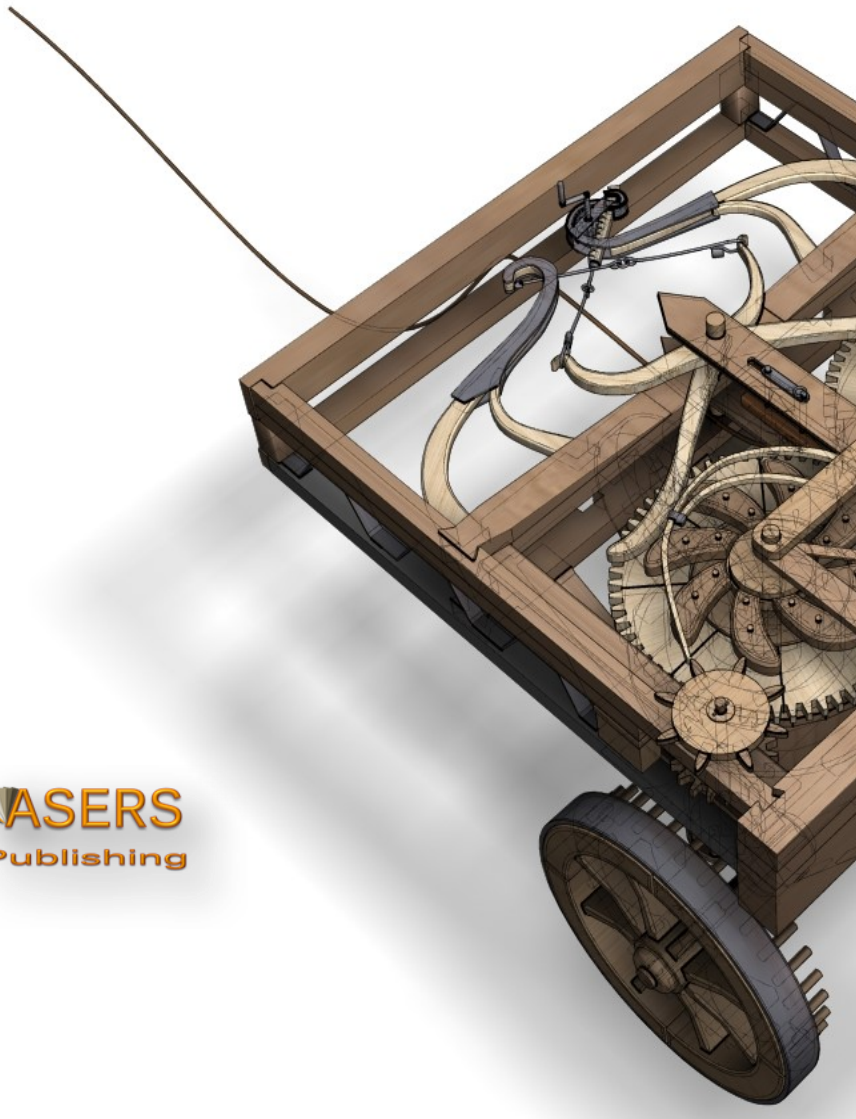
# Theoretical and Practical Research in Economic Fields



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# Opinion about the Liquidity Preference Theory. Discussions Concerning Weight and Risk in the Townshend-Keynes Letters of November-December 1938

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**Abstract:** Townshend wrote Keynes a letter on November 25th,1938 and asked Keynes the following question, after informing Keynes that he had read Keynes's *A Treatise on Probability* a number of years earlier and understood Keynes's concept of non-numerical probability:

"*This is the nearest I can get to an analysis of the part played by the factor of confidence in the rationale of interest. I believe that its further logical analysis at a deeper level of generalization is connected with the part played by the weight of evidence in your theory of probability, but I cannot see just how*…." (Townshend 1979, 292; italics added).

Townshend 's question can be rewritten in the following fashion:

"Where, in your *A Treatise on Probability,* is your analysis of the connection between the variable, confidence, in the *General Theory* and the weight of evidence in your *A Treatise on Probability*, applied to support your analysis in the *General Theory* of your liquidity preference theory of the rate of interest?"

Keynes's response was direct and straightforward:

"As regards my remarks in my *General Theory*, have you taken account of what I say on page 240, as well as what I say at page 148, which is the passage I think you previously quoted…".(Letter to Townshend, Dec. 7th ,1938).

The answer given here by Keynes is for Townshend to read p.240 of the *General Theory*; however, it relates directly to Keynes's chapter 26 of the *A Treatise on Probability*.

What Keynes provides the reader of the *General Theory* on p.240 is his statement that there is *no discussion of how to estimate/calculate the risk and liquidity premiums in the General Theory.* This paper demonstrated that Keynes's discussion of how to estimate the risk and liquidity premiums occurs in chapter XXVI of the TP.

This paper demonstrates the logical and mathematical links between Keynes's *General Theory* liquidity preference theory of the rate of interest, where liquidity preference is defined as a function of uncertainty, U, and Keynes's *A Treatise on Probability* analysis of the evidential weight of the argument, V, which equals w, which is expressed in degrees. Keynes is pointing out to Townshend that U is a function of V, which is equal to w expressed in degrees. Thus, U is a function of w. We can write this out in English-

The evidential weight of the argument, V, is equal to the degree of the completeness of the amount of information on which the probability is based. Thus, Uncertainty is a function of the evidential weight of the argument, while liquidity preference is a function of uncertainty. The analysis that is missing in all past discussions by economists and philosophers of this issue has been their failure to identify the role played by Keynes's mathematical variable, w.

**Keywords:** evidential weight of the argument; weight; uncertainty; degree of completeness of the evidence; confidence; liquidity preference; rate of interest.

**JEL Classification:** B10; B12; B14; B16; B18; B22.

## Introduction

The paper will be organized in the following way. Section One will cover the connections between chapter VI of the *A Treatise on Probability (TP,1921),* which involves Keynes's definition and application of his second logical relation, V, which is called the 'evidential weight of the argument", and chapter XXVI, which contains Keynes's measurement of V, as well as the mathematical development that is required to fulfill Keynes's promise, made on p.75 of chapter 6 of the *TP*, to integrate both probability and weight into a combined approach to dealing with expectations about the future.

Section Two will demonstrate that Keynes is referring Townshend to chapter XXVI of the TP, where Keynes completed his analysis of evidential weight that he began in chapter VI.

Section Three will look at some examples of Post Keynesian and heterodox economists trying to deal with chapter XXVI, who lack an understanding of the mathematical and theoretical nature of Keynes 's exposition that resulted in the creation of the first decision weight approach to expectations in history, Keynes's c coefficient.

Section Four discusses how Keynes's liquidity preference theory of the rate of interest, which is based on his non numerical probability, weight concept and c coefficient, underlies the logical foundations of Keynes's LM equation specification on page 199 of the *General Theory*.

The conclusion of the paper ends the paper by emphasizing that, if a reader does not correctly understand how Keynes measures V in chapter XXVI of the TP, then it will be nearly impossible for that reader to fully grasp Keynes's liquidity preference theory of the rate of interest in the General Theory. Keynes does make it clear in his letter of Dec.7th, 1938 to Townshend that he did discuss the estimation of both liquidity and risk premiums in his TP:

"I am rather inclined to associate risk premium with probability strictly speaking, and liquidity premium with what in my Treatise on Probability I called 'weight'" (Townshend 1979; Keynes, letter to Townshend, Dec. 7th, 1938, Vol. 29, CWJMK, p.293).

The only place this occurs in Keynes's published work is on p.315 of the TP. Keynes has set the stage for Townshend. Townshend knew, based on his having read the TP, that there were only two chapters in the TP that examine weight, by which Keynes means the evidential weight of the argument. Chapter 6 provides the logical foundation; chapter 26 provides the mathematical foundation. Keynes's emphasis on display here, on logic first and mathematics second, follows directly from G Boole.

Keynes thus supplemented his footnote 1 on page 148, which mentions chapter 6 of the A Treatise on Probability, while simultaneously emphasizing page 240 of the *General Theory*. Only one possibility was left for Hugh Townshend to consider -it is chapter 26 of the TP which contains Keynes's discussion about how to estimate/calculate both the risk (probability) and liquidity (weight) premiums. Keynes's discussion and analysis is contained on pp. 310-315 of chapter 26, where weight is analyzed in the context of Keynes's development of his conventional coefficient of weight and risk, c, which incorporated both weight and risk into a decision theoretic approach dealing with probability(risk) and confidence (weight), which together form a decision maker's expectations of the future.

An example of the failure to grasp Keynes's chapter XXVI analysis occurs in Weatherson (2002) which is confusing, as Weatherson (2002) never covered Keynes's interval valued approach to imprecise probability, covered in Part II of the TP or Keynes's measurement of V by w in chapter XXVI. Weatherson (2002) covers only chapter III and chapter VI of the TP. The conclusion of this paper, that Keynes's theoretical exposition could be greatly improved upon by reinterpreting it as a very early, unclear attempt on Keynes's part to deal with imprecise probability, fails because Weatherson (2002) never realized that Keynes had a fully developed, imprecise probability in Parts II and III of the TP, in 1921. Weatherson (2002) is thus a good example of the main conjecture in Hishiyama (1969), which was that the major problem in Keynes studies and scholarship was the failure to have read the TP.

## 1. Literature Review: Chapters VI and XXVI of the A Treatise on Probability as Analyzed by Academicians

Chapter 6 lays out the nature of Keynes's second logical relation, V, where V stands for V(a/h), where, as in Keynes's discussions in chapter 2 on pp. 4-6 and later chapters, h stands for the propositions (premises) that contain the relevant evidence and a stand for the conclusion(s) that are related to the h propositions. Apparently, no academician in the 20th or 21st centuries actually read pp.4-6 of chapter II of the TP, given the currently unanimous conclusion that Keynes capitulated to Ramsey, either wholly or in part, in 1931. (See Clarke 2023, Gerrard 2023a, and Misak 2020 for a few examples). Reading pp.4-6 of the TP is the antidote for Braithwaite (1973). It was in Keynes (1973) that a catastrophic miscalculation took place. An editorial foreword, placed at the front of the CWJMK edition of the TP in Keynes (1973), has misled thousands of readers since 1973. It is quite impossible to read pp.4-6 of the TP and simultaneously accept that Keynes made major errors in Part II of the TP.

There are two major errors that recur repeatedly in the 100-year literature on Keynes's Evidential Weight of the Argument. The four reviews of the TP, published in 1922 by Edgeworth, Russell, and Broad, all covered weight and none of them mention any errors. Unfortunately, these reviews have not been read carefully or in any great detail by philosophers and economists.

The first error is the claim that Keynes measured weight in chapter VI, which is an impossibility as no logical relation can be measured until it has been normalized on the unit interval and interpreted as a degree.

The second error is the claim that Keynes never followed through on his discussion on page 76 of the TP in chapter VI about the problem of incorporating weight technically, along with probability, into a representation of expectations as it relates to the application of probability to conduct.

Consider the summary made by Levi (2011) of his position in 2011:

"…although Keynes reiterated this thought ("… to take into account the weight as well as the probability of different expectations." (Keynes 1921, 76). Later on in his Treatise, he did not propose anything more than a sketch of a positive account of his own weight of argument or how it bore on decision making or inquiry." (Braithwaite 1973, 48).

This is simply false. Keynes provides a detailed analysis from page 310 to page 315 leading up to his mathematical analysis on p.315 of the *TP* that accomplished precisely and exactly what Keynes said he would do on page 76-integrate weight and probability into a formal, mathematical analysis of expectation formation.

In chapter VI, Keynes makes it very clear that he is not discussing the measurement of V other than to make comparisons involving different V relations:

"The weight, *to speak metaphorically*, measures the *sum (*Keynes's italics*)* of the favorable and unfavorable evidence, the probability measures the *difference* (Keynes's italics)." (Keynes 1921, 77).

Every single economist and philosopher, who has written on Keynes's evidential weight of the argument, has simply ignored Keynes's qualification about "to speak metaphorically." The erroneous belief among philosophers, that Keynes is specifying measurement of V in chapter VI, for example, is presented in Keynes, J. M. (1921), Levi (2011), Weatherson (2002), Peden (2018), Joyce (2005), Kasser (2016).

Among economists, the major error had been made by Keynes (1921). Vercelli attempted to correct Keynes (1921), but failed (See Vercelli 2011, 2013, 2016, 2018).

Where, then, does Keynes's definition of the measure of 'weight' (evidential weight of the argument) appear in his TP? The answer is specifically given by Keynes on p.315 of the TP. [The importance of w was explicitly discussed in Brady (2004a, 2004b, 2023)]:

"…where *w* measures the 'weight'…" (Keynes 1921, 315).

Therefore V=V(a/h) =w, where 0≤w≤1, so that the evidential weight of the argument must come in degrees. Therefore, the claim that Keynes's weight is monotonically increasing is an oxymoron, given that 0≤w≤1.It is mathematically and logically impossible for weight to be monotonically increasing for Keynes. The monotonicity conclusion follows by mistakenly treating V as a mathematical variable instead of as a logical symbol.

There can only be ONE, AND ONLY ONE, way to measure Keynes's weight and that is by using Keynes's own definition on p.315. Runde's severely erroneous reading, in which he claims that Keynes gave three different conflicting and contradictory, multiple definitions/meanings of weight, each with their own distinct measure, of Keynes's chapter VI, is very similar to Ramsey's imagined claims, based on his own definitions about how the a and h propositions were related in Keynes's logical theory of probability, which Ramsey claimed were similar to Moore's Platonic entities. Ramsey's definitions directly conflict with, and are contradicted by, Keynes's explicit and clearly defined analysis of the meaning of the a and h propositions on pp.4-6 of the TP, which follow directly from Boole's analysis and have nothing to do with Plato, who is never mentioned anywhere in Keynes's TP or General Theory.

Keynes defined w to be on the unit interval [0,1], 0≤w≤1, so that it must come in degrees. This makes it impossible for weight to be monotonically increasing if it is defined on the unit interval as a degree. Yet this is exactly what is asserted by all philosophers who have done work on Keynes's weight relation. What does w mean? Keynes had already stated that w measures

"…the degree of the completeness of the relevant information …" (Keynes 1921, 313).

w needs to be incorporated in the calculations of expectations. w is the degree of the completeness of the relevant information. It is a mathematical variable. V is a logical symbol. V has been conflated with w. This error has made it impossible to formally deal with Keynes's liquidity preference theory of interest.

## 2. Method

Examining (Townshend 1979) to specify where in Keynes's *A Treatise on Probability* Keynes provides an analysis of weight that supports his *General Theory* concept of confidence. The answers provided by Keynes appear in his letter of 7th of December,1938.

We are now in a position to show how Keynes answered Townshend's question to him, which was

"This is the nearest I can get to an analysis of the part played by the factor of confidence in the rationale of interest. *I believe that its further logical analysis at a deeper level of generalization is connected with the part played by the weight of evidence in your theory of probability, but I cannot see just how*…." (Townshend 1979, 292; italics added).

Given that Keynes clearly and unambiguously defined V=V(a/h)=w appears on page 315 of (Keynes 1921) where 0≤w≤1,it was easy and simple for Keynes to answer Townshend's question ,as well as to fill in the relationships between the evidential weight of the evidence, V, confidence, liquidity preference and uncertainty that exist in the GT .We will let C=confidence, LP =liquidity preference, and U=uncertainty.

In footnote 1 on p.148 of Keynes (1936), Keynes defines uncertainty as a function of weight, V. Therefore, one gets U=f(V). However, Keynes on p.315 of the TP defines V=V(a/h)=w. Therefore, so U=g(w). It directly follows from this that C=h(w) and LP =j(w). Finally, Keynes's discussions of uncertainty, confidence, and liquidity preference are all expressed by Keynes *as being in terms of degrees*. This follows directly from page 315 in chapter 26 of the TP, where w was defined in terms of degrees.

Keynes's analysis in (Townshend 1979) directly conflicts with the Joan Robinson, G L S Shackle, Robert Skidelsky and Paul Davidson claims about something called fundamental uncertainty, which is a binary(dual) representation of uncertainty-unknowledge and certainty-knowledge that does not appear in any of Keynes's writings. No degrees of uncertainty are allowed, as it is impossible for Keynes's w to be accounted for by Robinson, Shackle, Skidelsky or Davidson in their ideas about fundamental uncertainty, which is excluded from Keynes's three decision categories of risk, uncertainty and ignorance.

It also calls into question any claims made by Post Keynesian, Institutionalist, and heterodox economists about alleged connections that have been claimed to exist between Keynes's work and their work on liquidity preference and the liquidity preference theory of the rate of interest, since none of their work integrates Keynes's mathematical measure of V, given by w.

## 3. Research Results

The grave error of overlooking Keynes's decision weight version of his interval valued approach to probability in chapter XXVI of the TP-The cases of Runde (1990, 1994); Baddeley (1999), Basili and Zappia (2009).

The errors in Runde (1990) follow directly from Runde's decision to simply ignore Keynes's analysis on p.315 of the TP, as it directly contradicts the analysis in Runde (1990, 1994).

Consider the following:

"Nevertheless, an unambiguous statement on the role of weight appears in Chapter 26(XXVI) of the Treatise, on" The Application of Probability to Conduct." …I now turn to the role of uncertainty and weight in Chapter 12 of the General Theory." (Runde 1990, 285).

There is no ambiguity in Keynes's statements about weight. Nowhere in Runde (1990, 1994) is there the slightest understanding that Keynes stated that the weight, V, is measured by w or of its seminal importance in the history of decision theory, since Keynes's c coefficient is the first such attempt in history.

First, I will examine (Runde 1994):

"It is true that he does, in an offhand passage, propose a 'conventional coefficient' of weight and risk. But this is only to set up his conclusion that the DME is unlikely to be saved by attempts to find 'some more complicated function of the probability wherewith to compound the proposed good (VIII, p.148)." (Runde 1994, 115).

Unfortunately, Runde is totally and completely oblivious to the fact that Keynes, in this so called offhand passage , is unequivocal in defining that…' weight' is measured by w…" (Runde 1990, 315).This is the only place in the TP where Keynes measures weight .The claims in Runde 1990 about Keynes having given three conflicting and different definitions concerning the measurement of weight makes it impossible for a reader to understand Keynes's analysis. Runde completely conflates and confuses two completely different questions here, which are (a) the theoretical specification of a model to explain a particular phenomenon versus the second

question (b), which concerns the appropriate role for the actual application of such a theoretical model in the real world.

Given that Keynes's V, weight, is measured by w, then significant parts of Runde 1990 are erroneous and need to be either revised, rewritten, corrected or withdrawn from the journal, *Economics and Philosophy*. See Runde 1990.

Second, I will examine Baddeley's erroneous assessments of Keynes c coefficient. Consider the following claim made by Baddeley (1999). Baddeley (1999) makes the following claim:

"His (Keynes's) derivation of this coefficient (author's note -the conventional coefficient of weight and risk, c) seems anomalous given his emphasis on the limits to quantifying probability and weight." (Baddeley 1999, 203).

Of course, Baddeley (1999) is confused here. Keynes's emphasis was on the limits of exact and precise numerical quantification. Keynes, however, was an advocate of imprecise and inexact approximation regarding measurement. The c coefficient analysis follows directly from Keynes's analysis in chapter VI of the TP, which has been overlooked for 100 plus years:

"The conclusion, that the 'weight' and the 'probability' of an argument are independent properties, may possibly introduce a difficulty into the discussion of the application of probability to practice.∗ For in deciding on a course of action, it seems plausible to suppose that we ought to take account of the weight as well as the probability of different expectations. But it is difficult to think of any clear example of this, and I do not feel sure that the theory of 'evidential weight' has much practical significance." (Keynes 1921, 76).

The * footnote is explicit. It says:

Keynes is explicit that it is in chapter XXVI that he will discuss "…. A difficulty … of the application of probability to practice. ∗" (Keynes 1921, 76). Of course, Keynes eventually

"∗See also Chapter XXVI. § 7" (Keynes 1921, 76).

was able to construct a" … clear example of this." Keynes's example was called liquidity preference by Keynes in the case of decision making under uncertainty and absolute liquidity preference in the case of decision making under ignorance.

Lastly, I will examine Basili and Zappia (2009). Basili and Zappia (2009) can be regarded as an example of what happens over time in academia when a severe errors appears in a journal article, in this case (Runde 1990), and the errors are not corrected. The error then starts to spread like a virus exponentially throughout the academic community.

Consider the following extensive, but erroneous, discussions of Basili and Zappia (2009):

"Keynes's definition of weight was not accurate enough to be interpreted unambiguously. As reported in the above statement regarding the balance between amounts of "relevant knowledge" and "relevant ignorance," he hinted at a way to calculate the weight, but the point was not taken further. And when he used the weight in discussing decision criteria for choice, Keynes (1973, p. 345-Page 345 is actually from the 1973 edition of the TP) admitted that he considered the significance of the weight "highly perplexing;" additionally, he gave a slightly different definition of it by arguing that the weight of an argument is "the degree of completeness of the information upon which a probability is based."

There is a substantial literature about the Keynesian notion of weight of argument. Possibly because of Keynes's inability to adhere to a precise definition, the weight has been given different readings… Apart from Keynes's explicit claim that probability and weight are independent properties, the latter seems to refer to something different from the absolute amount of knowledge on which the probability assessment is based, as even the admittedly scant references to it in his major economic works suggest. Runde (1990) was probably the first commentator to call attention to the fact that there are different definitions of weight in the Treatise. Runde emphasized the importance of the definition of evidential weight as the degree of completeness of information on which a probability assessment is based, rather than the mere absolute amount of evidence implicit in the second order probability interpretation. In Keynes's approach, that is, new evidence can increase the relevant ignorance more than the relevant knowledge, thus decreasing the weight of argument." (Basili and Zappia 2009).

Contrary to Basili and Zappia (2009), Keynes gave an exact and precise definition of weight. That definition, that $V(a/h)=w, 0 \leq w \leq 1$, appears on p.315 of the TP. Their footnote 13 simply ignores Keynes's definition and reduplicates all of the erroneous conclusions about the measurement of V made in (Runde 1990), 20 years before the publication of Basili and Zappia (2009):

"[13] Runde (1990) has proposed the following notation for the different notions of weight (V) of a certain proposition (a) given the available evidence (h), in terms of knowledge (K) and ignorance (I): absolute amount of relevant knowledge: V(a/h) = K; balance of absolute amounts of relevant knowledge and ignorance: V(a/h) = K/I; and degree of completeness of information: V(a/h) = K/(K + I). As Keynes (1921, p. 348 [author's note -this pagination is from the 1973 CWJMK edition of the TP, not the 1921 edition, which is on p.315] stated that the weight can be measured by means of the closed interval between 0 and 1, assuming K + I = 1 only the third definition of weight seems accurate." (Basili and Zappia 2009, 424).

Incredibly, Basili and Zappia are referring to the fact that Keynes stated that

"…'weight' is measured by w"…by means of the closed interval between 0 and 1."

Strangely, Basili and Zappia 2009 do not notice that if Keynes measured weight by w, then this invalidates all of their discussions of Runde (1990) on weight.

Vercelli (2011, 2013, 2016, 2018) tried to correct for the failure of Runde (1990) to incorporate normalization in his discussions in Runde (1990). However, Vercelli's normalization, that $0 \leq V \leq 1$, can't apply to a logical relation (See Townshend 1979, Vercelli 2011, 2013, 2016, 2018). So, it is quite impossible for V(a/h) =K/(K+I). What is missing here is Keynes's mathematical variable, w:

$V=V(a/h) =w$, where $w = K/(K+I)$ and $0 \leq w \leq 1$,

provided the correct analysis. It is impossible to have $0 \leq V \leq 1$.

The wrong normalization made by Vercelli 2011 appears in Terra (2023), *The Economics of John Maynard Keynes*. (Terra 2023, 5-9). Terra follows Vercelli (2011) word for word.

It must be pointed out that Vercelli did spot the errors in Runde 1990. Vercelli did correctly attempt to correct for Runde's failure to incorporate the required normalization in his discussion of V in Runde 1990, 1994. Unfortunately, Vercelli's attempted correction does not work. Vercelli's contribution is the normalization of the logical relation, V, which results in the mathematical impossibility that $0 \leq V \leq 1$ (See Vercelli in Townshend 1979, Vercelli 2011, 2013, 2016, 2018). It is quite impossible for the logical relation V(a/h) in chapter VI of the TP to equal the mathematical equation K/(K+I) until the normalization on the unit interval occurs on p.315 by setting K +I=1.

The only way to proceed is to follow Keynes in (Keynes 1921, 315):

$V=V(a/h) =w, 0 \leq w \leq 1$, where $w=K/(K+I)$.

## 4. Discussion

The relation between Keynes's LM curve, his liquidity preference theory of the rate of interest, and the TP, as discussed by Townshend in 1938.

Given Keynes's discussions of p.240 of the GT with Townshend, the Liquidity Preference theory of the rate of interest, where the rate of interest, i, is a function of expectations (indeterminate, non-numerical, interval probability $[p_1, p_2]$, where $p_1$ is the lower bound and $p_2$ is the upper bound) and uncertainty, which is a function of V(a/h) =w.

Keynes's LM curve is a function of i and Y, where Y equals Nominal Income, defined by Keynes as PO, where O is real output and P is the actual price level.

We are now in a position to consider Townsend's question, which was

"This is the nearest I can get to an analysis of the part played by the factor of confidence in the rationale of interest. I believe that its further logical analysis at a deeper level of generalization is connected with the part played by the weight of evidence in your theory of probability, but I cannot see just how…." (Townshend 1979, 292).

So as to be able i to analyze Keynes's answer.

We quoted the question of Townshend 1979 to Keynes in 1938 at the very beginning of this paper. Townshend (1979) is asking Keynes to explain to him how he was able to connect the question of confidence in Keynes's GT to the discussion of weight of evidence and non-numerical probabilities, as contained in Keynes's *A Treatise on Probability*.

Keynes's definition of LM appears on page 199 of the GT. It was that LM=f (i, Y).We can now use Keynes's answer to Townshend to discuss the foundation for this function that can be found in the *A Treatise on Probability*. LM =f (i, Y), where i =g(expectations, confidence)=h([p1,p2],w) would link Keynes's chapters XV and XXVI of (Keynes 1921) to chapters 15 and 21 of (Keynes 1936, 199, 298-299),where Keynes discusses both the IS and the LM equations.

However, Keynes made it clear in his answer to Townshend in his letter of Dec.7th, 1938, that he discussed the estimation of both the liquidity and risk premiums in his A *Treatise on Probability.* Keynes's answer to Townshend is repeated below:

"*I am rather inclined to associate risk premium with probability strictly speaking, and liquidity premium with what in my Treatise on Probability I called 'weight'"* (Runde 1994, 293, italics added).

There is only ONE place where this was done by Keynes during his lifetime. It is in chapter XXVI of the TP, where Keynes put forth his conventional coefficient of weight and risk, c (Keynes 1921, 315; Keynes 1973, 348).

c is a function of p, probability, and w, weight,

so c= (p, w), which, as Keynes made clear in his definition of c, explicitly dealt with both risk and weight .

We can then rewrite LM =f (i, Y),where i=g(expectations, confidence)=h(p, w )=j(c ).It is much simpler and straightforward to make use of c then use the difficult to grasp interval valued approach of Keynes ,which Keynes referred to as non-numerical probabilities .No economist or philosopher in either the 20th or 21st centuries was ever able to realize that an interval valued probability was called by Keynes a non-numerical probability.

Keynes then combines his LM curve with his IS curve on pp.298-299 in Keynes 1936, where he presents his whole IS-LM model. Keynes described his model on pp.298-299 in Keynes 1936, using the following words and phrases:

- Keynes states that one can calculate a quantitative answer with the model's three elements
- Keynes states that the model is composed of three elements a), b), and c), which are the Liquidity Preference function, the m. e .c. schedule, and the consumption function-investment multiplier. All three elements together determine the rate of interest.
- Keynes states that it provides an analysis that is valuable in introducing order and method to the enquiry
- Keynes states that the analysis is based on a set of simultaneous, mathematical equations
- Keynes states that these equations provide a determinate answer or result
- Keynes states that this answer or result is an equilibrium position
- Keynes states on pp.300-303 that his model does *not explicitly* include five other, important factors, which must be taken into account by any user of his model
- Keynes mathematically integrates LM into the AD(D)-AS(Z) model of chapter 20 on pp.304-306 in section 6 of chapter 21 of Keynes 1936.

Keynes had thus clearly discussed his model's shortcomings on pp.300-303 before he mathematically integrated his LM equation into his D-Z model of chapter 20 on pp.304-306 of chapter 21 (Keynes 1936).

The Townshend-Keynes exchanges thus provide the evidence to support the conjecture of Hishiyama (1969) that there was a close connection existing between Keynes's TP analysis and his GT analysis.

## Conclusion

Keynes carefully discussed V as a logical relation in Chapter 6 of the TP. Keynes uses the words "The measurement of evidential weight presents similar difficulties" (Keynes 1921, 71). However, he merely discusses the strengths of the two logical arguments, given two different, logical V relations, for instance, $V(a/hh_1)>V(a/h)$. This is a very weak form of comparison of the logical strengths of each of the arguments (Keynes 1921, 73). It is on p.77 that Keynes makes it clear that he has NOT defined or measured what the V's are equal to .Once Keynes defines that $V =w, 0\leq w\leq 1$,then one can say that, given that $V_1 = w_1$ and that $V_2 =w_2$,that either $w_1>w_2$ or the reverse is the case. Suppose $V(a/h\ h_1)=w_1$ and $V(a/h)=w_2$.Then $w_1>w_2$ since it has a greater amount of absolute knowledge and less absolute ignorance, given the normalization of w on [0,1].

Keynes's position is clearly presented below:

"The fundamental distinction of this chapter may be briefly repeated. One argument has more weight than another if it is based upon a greater amount of relevant evidence, but it is not always, or even generally, possible to say of two sets of propositions that one set embodies more evidence than the other. It has a greater probability than another *if the balance in its favour, of what evidence there is, is greater than the balance in favour of the argument with which we compare it; but it is not always, or even generally, possible to say that the balance in the one case is greater than the balance in the other. The weight, to speak metaphorically, measures the sum of the favourable and unfavourable evidence, the probability measures the difference."* (Keynes 1921, 77); italics added).

At this point, it is simply impossible to incorporate both probability and weight into a decision rule, since only the logical relation of probability has been defined mathematically as

$P(a/h) = \alpha, 0 \leq \alpha \leq 1$, where $\alpha = p / (p + q)$.

Only after chapter XXVI of Keynes (1921) is reached do we have the logical relation of weight defined mathematically as

$V(a/h) = w, 0 \leq w \leq 1$, where $w = K/K+I)$.

Only then can both risk (probability) and weight (confidence) be integrated together in Keynes's c coefficient, where

$c=p[1/(1+q)]\ [2w/(1+w)]$.

This is then multiplied by A, an outcome or U(A), the utility of the outcome, to obtain

cA or cU(A).

cA is to be used by a decision maker instead of pA, where pA is the exact or strict mathematical expectation that does *not* integrate either risk or weight considerations into the decision-making calculus.

Until this basic, fundamental, logical and mathematical foundation is understood and recognized by economists, as well as by the philosophers who rely only on F P Ramsey's mathematical expectations approach, no progress will ever be made by them regarding the connections between Keynes's Liquidity Preference theory of the rate of interest, the TP and GT. See Brady (2023) for a reassessment of Keynes's V relation and the role played by it in Keynes's approach to decision making in Keynes (1936) as well as Arthmar and Brady 2018.

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The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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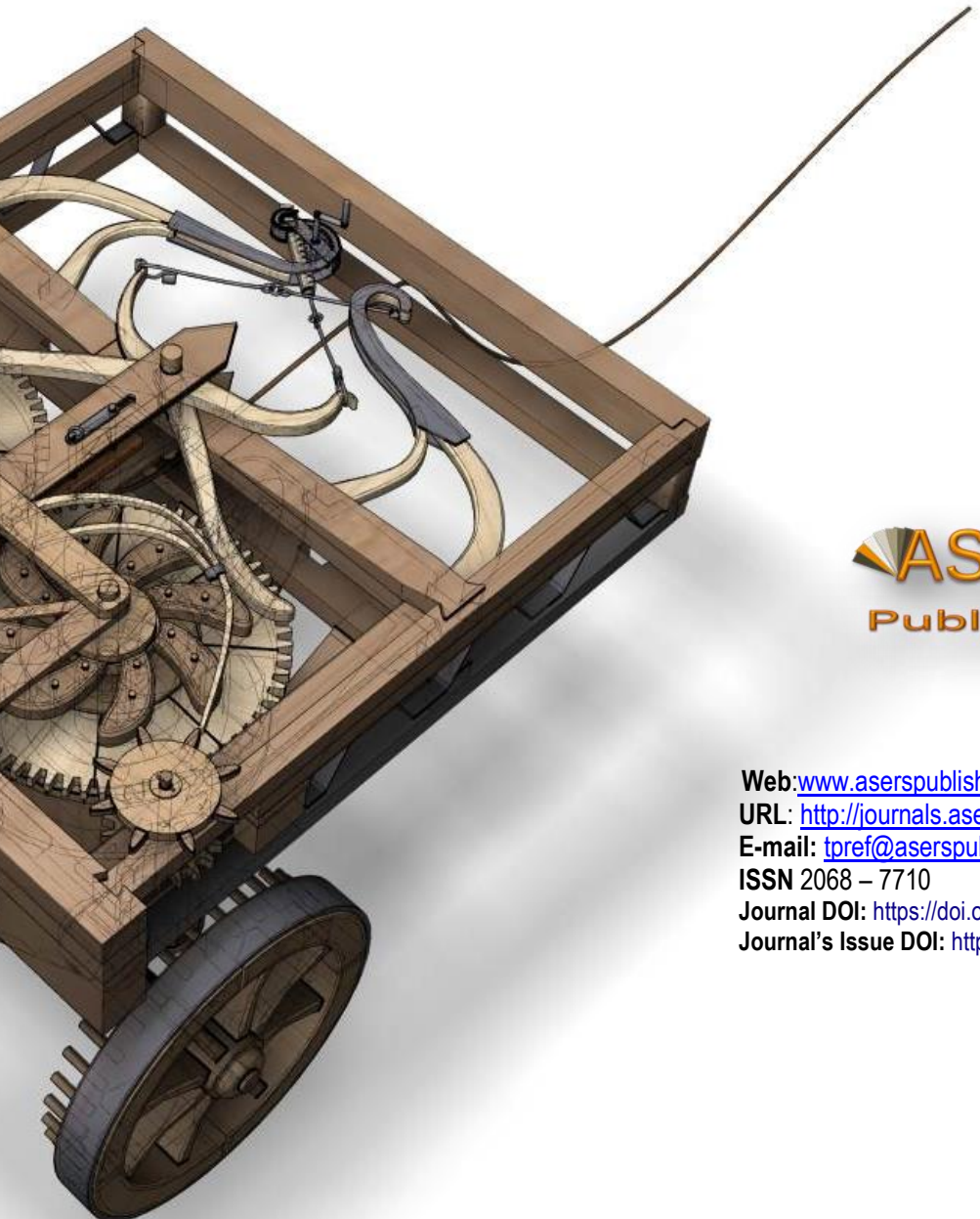

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