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A COMMENT ON DONALD GILLIES'S «DIFFICULTIES IN THE LOGICAL
INTERPRETATION OF PROBABILITY»

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Donald Gillies took the occasion of the 100 years anniversary of Keynes's *Treatise on Probability* (henceforth TP) to remind scholars at the STOREP Conference that the theory of expectations Keynes formulated in Chapter 12 of the *General Theory* (henceforth GT) suggests that a change in his understanding of probabilities may have occurred. Following on his joint work with Grazia Ietto-Gillies and the assessment of philosophical theories of probabilities provided in his well-renowned volume (Gillies 2000), Gillies argues that Keynes may have moved towards an intermediate position between his logical interpretation in the TP and the subjective theory of probability introduced by Frank Ramsey in his critical remarks on the TP.

I would like to comment on two aspects of Gillies's interpretation. I will deal first with a general aspect. Then I will introduce a more technical one.

An important historical issue in the literature on Keynes is whether he yielded to Ramsey's critique, namely, whether his was a complete acceptance of the idea that degrees of belief are purely subjective. Gillies and Ietto-Gillies (1991) noted that Keynes may have accepted Ramsey's criticism only partially, something other scholars objected to because they saw in Keynes's memoir about his early beliefs a total retreat from the epistemology of the TP (Bateman 1996). Gillies's point is that it is difficult to say to what extent Keynes changed his mind, since he never undertook the task of modifying his original theory of probability. Instead of distinguishing from an epistemology Keynes may have considered out-dated and the technical theory of probability ensuing from this epistemology – as other commentators have done to save the TP from oblivion (Runde 1994) – Gillies suggests to follow Chapter 12 insights and to examine the kind of probability theory they may accord with.

Gillies recommends to shift focus from individuals to social groups and to investigate how a group can adapt to an uncertain environment. Gillies and Ietto-Gillies (1991) showed how to generate the intersubjective belief of a group, that is, a consensus degree of belief, and how this probabilistic attitude works in Keynes's economics, that is, in the formation of expectations not

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based on a rational assessment, but depending on a process of social interaction inducing a consensus among a group.

While the issue of conventional judgement is central in Chapter 12, I doubt it is its only main message. In Keynes's analysis there is also an urge to discuss the role of the individual agents who are so knowledgeable of the «flimsy» nature of the conventional attitude established in the market that they consider rejecting the conventional judgement. These individuals, usually long-term «professional investors» and speculators who no longer expect profits from the activity «to beat the gun», still need a probability representation of their beliefs that is different from that envisaged by Gillies, since relative to individuals who, in a sense, do not trust the consensus probability. In addition, there is evidence in the correspondence with Hugh Townshend (in particular as re-examined in Zappia 2015) that Keynes did not abandon the technical approach of the TP. On the issue of whether there still is need for a representation of individual probabilities, it would be highly valuable to know Gillies's position.

The second point I would like to raise relates to the previous one, but is somewhat more technical. Gillies acknowledges that, if properly developed, a logical approach based on non-measurable probabilities – probabilities that are not precise numbers – can lead to a qualitative theory of uncertainty that, in his words, «instils a more realistic appreciation of the situation facing the decision maker». But his main contention is that this kind of qualitative probabilities are not probabilities in the sense of Kolmogorov, and so there remains to show what is the method of measurement of Keynes's logical probabilities. To this foundational issue Keynes did not offer an answer, as Ramsey himself noted when he argued that, if Keynes's probabilities are to be «perceived», he did not perceive them. Gillies notes that Keynes did not provide a method of measurement since he limited to numerical probabilities the application of the foundation of a probability theory on the «Principle of Indifference», but when this principle cannot be applied, and probabilities are not precise numbers, there is a theoretical void. As a matter of fact, the pragmatic approach followed by Ramsey, that subjective probabilities can be elicited through a betting procedure, offers solid foundations for the measurement probabilities, something Keynes was not able to provide regardless of his insistence on non-numerical probabilities.

It would be of great interest if Gillies could comment on the path followed by authors who, following in Keynes's footsteps, insisted on the importance of probabilities *à la* Keynes and developed the axiomatic bases for an approach to probability that admits imprecision (Walley 1991). As noted in my contribution to this symposium, Bernard Koopman and Irving Good's axiomatic system was based on Keynes's intuition and his hint at interval-valued probabilities in Chapter XV of the TP. These kind of intuitive probabilities were given a decision theoretic

justification *à la* Ramsey by Cedric Smith (1961), who showed how to derive interval-valued probabilities as betting quotients. Indeed, in their joint «Sul modo di scegliere le probabilità iniziali» de Finetti and Savage made some relevant concessions to Smith's emphasis on interval-valued probabilities, exactly because he derived probability intervals from choices and showed that these may be immune to a Dutch book (Zappia 2020). Moreover in the 1972 edition of his *Foundations*, as an additional comment to his original 1954 viewpoint, Savage suggested that Smith, Good and Dempster provided a «tempting representation of the unsure», that is, the replacement of «the person's single probability measure P by a set of such measures, especially a convex set». Since this is presented as a possible way-out of the problems Savage originally saw in the distinction between «sure» and «unsure» opinions, it can be seen as a notable concession to the viewpoint originated by Keynes's TP. Even on this way out of the measurement problem, it would be extremely valuable to know Gillies's opinion.

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