.

_____. 2009 "Aspectos metodológicos do pensamento de Keynes". *Anais do XXXVII Encontro Nacional de Economia*. Foz do Iguaçu: ANPEC.

Davidson, P., 1972, *Money and the Real World*. London: Macmillan.

_____. 1994, *Post Keynesian Macroeconomic Theory: a foundation for successful economic policies for the twenty-first century*. Aldershot: Edward Elgar.

Davis, J. B., 1989-1990, "Keynes and organicism". *Journal of Post-Keynesian Economics*, 12, 2, 308-315.

_____. 1994, *Keynes's Philosophical Development*. Cambridge University Press: Cambridge.

Dostaler, G., 2007, *Keynes and his Battles*. Edward Elgar: Cheltenhan.

Ferrari Filho, F.; Terra, F. H. B., 2011, "As disfunções do capitalismo na visão de Keynes e suas proposições reformistas". *Revista de Economia Contemporânea*, 15, 2, 271-295, 2011.

Fonseca, P. C. D., 2003, "O método como tema: controvérsias filosóficas, discussões econômicas". *In:* Corazza, G. (org.) *Métodos da Ciência Econômica*. Porto Alegre: UFRGS, 17- 34.

Gerrard, B., 1992, "From a Treatise on Probability to the General Theory: continuity or change in Keynes' thought?" *In:* Gerrard, B.; Hillard, J. (eds.). *The Philosophy and Economics of J. M. Keynes*. Aldershot: Edward Elgar, 80-95.

Germer, C., 2003, "A relação abstrato/concreto no método da economia política". *In*: Corazza, G. (org.) *Métodos da Ciência Econômica*. Porto Alegre: UFRGS, 61-92.

Hesse, M., 1987, "Keynes and the method of analogy". *Topoi*, 6, 1, 65-74.

Keynes, J. M., 1921, *Treatise on Probability*. London: MacMillan and Co.. Available at: http://www.gutenberg.org/ebooks/32625. Accessed in June 2013.

_____. 1964 [1936], *The General Theory of Employment, Interest and Money*, 1964. New York: HBJ.

_____. 1971a [1923], *A Tract on Monetary Reform*. London: Cambridge University Press.

_____. 1971b [1930], *A Treatise on Money: the pure theory of money*. London: Cambridge University Press.

_____. 1972 [1931], *Essays in Persuasion.* London: Cambridge University Press.

_____. 1973, *The General Theory and After: defense and development*. London: Cambridge University Press.

_____. 1979, *The General Theory and After: a supplement*. London: Macmillan.

_____. 2010 [1931], *Essays in Biography.* New York: Palgrave Macmillan.

Kregel, J., 1976, "Economic methodology in the face of uncertainty: the modeling methods of Keynes and the post-Keynesians". *Economic Journal*, 86, 342, 209-225.

LAWSON, T., 1997, *Economics and Reality*. London: Routledge.

O'DONNELL, R. M., 1989, *Keynes: philosophy, economics and politics*. New York: St. Martin's Press.

_____. 2002, The thick and the thin of controversy: a critique of Bateman on Keynes. *Macquarie Economics Research Papers, 4*. Available at: http://www.econ.mq.edu.au/Econ_docs/research_papers2/2002_research_papers/4-2002_ODonnell.PDF. Accessed in June 2013.

Rotheim, R. J., 1989-1990, "Organicism and the role of the individual in Keynes' thought". *Journal of Post-Keynesian Economics*, 12, 2, 316-326.

Shackle, G., 1965, *A Scheme of Economic Theory*. London: Cambridge University Press.

Souza, M. A. G., 2003, Método e visão de mundo em Keynes: uma abordagem alternativa. *In:* Corazza, G. (org.) *Métodos da Ciência Econômica*. Porto Alegre: UFRGS, 153-174.

Winslow, E. G., 1986, '"Human logic' and Keynes' Economics". *Eastern Economic Journal*, 12, 4, 413-430.

_____. 1989a, "'Human Logic` and Keynes' Economics: a reply to Bateman". *Eastern Economic Journal*, 12, 4, 67-70.

_____. 1989b, "Organic interdependence, uncertainty and economic analysis". *Economic Journal*, 99, 398, 1173-1182.