Keynesian interpretations of the financial crisis

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Abstract

A by-product of the recent financial crisis has been the renewed interest in John Maynard Keynes's works. Both in the press and in scientific journals, a crowd of commentators has emphasised the need to scrutinise the General Theory in order to gain a better understanding of the actual macro-dynamics of the economy and of the policy measures apt to help the economy recover from the downturn. But Keynes's thought has been given central prominence also with respect to the understanding of what went wrong at the microeconomic level, with specific reference to the role played by “irrational” agents animated by animal spirits. This paper discusses this second main thread of the recent Keynesian revival. The paper supplements the influential analyses of George Akerlof and Robert Shiller's Animal Spirits and Robert Skidelsky's The Return of the Master by arguing that a Keynesian explanation of the actual behaviour of individual agents is to be based more on the Treatise on Probability than on the General Theory itself. Indeed, while it is well-known that the rationale of Keynes's rejection of “Benthamite calculus” is best provided in the Treatise, less attention is usually given to the constructive analysis that emerges from Keynes's criticism of contemporary probability theory. Through an assessment of Keynes's examination of “the application of probability to conduct” in the Treatise, the paper shows that most of the developments of what is usually referred to as behavioural finance have indeed a Keynesian origin. In particular Keynes hinted at a decision rule different from mathematical expectation, a rule intended to mimic the behaviour of actual agents making decisions under uncertainty, that is of great interpretative help as regards the current crisis. The understanding of the current financial crisis, the paper concludes, would gain from a Keynesian assessment of the rationale for actual decisions as much as from the usual one concerning macroeconomic policy. But it is the Treatise that provides the pertinent interpretative background.

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1. Introduction: re-reading Keynes after the crisis

The recent financial crisis has rejuvenated the interest in the works of John Maynard Keynes in internet blogs, magazines and scientific journals. Unsurprisingly a crowd of commentators have emphasised the need to scrutinise the General Theory in order to gain a better understanding of the actual dynamics of the economy, and to devise the policy measures apt to help the world economy recover from the downturn.¹

Most of the attention has been put on the mechanics of the economic system. For instance, Gregory Mankiw summarises Keynes’s message arguing, very much like as in old-fashioned macro-textbooks, that “the root cause of economic downturns is insufficient aggregate demand.” When the total demand for goods and services declines, he reminds, businesses throughout the economy see their sales fall off. This induces firms to cut back production and to lay off workers. As rising unemployment and declining profits further depress demand, Mankiw concludes, the “the situation reverses only when some event or policy increases aggregate demand. The problem right now is that it is hard to see where that demand might come from.” (Mankiw 2008).²

Still concerned with the macro-dynamics of the economy is the emphasis of authors working in the tradition of Hyman Minsky, one of the most notable followers of Keynes. As is well-known, Keynes was a close observer of finance and speculation in capitalist economies. On Minsky’s (1992, pp. 7-8) elaboration of Keynes’s viewpoint it can be shown that “if hedge financing dominates, then the economy may well be an equilibrium-seeking and containing system.” In contrast, “the greater the weight of speculative and Ponzi finance, the greater the likelihood that the economy is a deviation-amplifying system.” Over a period of prolonged prosperity, the economy “transits from financial relations that make for a stable system to financial relations that make for an unstable system.” The current crises can thus be seen as the inevitable outcome of a fundamental shift of financial economies towards fragility

¹ For instance, Richard Posner admitted he never thought to read Keynes up until recently, mostly on the advice of Milton Friedman. Baffled by the economics profession’s disarray concerning the causes of the crisis he decided to go through the General Theory and found it convincing to such an extent to publish a chronicle on how he became a Keynesian (Posner 2009).

² Mankiw’s ambivalence as to how much compelling Keynes’s recommendations to get out of a situation of deficiency in aggregate demand are is not shared by Paul Krugman, another prominent commentator focusing on Keynesian mechanics. As “depression economics” has returned, Krugman (2008, p. 187) argues, the solution simply is “good, old Keynesian fiscal stimulus.”
As in the previous interpretation, Keynes is notable because of his vision of how the market economy, and its financial structure, works as macro-system.

But Keynes's thought has been given central prominence also in the analyses of those authors concentrating on the role played by individual agents. George Akerlof and Robert Shiller (2009), in particular, argue that, animated by “animal spirits,” Keynesian agents reject standard rationality and the maximisation of expected utility. Sophisticated theories of the financial markets that hinge on agents maximising intertemporal flows of consumption from the holding of assets are as a result flawed in a Keynesian perspective. Drawing on the growing interest in behavioural interpretations of financial markets, Akerlof and Shiller (2009, p. 3) hold that Keynes’s insistence on “the spontaneous urge to action” characterising decision-making in the actual word is the most relevant message conveyed by the General Theory. They argue that only an accurate consideration of the effects of the individuals’ attitude towards phenomena like ambiguity and uncertainty can help understand the causes of the crisis.

On a more general tone, but still emphasising a decision theoretic perspective, Robert Skidelsky (2009, p. xv) argues that the centrepiece of Keynes’s theory is “the existence of inescapable uncertainty about the future”, and this has profound implications for the understanding of both human activity in general and the behaviour of individual agents in particular. Very much along the lines of post Keynesian interpreters, Skidelsky claims that the relevance of Keynes’s thought for an understanding of the causes of the instability of economic systems mostly stays in the acknowledgement that uncertainty in the world cannot be reduced to statistical probabilities. This irreducible uncertainty, he argues, lies behind panics and bouts of exuberance of economic agents and primarily accounts for the instability of market economies we are experiencing nowadays (see also Davidson 2009).

This paper concentrates on this second main thread of the current Keynesian revival. In particular, starting from a brief critical assessment of Akerlof and Shiller’s recent volume the paper aims to provide a sounder historical background for their claim that Keynesian animal spirits are at the basis of those developments of behavioural finance that provide a convincing explanation of the crisis and of the failure of conventional models to account for it. It is argued that a Keynesian explanation of the actual behaviour of individual agents would gain more strength if based on the Treatise on Probability rather than on the General Theory alone. Indeed, as well documented in the secondary literature on the Treatise (see for instance
Lawson 1985, Runde 1994 and Carabelli 1995) and recently recalled by Skidelsky (2009), the rationale of Keynes's rejection of “Benthamite calculus” is best provided in the *Treatise*. The main claim of this paper is that even those authors who correctly put major attention on the *Treatise* have not given accurate account of the constructive analysis emerging from his criticism of contemporary probability theory. Drawing on the assessment provided in Basili and Zappia (2009), emphasis is put on the constructive elements of Keynes’s philosophy of probability with specific regard to its “application to conduct” (Keynes 1921, p. 335). The paper tries to show that a fresh reading of this part of Keynes’s work can contribute to an understanding of how actual individual agents behave under uncertainty. In particular, it is almost totally untold that Keynes hinted at a decision rule, different from mathematical expectation, intended to mimic the behaviour of actual agents under uncertainty, that is very much in the same vein of some recent attempts to put behavioural insights at work.

The fundamental theme of how to model individual agents in stylised, formal analysis of the financial markets put forward by Akerlof and Shiller can thus be illuminated by a Keynesian perspective, and the understanding of the current financial crisis would gain from a Keynesian assessment of the rationale for actual decisions as much as from the usual one concerning economic policy. But it is the *Treatise*, more than the *General Theory*, that provides the rationale for it.

2. Keynesian animal spirits in Akerlof and Shiller

George Akerlof and Robert Shiller (2009) have provided an influential analysis of the current crisis. Their understanding of the crisis, and of the inability of mainstream economic theory to predict it, is mostly based on the distinction between the “rational” agents of theoretical models and the “irrational” agents of actual markets. Their emphasis on Keynes and a possible Keynesian explanation of the crisis is apparent from the title of their recent book, as they are keen to characterise irrationality in terms of “animal spirits.” Keynes’s *General Theory* is quoted for his discussion of businessmen’s calculation. In a world of uncertain, Akerlof and Shiller ask, how are decisions made? Keynes provided the rationale for a convincing answer: decisions are the result of “a spontaneous urge to action”, which is not
“the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities” (Keynes 1936, p. 161, reported in Akerlof and Shiller 2009, p. 3).

The connection with current decision theory emphasising the behavioural roots of individual decisions is made central to their analysis from the beginning: in modern economics, Akerlof and Shiller claim, “animal spirits … is an economic term, referring to a restless and inconsistent element in the economy. It refers to our peculiar relationship with ambiguity and uncertainty.” This element of “inconsistency,” though, is not introduced by following the usual procedure of taking simple, well understood models of the economy in which rational individuals are motivated by pure economic interests as a benchmark, and then imagining simple departures from it to explain phenomena the original model cannot account for. The methodological option favoured by Akerlof and Shiller is the one typically followed in recent years by behavioural economics: their analysis starts off with the “deviations that actually do occur” and that are observed in real markets. As a matter of fact, “insofar as animal spirits exist in everyday economy, a description of how the economy really works must consider those animal spirits.”

Akerlof and Shiller identify five different aspects of animal spirits: confidence, fairness, antisocial behaviour, money illusion, and stories. The connection with Keynes mostly concerns confidence. Confidence implies “behaviour that goes beyond a rational approach to decision making.” (Akerlof and Shiller 2009, p. 13). Keynes’s main message about animal spirit is that “when people make significant investment decisions, they must depend on confidence.” Many of the decision made are made because people “feel right.” This is of course at odds with standard economic theory and the formal process for making rational decisions of considering all options available, their outcome, and the probabilities of each option. Akerlof and Shiller report a number of historical cases in which confidence has played a major role in the actual dynamics of the economy and emphasise that even the effect of Keynes’s multiplier can be correctly understood only if confidence is taken into account: a policy measure intended to stimulate the economy has greatly different effects under diverse confidence regimes. For instance, during the Great Depression the focus on the level of nominal wages, to be increased to build up buying power, was misplaced. As Keynes later argued in his General Theory, Akerlof and Shiller (2009, p. 69) maintain, “the policy lost sight of the real problem: in the Depression, confidence was so shuttered that banks were holding vast unlent sums, and business did not want to invest in new capital even though
interest rates were at abnormal low levels.” The general loss in confidence was the main cause of the low demand, and this could not be addressed by a policy concerning nominal wages.

Keynes’s understanding of individual behaviour as a result is the pivotal element of Akerlof and Shiller’s critical analysis of the current mainstream. However when it comes to indicate how to represent individuals and their animal spirits Akerlof and Shiller turn their attention to the “irrational” agents of behavioural economics and leave Keynes out of their main focus. Akerlof and Shiller adhere to a strand of thought that in recent years has seen financial modelling progressively shifting from the analysis of rational agents to “noise traders” first (Black 1986) and “biased traders” later (Barberis, Huang and Santos 2001). Indeed, Shiller is possibly the first author who argued against the efficient market hypothesis in his analysis of volatility in financial markets (Shiller 1981) giving birth to the empirical literature on financial puzzles of the 1980s. He endorsed De Bondt and Thaler’s (1985) seminal attempt to predict this stock market anomaly, which they showed to be mostly originated by the observed overreaction to unexpected events in violation of Bayesian updating, from the psychology of decision making.3

Significantly, Shiller (2003) followed Kahneman and Tversky (1979) in assuming that individuals operating in financial markets tend to overweight recent information and underweight long term tendencies. Akerlof and Shiller, as a result, endorse the so-called limited arbitrage critique to the efficient market hypothesis and propose the theoretical strategy of using models that represent investors endowed with a cognitive bias of the Kahneman and Tversky type, models that have been used in recent years to explain puzzles, over-reaction, herd behaviour and so on. This is in accordance with the attempt of economists to adopt broader notions of rationality in their modelling of choice under uncertainty motivated by the huge experimental evidence contradicting rational choice (Camerer 1995). It is to this literature, Akerlof and Shiller argue, that one has to turn if a convincing explanation of the crisis is aimed at.4

3 As for Akerlof, his main contribution to new Keynesian models, the study of price and wage stickiness as “near-rational” behaviour (Akerlof and Yellen 1985), can be seen as an attempt to provide the behavioural assumptions that extricate traditional Keynesian macroeconomics from ad hoc sities, and to give emphasis to the psychological aspect in the General Theory incorporating assumptions honed to the observation of cognitive biases (Akerlof 2002).

4 On the basis of empirical evidence, the theory of limited arbitrage objects to the efficient market hypothesis that when irrational traders cause deviations from fundamental value, rational traders will often be powerless to do anything about it, since strategies designed to correct mispricings can be both risky and costly, thereby allowing the mispricing to survive. In order to say more about the structure of these deviations, behavioral models often assume a specific form of irrationality. For a
Akerlof and Shiller (2009, p. 167) conclude their analysis with a straightforward thesis: “the crisis was not foreseen, and is still not understood … because there have been no principles in conventional economic theories regarding animal spirits.” The failure of incorporating animal spirits into economic models made the economics profession, and key decision makers, unable to understand the main source of the trouble that stays, in Akerlof and Shiller’s view, in the way actual individuals act. Indeed, Akerlof and Shiller (2009, p. 174) claim that a “correct” view of how the economy works is instrumental both to “correct individual” and “correct public” decisions. As for Keynes, his critique of standard decision theory is still of interest since it conveys the main message, though it does not provide valuable hints for moving forward. Apparently, thus, Keynes has no clue concerning what “correct” individual and public decisions may mean.

3. Keynesian uncertainty

As seen in the previous section, Akerlof and Shiller’s discussion of Keynes is mostly based on Chapter 12 of the General Theory. In discussing the “state of long-term expectations” Keynes (1936, p. 148) evidenced that future events conditioning economic activity in general, and investment in particular, “can only be forecasted with more or less confidence.” As a matter of fact, “the state of confidence, as they term it, is a matter to which practical men always pay the closest and most anxious attention,” while economic theory does not. It is this pervading anxiety with respect to the uncertain environment that makes it important to understand that conventional behaviour may substitute for rational behaviour, and animal spirits for “strict mathematical expectation.” However, Chapter 12 contains also a crucial reference as to what Keynes meant for “very uncertain,” which Akerlof and Shiller do not discuss and which makes Keynes’s position better intelligible. In an often-quoted footnote, Keynes (1936, p. 148fn) argues that “by ‘very uncertain’ I do not mean the same thing as ‘very improbable’” and urges the reader to check his notions of probability and weight of argument in the Treatise. This reference cannot be overlooked as Keynes made it again in Chapter 17 of the

survey of these developments see Barberis and Thaler (2003).
General Theory, when discussing the notion of liquidity premium, whose meaning is heavily influenced by the state of confidence in the economy.\textsuperscript{5}

As it is well known a long standing tradition of Keynesian interpreters exists that bases his analysis on Chapter 12, but provide a thorough examination of the role played by uncertainty in Keynes’s thought. Reference to this tradition helps put the question of its relevance for the current crisis in a more comprehensive historical context than Akerlof and Shiller’s. Akerlof and Shiller’s viewpoint that the psychological motivation of individual agents are of crucial, often disregarded importance for the understanding of the crisis is consistent with this tradition. But aiming to provide a Keynesian assessment of the crisis one cannot dispense with the issue of the irreducibility of uncertainty to risk, a crucial aspect of the Keynesian fundamentalist viewpoint. In order to review it from today’s perspective let us follow Robert Skidelsky’s recent re-statement of it.

Skidelsky’s Keynesian assessment of the crisis starts off by noticing Alan Greenspan’s admission that the market regime he oversaw as chairman of the Federal Reserve was deregulated on the basis of an over-esteeem of the ability of a free market to self-correct. Greenspan’s mis-appreciation of the self-destructive power of deregulated mortgage lending appears to Skidelsky (2009, pp. 3-4) the same as the reliance on an “intellectual edifice” that turn out to be flawed, in Greenspan’s case the efficient market hypothesis. The simple story that since markets are efficient in pricing assets correctly they would need only the lightest regulation, mostly the received view in mainstream financial modelling, must have induced Greenspan to support extensive financial deregulation and concentrate on keeping interest rates low in the period when the housing bubble was growing. “This was the intellectual edifice, of both theory and policy, which has just been blown sky high,” Skidelski (2008) concludes.

Since the current financial crisis was not caused by some external shock but generated by the financial system itself, the analysis of the endogenous mechanics of the economy is necessary. But this mechanics depends on aspects of individual behaviour that are unintelligible in mainstream economics. The identification of both the mechanical aspect and its possible ineffectiveness due to the action of individuals’ animal spirits is central to the theory Keynes provided in the 1930s and turns out to be as accurate as in his days even with

\textsuperscript{5} Here the difference between the risk premium and the liquidity premium is said to correspond to “the difference between the best estimate we can make of probabilities and the confidence with which we make them” (Keynes 1936, p. 240).
respect to the actual crisis. Then, as now, Skidelsky contends, economists believed that all uncertainty could be reduced to measurable risk, implying that asset prices always reflected fundamentals, and unregulated markets would in general be very stable.

By contrast, Skidelsky (2009, p. xviii) recalls, “it is ‘radical uncertainty’ which both makes economies unstable and prevents rapid recovery from ‘shocks’.” The starting point of Keynesian economics is that not all future events can be reduced to measurable risk. As a matter of fact any view of the future based on what Keynes called “so flimsy a foundation” is liable to “sudden and violent changes” when the news changes. Investment is sometimes more an act of faith than a scientific calculation of probabilities. When they do not know which information is relevant, investors do not process new information efficiently, and rely on habits. Conventional behaviour easily turns into herd behaviour and financial markets alternate currents of euphoria and panic. (Skidelsky 2008).

As regards the understanding of the crisis, Skidelsky (2009, p. 50) summarises, the case for Keynes is quite simple: “He might not have predicted that the financial collapse would occur when it did … but he would certainly have thought a financial collapse possible, and even likely.” Keynes, himself “a hedge-fund manager a generation before Alfred Jones, the acknowledged inventor of the hedge fund” (Skidelsky 2009, p. 62), would have pointed out that people in the market were using the wrong model, as much as those government who monitored the market trends.

Skidelsky can be considered the prototype of that part of Keynesian revival downplaying the macro-aspects connected to the rejection of Say’s law and the mechanics of depression (for which see Krugman 2008) and emphasising the role of uncertainty. Skidelsky puts Chapter 12 of the General Theory at the centre of his analysis, but stays in the camp of those authors who argue that the thread which goes from it to Chapter 17 and Keynes’s 1937 recapitulation essay constitute the most enduring Keynesian inheritance. Also, Skidelsky (2009, pp. 84-88) is clear about noting that this thread departs from the Treatise on Probability, and convincingly shows that Keynes spent much of his life deeply focused upon

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6 In these instances, Skidelsky recalls, people may fall back on “conventions,” which give them the assurance that they are doing the right thing. Individuals assume that the future will be like the past (witness all the financial models that assumed housing prices wouldn’t fall) and that current prices correctly sum up “future prospects.”

7 Indeed, as to the basic question of how do rational people behave under conditions of uncertainty, Skidelsky (2008) stresses that Keynes’s answer was profound and extends far beyond economics: “people fall back on ‘conventions,’ which give them the assurance that they are doing the right thing. The chief of these are the assumptions that the future will be like the past (witness all the financial models that assumed housing prices wouldn’t fall) and that current prices correctly sum up ‘future prospects.’ Above all, we run with the crowd”.

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the question of how one acts in the face of uncertainty, since from his early philosophical studies.

Even if more accurately motivated in Keynes’s thought, the Keynesian explanation of the crisis offered by Skidelsky does not differ much from Akerlof and Shiller’s, and eventually comes to the same conclusions. Skidelsky, though, is sceptical of the behavioural economics programme. He claims that, in relying on “human behaviour irrationality,” behavioural economics leaves the “epistemological source of this irrationality unexplored”. Even if parting with the new Keynesian explanation, which typically concentrates on informational problems in an otherwise rational context, an approach repelled by Skidelsky, behavioural economics does not get to the heart of the matter, since it leaves out “the influence of irreducible uncertainty on behaviour” (Skidelsky 2009, p. 46). Apart from the correctness of this judgement in itself, on which see section 5 later, this leaves Skidelsky’s analysis incomplete. His insistence on the importance of individual behaviour under uncertainty is not substantiated by any indication of how agents really behave in the market, differently from the strong message of Akerlof and Shiller’s re-interpretation of animal spirits. Skidelsky, however, is well aware that the philosophical background of Keynes’s understanding of choice is in the Treatise. So a closer inspection of the Treatise may be worth making. The next section of the paper is devoted to it.

4. Keynes’s theory of probability

Keynes’s Treatise on Probability provides an essential starting point to an assessment of his understanding of decision theory. In the Treatise Keynes specifically questioned what contemporary frequency probability theory could encompass and put forward an alternative, epistemic notion of probability. But if retrospectively assessed his analysis has a much wider significance. Indeed, Keynes’s critical remarks in the Treatise constitute a challenge not only to frequency probability but also to any theory of probability based on a unique additive distribution and the ensuing theories of decision, like Savage’s (1954) subjective expected
utility theory. Very much in the spirit of modern criticism of the Bayesian mainstream, Keynes came to reject the idea that probability functions are always well-defined.\(^9\)

Drawing on Basili and Zappia (2009) this and the following section show that Keynes’s critiques of frequency probability also have a strong constructive, usually disregarded, content. In particular, Keynes’s view of the potential incomparability of alternative probability assessments hints at the crucial notion of decision weights that are not necessarily probabilities. Further, Keynes’s application of his theory of probability to human conduct, put forward in Chapter 26 of the *Treatise*, goes further than a critique of maximisation, and discusses the need for every sensible decision rule under uncertainty to incorporate a measure of the degree of confidence in the probability assessment. Certain decision rules recently proposed in the technical literature on individual choice seem to be motivated in much the same way.

Keynes’s theory provides an interpretation of probability as different from chance or frequency and treats it as a property of the way individuals think about the world, thus reviving the notion of epistemic probability (Hacking 1975). In Keynes’s view (1921, p. 109), probability should not be identified with statistical frequency as the theory of probability concerns the broader issue of inferring degrees of belief from the available evidence, whereas relative frequencies are a special kind of evidence. Probability, Keynes argued, “is concerned with arguments, that is to say, with the ‘bearing’ of one set of propositions upon another set.” The subject matter of the theory of probability, therefore, is the logical relation of implication between a certain evidence and a conclusion, “a relation, in virtue of which, if we know the first, we can attach to the latter some degree of rational belief” (Keynes 1921, pp. 6-7).\(^10\)

\(^9\) As is well-know, these aspects were of concern to Shackle (1949) and the Keynesian scholars who emphasise the role of “fundamental uncertainty” in decision making (Davidson 1982-83). However it has passed unnoticed for long that Ellsberg (1961) held similar concerns in his critique of Savage’s axiomatisation. Since most current efforts to understand individual decisions is motivated by the experimental confirmation of Ellsberg’s analysis of Savage, the link between Ellsberg and Keynes is examined in what follows.

\(^10\) Depending on the knowledge on which it is based probability may appear subjective, Keynes (1921, p. 4) maintained, but “the theory of probability is logical … because is concerned with the degree of belief which is rational to entertain in given conditions, and not merely with the actual beliefs of particular individuals.” The *Treatise*, therefore, shows how to derive knowledge from probability arguments, and the goal of the “logical” approach is to identify the principles of inductive rationality leading different individuals sharing the same evidence to agree on definite probability judgements. This logical perspective met with strong resistance after the emergence of the subjectivist-personalist approach and became a minority viewpoint. While advocating an epistemic approach to probability, neither Ramsey (1926) nor de Finetti (1937) followed Keynes in regarding probability as a purely logical relation. As a matter of fact, Keynes’s (1931) reaction to Ramsey’s critique of his logical viewpoint is seen by most critics as showing a retreat form the
Keynes developed his own formal logic of probability in Part II of the *Treatise*. Although these formal developments did not survive the test of a consistent axiomatic system, the rationale of Keynes’s attempt is of great interest nonetheless, mostly because of his criticism of frequency probability. First, Keynes rejected the idea, implicit in the definition of frequency probability, that probabilities can always be represented through real numbers, and before presenting the formal logic of his own system of probability he pointed out the limited degree to which probability can be measured. Second, Keynes introduced the notion of weight of argument by arguing that even when a probability measure can be identified the degree of completeness of information is a crucial factor in the assessment of an uncertain environment. Third, he discussed the issue of what kind of decision rule proves to be consistent with his critiques of frequency probability.

Keynes’s rejection of the numerical character of probability is put forward in Chapter 3 of the Treatise, where he (1921, p. 21) argued against the generally accepted opinion that “a numerical comparison between the degrees of any pair of probabilities is not only conceivable but it is actually within our power.” Being critical of the frequentist viewpoint that the numerical character of probability is necessarily involved in the definition of probability as the ratio between “favourable cases” and the “total number of cases,” he analysed various instances of ordinary life in which “no rational bases have been discovered for numerical comparison” (Keynes 1921, p. 23). Only in the “very special case” that the principle of indifference can be applied, Keynes (1921, p. 32) argued, “a meaning can be given to a numerical comparison of magnitude.” Keynes conceded that, being probability an intermediate stage between certainty and impossibility, when one argues that one probability is “greater” than another, “this precisely means that the degree of our rational belief in the first case lies between certainty and the degree of the rational belief in the second case” (Keynes 1921, p. 37). But he also stressed that the probabilities of two quite different arguments can be impossible to compare. Probabilities can be compared if they belong to the same “ordered series,” that is, if they “belong to a single set of magnitude measurable in term of a common unit.” But there may be more than one “path” from certainty to impossibility and probabilities cannot be compared if they belong to two different paths. Also when there is

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*position upheld in the Treatise (for instance, see Bateman 1996). But see Runde (1994) who argues that excerpts from the *General Theory* provide evidence to the contrary.*
more than one path probabilities can still be ordered if follow on the same path, but cannot be numerically measurable.\footnote{Keynes’s discussion is summarised in a diagram, featuring different probabilistic paths. A linear path accounts for the usual probabilistic representation, ranging from impossibility to certainty, but other different non-linear paths between the extremes which do not lie on the straight line are drawn, representing what Keynes (1921, p. 42) calls a ‘non-numerical probability’ or a ‘numerically undetermined probability’. Only probabilities lying on the same path, or on paths that have points in common, can be compared among themselves, but ‘the legitimacy of such comparison must be a matter for special inquiry in each case’ (Keynes 1921, p. 40).}

The issue of unmeasurable probabilities is reminiscent of the Knightian distinction between risk and uncertainty, with the latter meant to describe situations in which information cannot be summarised by probabilities. That Keynesian uncertainty and Knightian uncertainty overlap on many grounds has been argued by several authors (in particular see O’Donnell 1989, and Runde 2001). Keynes himself gave support to this viewpoint in the discussion of uncertainty in his 1937 summary of the General Theory (Keynes 1937, pp. 113-114), an aspect emphasised by those Keynesian scholars who claim that “for Keynes uncertainty is an absence of probabilistic reasoning” (Hillard 1992, p. 69).

However the Knightian case of unmeasurable uncertainty can be seen as a limit case in Keynes’s taxonomy of probabilistic cases as Keynes’s main aim in the Treatise was to provide a formal structure for comparisons between probability relations. This was presented in the second part of the book, in which the “fundamental theorems” of his theory are stated. Keynes put emphasis on the inductive process of deriving new probability comparisons on the basis of other comparisons constituting direct knowledge; and he tried to establish the conditions for the emergence of an ordering of probabilities, well aware that the incompleteness of the probability relation induces only a partial order. Further, he attempted to account for a numerical measure of a relation of probability through the method of “numerical approximation,” that he described as “the relating of probabilities, which are not themselves numerical, to probabilities, which are numerical.”\footnote{Keynes (1921, p. 176) maintains that “many probabilities, which are incapable of numerical measurement, can be placed nevertheless between numerical limits. And by taking particular non-numerical probabilities as standards a great number of numerical comparisons or approximate measurements become possible.”}

The interpretative point here is that Keynes clearly stated that his concern with unmeasurable probabilities can be given operational content through the notion of interval-valued probabilities. Keynes points to inexact numerical comparison rather than simply to the impossibility of attributing cardinal numbers and deriving probability comparisons. Indeed,
despite Keynesian interpreters usually make only scant reference to these developments, this approach has survived the decline of interest in logical probability thanks to the works of a number of authors working in the subjectivist tradition, but critical of its strictly Bayesian version.\textsuperscript{13} This lively, though minor, tradition of thought opposing the restrictive interpretation of subjectivism systematized by Savage, surfaced in the works of Ellsberg (1961, 2001) and has paved the way for the modern treatment of “imprecise probabilities” in statistical reasoning (Walley 1991) and the multiple prior models in decision theory (Levi 1974, and Gärdenfors and Sahlin 1982). In the literature on the \textit{Treatise on Probability} only Brady (1993) and Kyburg (1995) discussed the issue of Keynesian “non-numerical” probabilities at length, the standard interpretation being that the \textit{Treatise} establishes the philosophical foundations of Keynes’s characterization of uncertainty as an epistemic state of individuals in which, using Keynes’s (1937, p. 214) words, “we simply do not know.” As seen earlier, Skidelsky follows squarely in this post Keynesian tradition.

The received reading of the \textit{Treatise} also misses another interpretatively crucial issue. The Keynesian paths describing non-numerical probabilities closely resemble what nowadays would be identified with decision weights, a theme that has come to the fore in modern decision theory after Kahneman and Tversky’s (1979) introduction of prospect theory. As is well-known, in order to justify individuals’ unwillingness to use objective probabilities as a basis for decisions not only under uncertainty but also under risk, as in experimental evidence for the Allais Paradox, Kahneman and Tversky represented the perception of probabilities through probability weighting functions. After Kahneman and Tversky, it has become usual to use weighted functions to represent decision-makers over-weighting low probabilities and under-weighting high probabilities, a pattern of behaviour regularly observed in actual decision making under both risk and uncertainty (Wu and Gonzales 1999). An axiomatic representation of probability weight conforming with Kahneman and Tversky’s evidence has been proposed by means of non-additive probability measures.\textsuperscript{14} Behavioural theories of financial markets, like those referred to by Akerlof and Shiller (2009), have argued in recent

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\textsuperscript{13} Keynes’s attempt was taken up by Koopman (1940), Good (1950) and Smith (1961), who built an axiomatic system based on the intuition that probabilities usually provides only a partial ordering, and introduced the notion of upper and lower probabilities.

\textsuperscript{14} A consistent theory of decision capable of accommodating the behaviour of Kahneman and Tversky’s experimental subjects has ensued in the forms of Rank Dependent Expected Utility (Quiggin 1982) and Choquet Expected Utility (Schmeidler 1989), in which a non-additive probability measure is used to represent the individual’s assessment of uncertainty. Tversky and Kahneman (1992) proposed cumulative prospect theory to account for uncertain events and showed that their probability weighted functions are but an exemplar of a non-additive probability measure.
years that most of what is left unexplained by the theory of efficient markets can be understood by relaxing the basic tenet that individual agents are “rational” subjective utility maximisers and assuming that they deviate from it in the specific way prospect theory and the ensuing developments assume (Barberis and Thaler 2003). On these grounds, it can be argued that the Keynesian origin of most recent developments has been substantially overlooked.

The second fundamental aspect of Keynes’s rationale for criticising frequency probability is the weight of argument. Keynes emphasised that the uncertainty surrounding the individual cannot be represented only through probability: the confidence in the probability assessment itself is another relevant dimension in the epistemic state of the individual. In Keynes’s view the measurement of probabilities should encompass both the magnitude of the probability of an argument and the degree of confidence in it. Probability arguments, he argued (1921, p. 77), depends not only upon the balance between “favourable” and “unfavourable” evidence, but also upon the balance between “the absolute amounts of relevant knowledge and of relevant ignorance respectively.”

Keynes (1921, p. 82) exemplified the way in which the standing of a probability assessment depends on the information on which the assessment is based by the example of coloured balls drawn from urns, the same one made known in the economics literature by Ellsberg (1961). Keynes claimed that, by virtue of the principle of indifference, the probability of drawing a white ball from an urn known to contain black and white balls in equal proportion is equal to the probability of drawing a white ball from an urn containing an unknown proportion of white and black balls. But he argued nonetheless that, in the first case, a greater weight supports the argument that the probability is $\frac{1}{2}$, and thus hinted at the possibility that decision contemplating the “unknown” urn can be rationalised as if the probability of drawing a white (black) ball is less than $\frac{1}{2}$.

Keynes (1921, p. 345) defined the weight also as “the degree of completeness of the information upon which a probability is based.” This is intended to specify that the weight

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15 In order to make clear that probability and weight are “independent properties” Keynes explained (1921, p. 77): “the magnitude of the probability of the argument may either decrease or increase, according as the new knowledge strengthens the unfavourable or favourable evidence; but something seems to have increased in either case … an accession of new evidence increases the weight of an argument. New evidence will sometimes decrease the probability of an argument, but it will always increase its ‘weight’.”

16 As the probability $p(a/h)$ is the probability of some proposition $a$, on the basis of the available evidence $h$, the weight of a certain proposition $a$ given the available evidence $h$ is $w(a/h)$. Following Runde (1990), by using $K$ to denote knowledge and $I$ to denote ignorance, the weight as degree of completeness of information is: $w(a/h)=K/(K+I)$. If $K+I$ is normalised to the unity, $w$
of argument is not a second order probability, that is, a probability distribution over the probability distribution on the set of events, as contended by Bayesian authors (see Borch 1968, and the discussion in Marschak 1975). Keynesian scholars reading the Treatise in the 1980s, put great emphasis on Keynes’s claim that probability and weight are independent properties, and that the weight is intended to provide a deeper explanation of the way individuals assess uncertain phenomena (Lawson 1985; Carabelli 1988). As recalled above, Keynes himself provided an example of the distinction in his analysis of liquidity preference in the General Theory (1936, p. 148 fn., and p. 240). Skidelsky (2009, p. 88) signals its significance for the interpretation of individual behaviour in the markets: “the greater the amount of evidence supporting an expectation, the more confident we will be in having it.”

The distinction between a probability assessment and the degree of confidence in it has no place in a strictly Bayesian set-up, and has been substantially ignored in mainstream decision theory. However in current decision theory there emerges a fundamental role for Keynes’s weight, mostly evidenced in the increasingly wide literature on the Ellsberg Paradox. As is well-know, in his study of a few decisional urn problems Ellsberg showed that, when contemplating urns with an unknown proportion of balls of different colours, rational agents were induced to violate deliberately Savage’s axioms, a point we have just seen Keynes substantially anticipated in the Treatise.17 Ellsberg (1961, p. 657) remarked that the nature of the individual’s information concerning the likelihood of events was a relevant dimension of the decision problem, and proposed to call it the ambiguity of information, “a quality depending on the amount, type, reliability and ‘unanimity’ of information” expressing the individual’s “degree of confidence in an estimate of relative likelihoods.” Ambiguity, he argued, can be considered a special case of uncertainty.

Ellsberg aimed to counter the widespread “scepticism about the behavioural significance of the Knightian distinction between risk, intended as measurable uncertainty, and unmeasurable uncertainty (Ellsberg 1961, pp. 643-647). But the philosophical inspiration of his critique of Savage was more Keynes than Knight. In his Ph. D. thesis, Ellsberg (2001, p. 9, 11) put emphasis on Keynes’s idea that, in situations where information is perceived to be vague, the traditional approach to probability is inadequate and that Keynes’s discussion of non-numerical probabilities in the Treatise introduced “formally the notion of non-

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17 It is regrettable that Ellsberg, who mainly reproduced Keynes’s point in his examination of the two-urn example, did not comment on Keynes’s scrutiny of it (on this point see Feduzi 2007).
comparability of beliefs.” Further Ellsberg recognised that the notion of weight of argument is “closely related” to his notion of ambiguity. In Ellsberg’s (2001, p. 12) view Keynes’s Treatise is the main reference for the authors who share, although on different grounds, the same distrust about the meaningfulness of assuming that subjective beliefs could be always represented by a single and fully reliable additive probability function.19

Almost all modern accounts of decisions under ambiguity and uncertainty originated as attempts to account for Ellsberg’s ambiguity (Wakker 2008). Since Einhorn and Hogart’s (1986) assessment of Ellsberg, ambiguity and uncertainty have become almost synonyms in decision theory literature. Also, following on Ellsberg’s definition of ambiguity, Levi (1974) and Gärdenfors and Sahlin (1982) introduced the notions of “credal states” and “epistemic reliability” of a probability assessment. The adoption of decision criteria alternative to the maximisation of expected utility, like Levi’s E-admissibility and Gärdenfors and Sahlin’s maximin expected utility, rested on this basis.

Ellsberg’s analysis and the ensuing formal developments are thus squarely in the Keynesian tradition since they introduce a factor intended to represent the relative ignorance of the individual evaluating an act in ambiguous contexts, that is, his/her confidence in the subjectively held probability measure. Moreover the cognitive unease implicit in both Keynes’s insistence on the weight and Ellsberg’s insistence on ambiguity is recognised in current decision theory to such an extent that the literature on decision under uncertainty connected to the use of non-additive probability measures, reviewed in Gilboa (2009), offers a formal solution to the representation of the weight. Following on the experimental evidence on Ellsberg paradox, the choice of individuals taking decisions in ambiguous contexts is interpreted as showing that they are endowed with subjectively non-additive probabilities. When the decision-maker is not endowed with a unique additive probability measure, the non-additivite probabilistic weights are a function of the degree of ambiguity the decision-maker

18 Submitted to the Harvard Department of Economics in 1962, the thesis remained unpublished and substantially ignored until its publication in 2001. Ellsberg did not quote Keynes’s Treatise on Probability in the 1961 article, seemingly because he did not read it until working on the philosophical background of his own viewpoint in the thesis (Ellsberg, personal communication, June 2005).

19 It is worth noting that George Shackle is another major reference in Ellsberg’s thesis. In his characterisation of “the spectrum of uncertainties”, Ellsberg (2001, p. 17) argues that “when ambiguity is extreme, by any of his indices: relevant information sparse, or obviously unreliable and contradictory; wide differences in the expressed expectations of different individuals; low confidence in available estimates,” Shackle’s “somber reflections” seem “too ominously relevant to the very circumstances upon which this study focuses to be dismissed.” On the relationships between Ellsberg’s ambiguity and Shackle’s uncertainty see Basili and Zappia (2010).
takes into account in a given situation, that is, in Keynes’s perspective, the weight he/she attributes to his “argument.”

5. The “application to conduct” of Keynes’s probability theory

As shown in the previous section, Keynes used a probabilistic measure that has much of the properties of the modern ones that intended to account for Ellsberg’s ambiguity and Kahneman and Tversky’s decision weight. In particular, Keynes’s probabilities are additive only when the decision-maker’s confidence in his/her assessment of the decision context is at its maximum, a situation that Keynes did not consider applicable to uncertain environments. But there is a third, last aspect of Keynes’s rationale for criticising frequency probability is of major interest from a modern viewpoint. On the basis of the first two aspects, and in particular the taking into account of the weight of argument, Keynes came to reject the use of mathematical expectation as a criterion for making decisions. Keynes’s critique can be extensively found in his later work in economics, mostly under the headings of the rejection of Benthamite calculus, and is widely referred to in the literature on the current crisis, specifically, as seen in the previous sections, in both Akerlof and Shiller and Skidelsky. To this aspect Keynes devoted Chapter 26 of the Treatise, which examines “the application of probability to conduct.” A closer inspection of this chapter of Keynes’s investigation shows a constructive attitude that is not taken into account into today’s Keynesian interpretations.

Keynes’s problem was the interpretation of “goodness” of choice when “it is not rational for us to believe that the probable is true.” Keynes (1921, p. 343) recalled that “normal ethical theory at the present day makes two assumptions: first, that degrees of goodness are numerically measurable and arithmetically additive, and second, that degrees of probability also are numerically measurable.” As a result, ethical theory decides among alternative acts on the basis of their mathematical expectations, which Keynes presented as “a technical expression originally derived from the scientific study of gambling and games of chance, … [that] stands for the product of the possible gain with the probability of attaining it.” Apart from his reluctance to accept that “quantities of goodness are duly subject to the

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20 Keynes discussion is based on George E. Moore’s analysis of which are the appropriate behavioural rules to be used in ethics. He objected to Moore’s contention that mathematical expectation was the appropriate behavioural rule in ethics. On the relationship between Moore and Keynes see Bateman (1991).
law of arithmetic,” Keynes (1921, p. 344) disagreed with a generalized application of mathematical expectation for two reasons. First, because to assume that “degrees of probability are wholly subject to the law of arithmetic, runs directly counter to the view which has been advocated in part I [of the Treatise].” Keynes recalled here that in his view, “mathematical expectations, of goods or advantage, are not always numerically measurable, and hence even if a meaning can be given to the sum of a series of non-numerical mathematical expectations, not every pair of such sums are numerically comparable in respect of more and less.”

Secondly, Keynes contended that mathematical expectation cannot be used in actual conduct since it “ignores what I have termed the weights of arguments, namely the amount of evidence upon which each probability is founded.” To sum up, “it is not always possible by a mere process of arithmetic to determine which of the alternative ought be chosen” (Keynes 1921, p. 344-345).

Keynes (1921, p. 348) argued that an alternative to the notion of mathematical expectations does not lie, in principle, “in the discovery of some more complicated function of the probability wherewith to compound the proposed good.” However, even in this case, he made an effort at constructive analysis. In order to move forward in the search for a decision rule, Keynes proposed that probability and weight should be compounded into a coefficient to be used in the shaping of a normative theory of decision making.

Keynes introduced the following coefficient: $c = \frac{2pw}{(1+q)(1+w)}$, where $p$ is the probability of an event, $q=1-p$ the probability of its complement, and $w$ is the weight, ranging from 0 to 1. Keynes then argued that, in making a decision concerning a possible “amount of good” $A$ which can be expected with probability $p$, the standard mathematical expectation $E = pA$ should be disposed of in favour of an alternative criterion for choice such as $E' = cA$.21 Keynes provided also a short discussion of how, for different values of $w$ and $p$, $E'$ would help order different goods $A$ implying the same $E$ (Keynes 1921, p. 348fn). It has remained for long unnoticed, and indeed both Akerlof and Shiller and Skidelsky show that still it is mostly so, that the properties of this coefficient are of great interest with respect to a theory of how to take decisions when the weight of argument is of relevance. In particular, as suggested

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21 As Keynes did not use utility values but monetary amounts, in his discussion the coefficient $c = \frac{p}{1+q}$ is intended to take into account the “risk” implicit in taking a decision based on $E$. Except for the taking of risk into account, when the weight of argument is at its maximum there is no other need to modify $E$ as a decision rule. But when lower than 1, the weight must be taken into account as well.
by Brady (1993), Keynes’s coefficient \( c \) incorporates the properties of a probability weighting function, like the decision weights of Kahneman and Tversky, and can thus be used to provide a decision criterion that solves the Ellsberg Paradox.

It is plain to see as a result that even with respect to this third issue there is a relevant connection with Ellsberg’s analysis and the ensuing developments. Ellsberg rejected the rule of mathematical expectation applied to subjective probabilities because most of the decision-makers he interviewed (which, by the way, included Savage himself) declared to be unrepentant violators of the axioms of the theory, thus showing that they wanted to take their degree of ignorance into account in spite of normative statements to the contrary. In his analysis of alternative criteria for decision making, Ellsberg applied an evaluation method that explicitly includes the individual’s attitude towards the ambiguity of the context of choice. Following on a statistical literature initiated by Wald (1950) and Hodges and Lehmann (1952), he imagined that a set of plausible probability distributions as priors, rather than a single probability, could represent the beliefs of a decision-maker confronting what he/she perceived as an ambiguous contest. Ellsberg (1961, pp. 664-665) argued that a sensible criterion for making decision in this case would be a weighted average of the expectation of the most reliable (“best guess”) probability distribution, amongst a set of plausible probability distributions, and Wald’s (1945) maximin solution. Ellsberg contended that a decision-maker who fails to pick a single distribution out of a set as acceptable, may nevertheless regard one of them as the most reliable, and use it to ponder Wald’s maximin. Accordingly the decision rule adopted by Ellsberg (1961, p. 664) was to associate with each act \( x \) the index \( \rho E(x)+(1-\rho)\min(x) \), and then choose the act associated with the maximum value of the index.

It is apparent that that the parameter \( \rho \) can be interpreted as Keynes’s confidence in the probability assessment as represented by the weight \( w \). When \( \rho=1 \), confidence is at its maximum and the expected value is a sensible criterion for choice in much the same way as when \( w=1 \). When \( \rho<1 \), the lower the confidence value the less the expected value can be sensibly used. Thus, the rationale underlying this last aspect of Keynes’s criticism of aleatory probability – as much as the one underlying the two previous issues – indicates that Ellsberg’s rejection of mathematical expectation has a definite Keynesian origin. Moreover the current decision theoretic literature has shown that there is an omeomorphism between a non-additive prior and a (convex) set of priors, so that the Keynes-Ellsberg criterion can be axiomatised by means of a specific class of non-additive measures (Eichberger and Kelsey 1999, 2007).
6. Which Keynes for understanding the crisis?

In the above discussion it has been detailed that a fresh reading of the Treatise can help clarify a number of issues raised by commentators of the actual crisis when they discuss the role of individual agents. First, Keynes’s understanding of “non-numerical” probabilities hints at the notion of decision weights associated in current economic theory with Kahneman and Tversky’s (1979) rationalisation of actual behaviour through weights that are probability measures that do not satisfy the property of additivity (Tverski and Kahneman 1992). Second, the degree of non-additivity of the probability measure introduced by Schmeidler (1989) can account for confidence in a probability assessment without any reference to a second order probability, as suggested by Keynes’s weight of argument. Third, certain criteria for decision making under uncertainty put forward in the non-additive literature are devised to incorporate a measure of the degree of confidence in the probability assessment, also an issue Keynes discussed in the Treatise. This section briefly discusses the relevance of the assessment so far for the recent analyses of Akerlof and Shiller and Skidelsky.

Akerlof and Shiller’s main thesis is that the “spontaneous urge to action” of Keynes’s animal spirits must find room in economic and financial modelling. They support the approach of behavioural economics, and its application to financial issues, that rejects the idea of rational individual agents and efficient financial markets. They concentrate on how people “really” behave in the market. Limiting their inspiration from Keynes to a chapter of the General Theory, though, they could not find any constructive element in Keynes’s thought.

Most of all, Keynes was right in pointing out that most decisions depend on confidence and that when confidence is low a straightforward rational calculation of alternative expected outcomes is not available. But it is through behavioural economics that his message takes significance for positive analysis.

As shown in the paper, Keynes’s analysis of individual behaviour in the General Theory finds a consistent philosophical background in the analysis of probability in the Treatise, a background which is instrumental to illuminate the issue of how do people “really” behave under uncertainty, as Keynes himself recalled when he referred to it in two crucial passages of the General Theory. Keynesian decision-makers formulate subjective assessments of the external world that take the form of “non-numerical” probabilities, that is, probabilities that are not standard additive probability functions. Keynes put emphasis on the need to
conceive these non-numerical probabilities in a consistent qualitative, if not quantitative, ordering, and suggested using interval of probabilities when possible. With the benefit of insight, but still in accordance with Keynes’s suggestions, non-numerical probabilities can be interpreted as probabilistic weights, that is, as “subjective” distortions of an “objective” probability function that either cannot be known or is not known due to the ambiguity of the environment perceived by the individual agents. In certain contexts this ambiguity can be solved by the passing of time, or the replication of an experiment, like in the urn example. In other cases “we simply do not know.”

This framework entails the rejection of the ethical criterion for choice suggested by Moore, and endorsed by economic theory through the application of “Benthamite calculus.” However the rejection of mathematical expectation preludes to the analysis of alternative criteria. Keynesian decision-makers evaluate prospective investments using the maximisation of expected values only when the weight of argument is at its maximum. A lower weight is associated with situations in which the state of confidence worries the decision-maker up to the point of using a subjective distortion of probabilities. This must be taken into account when the theory of probability is applied to conduct, and though it is difficult, may be even “not likely that the solution will lie … in the discovery of some more complicated function of the probability” (Keynes 1921, p. 349), Keynes offers a specific solution. More importantly, Keynes suggests a philosophy of decision-making that, after Ellsberg, has emerged extensively in modern decision theory. Decision criteria devised to account for unknown probabilities (such as Wald’s maximin) or for probabilities with a low degree of reliability (such as Ellsberg’s and Huwicz’s α-maximin) or for multiple probabilities (such as Gilboa and Schmeidler’s maximin expected utility) all are different but related ways to account for the behaviour of agents in Keynesian settings. Most of them can be viewed as instances of a generalised procedure consisting in maximising an expected value where probabilities are non-additive like in Choquet expected utility models (Gilboa 2009). This class of “non-Benthamite” criteria has been used to rationalise the experimental evidence related to the work of Kahneman and Tversky. Akerlof and Shiller’s interpretation of the crisis have, as a result, a sounder Keynesian motivation than they themselves conceded.

Skidelsky, on the other hand, correctly refers to the *Treatise* as the Keynesian work that offers the more cogent motivation for the insistence on uncertainty, but relies on an assessment of it, the one made by post Keynesian interpreters, that rejects on ontological
grounds the possibility of discussing uncertainty in a formal context. In the end, the conventional behaviour to which individuals are supposed to adhere when confidence is low does not find a representation in Skidelsky’s understanding of Keynes. The discussion of the Treatise provided in the previous section shows that an alternative assessment of Keynes’s statement that “we simply do not know” can be provided: what individuals do not know can be interpreted as the limiting situation of an array of differently characterised situations entailing different degrees of confidence, all of which can be discussed without denying the fruitfulness of the Keynesian viewpoint.

One last example can be offered in order to elucidate the assessment of Keynes just proposed in this paper, one that finds a justification also in the interpretative effort made by Skidelsky. The analysis of decision under uncertainty at the individual level can be fruitfully applied to policy decisions. Indeed, the policy-maker’s decision to intervene in order to regulate the market when a certain information is available can be examined in much the same way. For instance, suppose that a governmental authority, concerned with the potential losses of a systemic crisis, calculates the expected utility of the decision to intervene and check exuberant financial markets, possibly because actual values do not seem to relate to fundamentals. It may well happened that, estimating a “very low,” maybe even very difficult to estimate, probability for the realisation of the admittedly rare event of the systemic crisis, the expected loss associated with this potentially catastrophic unfavourable event would have been low, even in the face of potentially enormously high losses. The option of inaction may have been considered a preferred choice in view of the expected utility of leaving business continue as usual, since the expected value of the gains experienced by financial markets associated with it well outweighs the expected value of the potential losses calculated on the basis of this “very low” probability. But this may well turn out to be incomprehensible with respect to the precautionary option to avoid the potentially enormously high losses associated with a world crisis like the one we are experiencing. With the benefit of insight, almost every commentator argues now, an attitude favouring a prudential attitude by means of intervening to check the bubble before it eventually bursts would have been advisable. This is a point Skidelsky, as much as Akerlof and Shiller and all the other Keynesian inspired analyses, makes.

This is a point that Keynes (1921, p. 344) made explicitly in the Treatise when contends that “the doctrine that the ‘mathematical expectations’ of alternative courses of
action are the proper measures of our degrees of preference is open to doubt … because it ignores the element of ‘risk’ and assumes that an even chance of heaven or hell is precisely as much to be desired as the certain attainment of a state of mediocrity.” Keynes’s argument cannot be interpreted simply as an allusion to risk aversion, or to the variance of the expected outcomes, as it preludes to the analysis on the coefficient $c$. A more persuading interpretation is that a precautionary attitude is fundamental when the numbers at stake are so huge, for instance, to cause an historic crisis. Here Skidelsky’s intellectual assessment of Keynes is of help when pointing out that the main underlying idea behind Keynes’s political philosophy was “prudence.” The expected probable consequences of achieving one’s goal, Keynes argued in his early thoughts on Edmund Burke’s political philosophy, must be pondered and “we should be very chary of sacrificing large numbers of people for the sake of a contingent end, however advantageous that may appear” (quoted in Skidelsky 2009, p. 156). Even with reference to a series of considerations on the action of government made by Keynes during his political life, Skidelsky (2009, p. 158) summarises this attitude as follows: “Prudence in the face of unknown is the key to Keynes’s philosophy of statesmanship.” Following on the interpretation of the *Treatise* just provided, Keynes’s quest for prudence is reflected in his application of probability to conduct.

### 7. Concluding remarks

One of the most frequent questions usually put to the fore by commentators of the current financial crisis is the following: why were warnings ignored? This is the typical question debated when a bubble bursts and a crisis unfolds. In today’s case, as the crisis is generalised in terms of both sectors and countries, the question has been put with higher strength that usual.

Richard Posner, even before turning Keynesian (see fn. 1 above), discussed the issue in his joint blog with Gary Becker, arguing as follows: “The deeper problem is that it is difficult and indeed often impossible to do responsible cost-benefit analysis of measures to prevent a contingency from materializing if the probability of that happening is unknown. The cost of a disaster has to be discounted (multiplied) by the probability that it will occur in order to decide how much money should be devoted to reducing that probability. No one knew the
probability of a financial crisis such as we are experiencing. Even Roubini did not (as far as I know) attempt to quantify that probability.” So: why were warnings ignored? Why did policy authorities intervene too late? Apparently, an unknown probability makes economic theory useless.

The philosophical theme underlying the mainstream position represented by the above quote from Posner relates to the issue of “unknown probabilities,” a theme Keynes discussed at length. From the viewpoint of Keynesian commentators like Akerlof and Shiller and Skidelsky, the wrong theory was used and the wrong criteria for making decision were implemented. The option of inaction, the one followed by policy-makers before the crisis unfolded, can be rationalised as the outcome of the use of a particular decision criterion. A different criterion may have advised to intervene even in the face of unknown probabilities. Simply, as both Akerlof and Shiller and Skidelsky argue in their analyses, Keynes would have argued that the justification of the failure of expected utility analysis offered by Posner is not adequate because the probability of an event is usually unreliable, when the uncertain context makes our knowledge inadequate. This paper has pointed out that Keynes’s discussion of probability in the *Treatise* can help illuminate this issue with specific regard to which decision rule Keynes would have argued in favour of.

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