

QUANTIFICATION OF EVERYTHING METHOD IN ECONOMICS

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ABSTRACT

This article is dedicated to the Quantification of Everything method in the field of economics, but it could be used in any scientific discipline by converting theoretical frameworks into positive and quantitative forms. Hinged on the concept of the axiomatics method, the Quantification of Everything method enables researchers to systematically extract conclusions in research. This approach has been applied multiple times in studies that scrutinize the mathematical foundations of theories, aiming to align initial hypotheses with final results. Fuzzy logic, as outlined in the theory, plays an important role in the application of the Quantification of Everything method. The methodology consists of three steps. The first step involves formulating the hypothesis of the model. The second step applies fuzzy logic via a generator, which serves as the foundation of the process by using the principles of fuzzy logic to extract results. The third step is the final stage, where the scientist evaluates the outcomes to decide whether to modify the model, leverage a feedback loop, or terminate the process if the results align with the initial hypothesis. The Quantification of Everything method represents a blend of mathematics, methodological modeling, and behavioral approaches, with decisions guided by the scientist. A key advantage of this method is its versatility, allowing it to be applied in every field of science, transforming theoretical concepts into mathematical equations. This article highlights the application of the Quantification of Everything method with a paradigm of a simulation process and the use of a feedback mechanism. The results confirm that through the feedback process and the iterations performed using the generator, the equations of the model and their behavior were determined and represented graphically. This study quantified qualitative data and validated the model's behavior through iterative feedback. The feedback loop allowed for continuous checking and refinement of results against the initial hypothetical equations, ensuring their consistency with the underlying theoretical framework. The main contribution of this article is that it enables any scientific field to transition from a purely theoretical framework to one that incorporates mathematical analysis.

KEY WORDS

Q.E. method, behavioral economics, fuzzy logic, quantification method

CLASSIFICATION

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INTRODUCTION

Axiomatics is the method where the hypothesis of the theory should comply with the final result of the estimations. The Quantification of Everything (Q.E.) method that uses the axiomatics method, mathematical modeling, quantification, and decision-making approach. The axiomatics uses the assumption that initially, the result of one hypothesis is unknown. This is the key to the scrutiny of an economic theory that is under examination. The hypothesis of economic theory is the ground for the further study of each economic model [1-15]. Therefore, the axiomatics try to answer the background of economic analysis and to confirm that the initial hypothesis of the model is satisfied. If the hypothesis is confirmed then the model complies with the principles of the model. There are two cases for the results of the axiomatics. In the first case, the axiomatics is fine because the hypothesis of the model after studying the model is satisfied. Now, the second case, that is, the incident, the axiomatics is not appropriate because the initial hypothesis of the model is not satisfied; thus, we conclude for this case that the economic model is not sufficient. Then, the key reason for axiomatics depends on the correspondence of the starting hypothesis to the mathematical and economic results of the analysis. Since the scholar can explain the theory from its preferred model [16-22].

The Q.E. theory is based on the philosophy of multiple axiomatics. It is in the hypothesis and the conclusions that every economic theory will be clarified through the affirmation that the conclusions agree with the initial hypothesis. Multi axiomatics also have an advance in the modifications of re-models through feedback. The feedback role is sufficiently important because it allows readjustments to the initial hypothesis to draw conclusions along with that given way so that more correct models would have been derived. The most important mainstream in repetitions involves feedback [23-29]. Thus, the Q.E. method standing on these theories shows that such methodological backgrounds are a source of accurate and well-adjusted models and theories. The method is being used as a generator for producing random numbers. The generator gives form to the behavior of the mathematical hypothesis of the estimating model [30-42].

The significance of the Q.E. method lies in its capacity to address the limitations of traditional approaches by integrating mathematical modeling, fuzzy logic, and feedback mechanisms. Specifically, fuzzy logic plays a pivotal role in managing uncertainty and imprecision, enabling the method to adapt to the complexities of real-world phenomena. Through a three-step process, hypothesis formulation, generator application, and feedback refinement, the Q.E. method ensures the development of accurate and reliable models.

This article contributes to the existing literature by demonstrating the application of the Q.E. method to economics, offering insights into its theoretical underpinnings and practical implications. It builds upon previous studies that explore the mathematical foundations of economic theories, incorporating innovations in modeling techniques to achieve greater precision and adaptability. By leveraging an iterative feedback loop, this methodology not only confirms the validity of the models but also enables the refinement of theoretical approaches to align with empirical data.

The structure of the article is as follows: the next section reviews the theoretical background and existing literature on the Q.E. method, followed by a detailed explanation of the methodology. Subsequently, a case study illustrates the application of the method in the field of economics. The conclusion summarizes the key findings, discusses the limitations of the study, and outlines potential directions for future research.

LITERATURE REVIEW

According to the work “Theoretical analysis of fuzzy logic and Q.E. method to economics” [43]: Fuzzy logic represents the relationship between precision and uncertainty. While the

uncertainty in any issue is high, then less precise we can be in our conception. A binary logic admits only the opposites of true and false, a logic which does not admit digress of truth and there are no variations in magnitudes, but only two possible results. The more complex is a system, the more imprecise or inexact the information that we have to the system. Aristotle mentioned that “It is the mark of an instructed mind to rest satisfied with that degree of precision which the nature of the subject admits, and not to seek exactness where only an approximation of the truth as possible”. Aristotelian logic does not admit imprecision in truth. However, Aristotle’s quote is relevant to the approach that admits uncertainty. The theme is the balance between precision the uncertainty as a concept. The case of imprecision comes from physical processes upon imprecise human reasoning. Requiring precision in engineering models and economics means high costs and long lead times in production and development. So, considering the use of fuzzy logic then ponder the need for exploiting the tolerance for imprecision. According to the traditional view of science, uncertainty represents an undesirable situation and must be excluded at any cost.

Another close concept related to uncertainty may be vagueness, of which possible states are vague: In a 1937 essay entitled “Vagueness: An exercise in logical analysis” Max Black presented some remarks about Uncertainty in geometry while Plato introduced. Russell expressed in 1923 the following view “All traditional logic habitually assumes that precise symbols are being employed”. The proposals may not be found yet. In 1965 Lofti A Zadeh in his paper “Fuzzy Sets” introduced the concept of fuzzy logic. The main idea of fuzzy sets and fuzzy logic were not accepted in many cases because some of the underlying mathematics had not yet been explored. Based on the lack of mathematical development in the Western world the usage of fuzzy logic was not so wide. But in Japan, it was fully accepted, no matter the initial condition that was stated. In Japan, fuzzy logic was implemented in many technological products, and the reason was only that fuzzy logic fully worked, regardless if mathematic proofs existed or not. In the decade of 1980s Japanese products used fuzzy logic algorithms and facts, and in the U.S. this happened at the end of this decade. To show the difficulties that fuzzy logic faced, we have to refer to the fact that a colleague of Lofti A Zadeh, named William Kahan had lots of objections to this theory because he didn’t accept the imprecise thinking that fuzzy logic consists of. One similar approach comes from Aristotle and his predecessors who devised their theories of logic and mathematics and according to them suggested the Law of the Excluded Middle. The law of non-contradiction informs us that a statement cannot be at the same time true and false. The law of excluded middle can be stated with a formula which means the statement is either true or false. Based on the concept of the fuzzy logic of Lofti A Zadeh, we use the more recent improvements of this theory of fuzzy logic to the ambient of Artificial Neural Networks and Machine Learning. A new view of fuzzy logic can lead to solutions that the assumptions of neoclassical points of view and behavioral economics face.

Hence, in the second step of the Q.E. method, Fuzzy Logic is used by the random values of the Generator to define the graph of the model and in general the behavior of the mode [44-49]. Then, if the first step, where the definition of the equation is given, complies with the results and the graph of the equation for random numbers (of the second step), then to the final third step the scientist decides if modifications need to the initial equation (of the first step).

- Understanding the Foundations of Fuzzy Logic: Fuzzy logic, introduced by Lofti A. Zadeh in 1965, bridges the gap between precision and uncertainty, emphasizing the importance of approximations in understanding and modeling complex systems. Unlike binary logic, which strictly categorizes statements as true or false, fuzzy logic accommodates degrees of truth. This flexibility is particularly useful when dealing with real-world phenomena, where imprecision is often inherent due to human reasoning, physical processes, or limitations in data collection. Aristotle’s perspective on precision, reflected in his quote about the instructed mind, provides a philosophical underpinning to fuzzy logic. While Aristotelian

logic traditionally does not tolerate imprecision in truth, the principle of accepting approximate truths aligns with fuzzy logic's approach to uncertainty. This balance between precision and imprecision becomes essential in fields like engineering and economics, where striving for exactness often leads to increased costs and extended development timelines.

- **Historical Perspectives on Uncertainty and Vagueness:** The concept of uncertainty is not new to philosophy or science. Plato's dialogues, Max Black's 1937 essay on vagueness, and Bertrand Russell's critiques of traditional logic highlight humanity's long-standing engagement with imprecise reasoning. Russell's observation that traditional logic relies on precise symbols underscores the rigidity of classical approaches. Fuzzy logic challenges this rigidity, offering a framework that tolerates and even exploits vagueness to model complex realities effectively. Despite its potential, fuzzy logic faced significant skepticism, especially in the Western scientific community. William Kahan, a colleague of Zadeh, objected to the imprecise reasoning inherent in fuzzy logic, reflecting broader resistance to approaches that deviated from established norms. The reluctance to embrace fuzzy logic was partly due to the lack of developed mathematical foundations at the time.
- **The Role of Fuzzy Logic in Technological Advancements:** While fuzzy logic struggled for acceptance in the West, Japan recognized its practical value early on. Japanese engineers and technologists implemented fuzzy logic in consumer electronics, robotics, and industrial automation during the 1980s. These applications demonstrated the efficacy of fuzzy algorithms, even without comprehensive mathematical proofs. In contrast, the United States and other Western nations only began to adopt fuzzy logic in technological products towards the end of the 1980s. The success of fuzzy logic in Japan underscores the value of prioritizing functionality over theoretical perfection. By embracing tolerance for imprecision, Japanese industries created innovative solutions that significantly improved product performance and user experience. This shift also highlights the cultural differences in scientific and technological approaches, with Japan emphasizing practical outcomes over theoretical completeness.
- **Fuzzy Logic in Modern Science and Technology:** In recent years, fuzzy logic has found renewed relevance in artificial intelligence (AI), particularly in artificial neural networks and machine learning (ML). These technologies require methods to handle uncertain and imprecise data effectively. Fuzzy logic provides a robust framework for decision-making processes in these domains, offering solutions where traditional logic and deterministic algorithms fall short. For example, in behavioral economics, fuzzy logic can address challenges that arise from human irrationality and bounded rationality. Classical economic models often assume perfect information and rational decision-making, which are rarely realistic. Fuzzy logic allows for the incorporation of degrees of uncertainty and imprecision, enabling more accurate predictions of human behavior in economic systems.
- **Overcoming Traditional Barriers to Acceptance:** The skepticism surrounding fuzzy logic mirrors historical debates about the boundaries of logic and mathematics. Aristotle's Law of the Excluded Middle, which states that a proposition must be either true or false, represents a classical view that leaves no room for gradation. Fuzzy logic challenges this binary framework, advocating for a continuum of truth values that reflect the complexity of real-world phenomena. This paradigm shift requires a reevaluation of traditional scientific principles. The success of fuzzy logic in AI and machine learning demonstrates that embracing imprecision can lead to innovative solutions. By moving beyond the limitations of binary logic, fuzzy logic offers a versatile tool for addressing contemporary challenges in science, technology, and economics.
- **The Future of Fuzzy Logic:** The integration of fuzzy logic into AI, ML, and behavioral economics marks a new chapter in its development. As computational power increases and

mathematical models become more sophisticated, the potential applications of fuzzy logic continue to expand. Its ability to model uncertainty and complexity makes it an invaluable tool for solving problems in diverse fields, from autonomous systems to climate modeling. The journey of fuzzy logic from skepticism to widespread application reflects a broader trend in science and technology: the recognition that precision is not always the ultimate goal. By embracing uncertainty and exploring the tolerance for imprecision, researchers and practitioners can unlock new possibilities for innovation and understanding.

METHODOLOGY

The Q.E. method is a quantification method using quality data or theoretical backgrounds. Further, the Q.E method allows the transformation of a theory into a mathematical model. Fuzzy logic in the Q.E. methodological approach has a key role in the whole procedure. The mathematical background is the following:

- $G = \{1, \dots, n\}$, where $n \in \mathbb{N}$ and G is the set of iterations to the Generator,
- $M = f(x_i)$, where $x_i \in \mathbb{R}$ are the variables of the equation and M is the estimating equation, with $f(x)$ to be the function.
- $E_n = f(x_i) G$, where $E_n \in \mathbb{R}$ is the forming equation after many repetitions until it takes its final form, and accordingly $f(x_i)$ is the number of the formed functions that are needed until to receive the final mathematical form.
- $E_n' = f(x_i \pm 1) G$ is the new set of estimations with different set of variables, subtracting or adding a variable from the equation.
- Ch: $\{E_n, E_n', \dots\}$, Ch is the final equation after the comparison E_n' of E_n' , etc., concluding which equation fits better to the theoretical background and the hypothesis of the model.

The Q.E. methodology is structured into three distinct steps that guide the development, application, and refinement of its models [30, 32, 37, 39-42, 50-54]. These steps ensure the method's reliability and adaptability across various scientific and practical domains. Below is a clear and detailed explanation of each step:

- 1) Hypothesis Formulation: The first step involves defining the hypothesis, which serves as the foundation for the study. This step includes the following aspects:
 - Setting Objectives – establish the aims and scope of the study. What is the problem or phenomenon being analyzed?
 - Ensuring Reliability – a well-constructed hypothesis ensures that the resulting model will be reliable and meaningful.

The hypothesis acts as a guiding principle, directing how the model will be structured and what variables or parameters will be included.

- 2) Generator Creation: The second step introduces the generator, which is central to the Q.E. methodology. This step involves:
 - Generating Data: Random numbers are produced to serve as inputs for the model. These random numbers are designed to reflect the uncertainty and variability inherent in real-world phenomena.
 - Incorporating Fuzzy Logic: The generated numbers are processed using principles of fuzzy logic. This step helps account for the degrees of truth and imprecision, ensuring the model is robust and adaptable to complex systems.
 - Building the Model: Based on the processed data, the model takes shape. This is a critical stage where the core structure of the Q.E. methodology is formed.

The generator is essentially the engine of the Q.E. methodology, creating the conditions necessary for the model to function effectively.

3) Conclusion and Feedback (Scrutinize Stage): The third step focuses on deriving conclusions and refining the model through feedback:

- Drawing Conclusions: The model's results are analyzed to reach conclusions about the study.
- Feedback for Readjustment: If the results do not meet expectations or new insights emerge, the model undergoes an iterative feedback process. This involves:
- Readjusting the Model: Altering equations or modifying parameters based on feedback.
- Iteration: Repeating the process to improve accuracy and relevance.

This stage ensures that the model remains dynamic and adaptable, allowing scientists to refine their approach and incorporate new data or perspectives.

The procedure of three steps of the Q.E. method is shown in Figure 1.

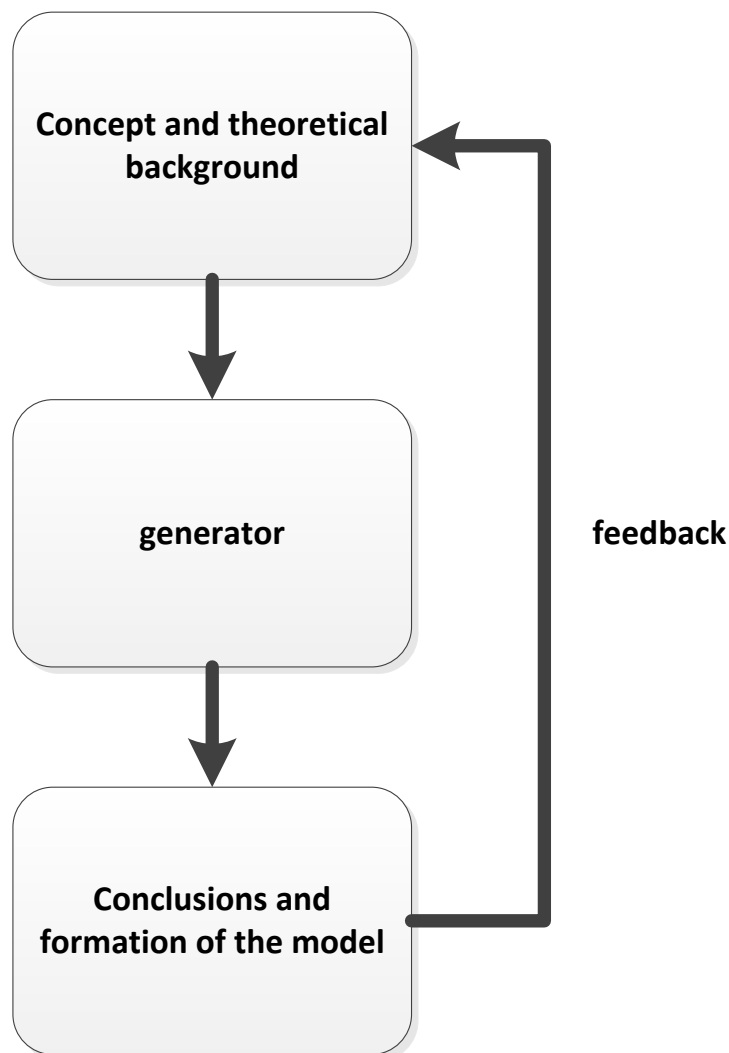


Figure 1. Q.E. method steps.

As derived from the previous analysis, all the steps hold significance for the final outcome. Following are the paradigms for the area of economics. The Q.E. (Quantification of Everything) method has a significant advantage: it allows for multiple iterations throughout the entire process. This iterative approach ensures that the initial hypothesis, the equation, and the resulting conclusions are aligned and refined over time.

Table 1. Q.E. procedure.

Q.E. procedure	Description	Key Features
1. Hypothesis Formulation	The first step involves defining the hypothesis and setting the objectives of the study. This serves as the foundation for the Q.E. method.	Establishes the aims and scope of the study.
		Ensures reliability and clarity in the hypothesis.
2. Generator Application	This step applies fuzzy logic via a generator, introducing random values to test the hypothesis and create the model.	Uses fuzzy logic to manage uncertainty.
		Generates data inputs reflecting real-world variability.
3. Feedback and Refinement	The final step evaluates the results. Feedback is used to refine the model iteratively until the hypothesis aligns with the outcomes or modifications are no longer required.	Ensures alignment of results with the hypothesis.
		Refines equations through iterative processes.

A detailed explanation:

- 1) **Initial Hypothesis and Equation Setup** – at the beginning of the Q.E. process, a hypothesis is proposed, and an initial equation is formulated based on this hypothesis. This equation is a mathematical representation of the relationships or dynamics being studied. However, it is common for the initial equation to be an approximation rather than a perfect fit for the complexity of the problem.
- 2) **Iteration Process** – during the Q.E. process, the model undergoes repeated iterations. Each iteration involves:
 - **Testing the Hypothesis** – the initial equation is tested against data or simulations to evaluate its accuracy and reliability.
 - **Feedback Analysis** – the results from the test are scrutinized to identify discrepancies between the expected outcomes (based on the hypothesis) and the actual results.
 - **Adjustment of the Equation** – based on the feedback, the equation is adjusted. This may involve refining variables, modifying relationships, or incorporating new parameters to better reflect the observed phenomena.
- 3) **Alignment with Final Results** – through repeated iterations, the hypothesis and the equation are fine-tuned until the final results comply with the original hypothesis or reveal new insights. This process ensures that:
 - The model becomes more accurate and representative of the phenomenon being studied.
 - Unanticipated complexities or relationships are discovered and incorporated into the model.
- 4) **Dynamic and Adaptive Approach** – the iterative nature of the Q.E. method provides a dynamic approach to problem-solving. Instead of relying on a static model, it adapts to new information and evolving conditions, making it particularly suited for complex, multidimensional problems.

PARADIGM – APPLICATION TO THE THEORY OF CYCLE OF MONEY

Based on the paper “Analysis of the Theory of the Cycle of Money” [55], the relationship between tax revenues and corporate savings is analyzed. Specifically, the paper posits that tax

revenues correspond to the savings that companies would retain if taxes were avoided. The administration of these savings varies depending on the specific case. Corporate profits, therefore, can be directed in two ways: they can either be saved or taxed.

The Theory of the Cycle of Money provides insights into how these savings and taxes influence the economy. It introduces a key distinction between two types of savings:

- 1) Non-returned savings (escaped savings): These are savings that do not re-enter the economic cycle, reducing the flow of money in the economy.
- 2) Returned savings (enforcement savings): These are savings that are reinvested or otherwise channeled back into the economic system, stimulating economic activity.

This distinction is crucial for analyzing the economic implications of taxation and corporate savings management. The mathematical foundation of this analysis is outlined in the following equations, which provide a structured framework to quantify and interpret these dynamics effectively:

$$\alpha = \alpha_s + \alpha_t, \tag{1}$$

$$x_m = m - \alpha, \tag{2}$$

$$m = \mu + \alpha_p, \tag{3}$$

$$\mu = \sum_{i=0}^n \mu_i, \tag{4}$$

$$\alpha_p = \sum_{j=0}^m \alpha_{p_j}, \tag{5}$$

$$c_m = \frac{dx_m}{dm}, \tag{6}$$

$$c_\alpha = \frac{dx_m}{d\alpha}, \tag{7}$$

$$c_y = c_m - c_\alpha. \tag{8}$$

The variable α_s represents escaped savings, which are savings that do not return to the economy or only re-enter after a long-term period. Additionally, α_s also accounts for escaped savings resulting from transfer pricing activities. The variable α_t indicates escaped savings arising not from transfer pricing but from other commercial activities, such as uncontrolled transactions.

The variable m represents the financial liquidity within an economy, while μ indicates the level of consumption. The variable α_p signifies enforcement savings, which are primarily derived from citizens and small to medium-sized enterprises. The variable x_m reflects the condition of financial liquidity in an economy, while c_m measures the rate at which financial liquidity increases or decreases. Similarly, c_α symbolizes the velocity of escaped savings.

Finally, the variable c_y represents the cycle of money, illustrating the economic dynamic and robustness of an economy. The cycle of money provides insight into the overall strength and resilience of an economic system.

For the scope of this work, the prior equations are utilized to generate the following table, which presents the coefficients of the values associated with the cycle of money, Table 2.

Table 2. Compiling coefficients.

Factor	Value
α_s	0,6
α_t	0,7
μ	0,9
α_p	0,8

The generator in this process utilizes the coefficients presented in the previous table. These factors typically range between 0 and 1, with 1 as the upper limit and 0 as the lower limit. However, certain variables, such as s and \tilde{s} , may exceed 1, depending on the specifics of the model's compilation.

Figure 2 shows diagrams generated after 461 iterations.

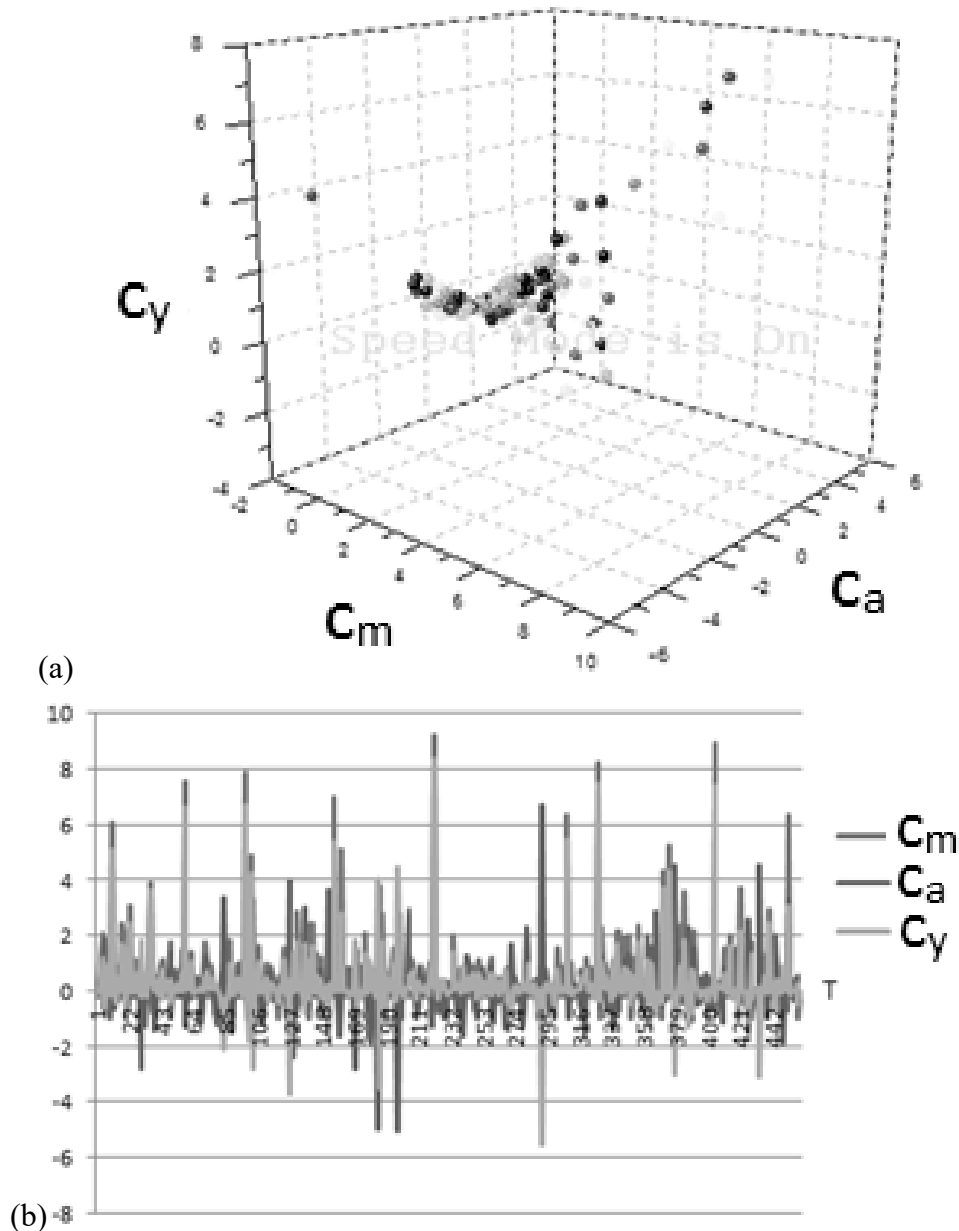


Figure 2. a) Three-dimensional representation of the cycle of money, b) cycle of money.

The results presented in Figure 2 are derived using the Q.E. method, which incorporates the mathematical equations and coefficients outlined in Table 2. To generate these graphs, multiple values were iteratively adjusted, culminating in 462 iterations with randomized inputs to achieve the desired output.

The Q.E. method follows its structured three-step procedure:

- 1) hypothesis formulation: defining the goals and scope of the analysis,
- 2) generator implementation: applying random values and adjustments to the equations,
- 3) feedback and refinement: iterating the process until the graphs accurately represent the desired outcomes.

In this case, many modifications were applied to equations (1)-(8) during the iterations, ensuring the model captured the relevant dynamics. Specifically, the generator in the second step introduced random values into the equations, which were used to iteratively refine and extract Figure 2. This iterative process is crucial in Q.E., Table 3, because it enables:

- Model Refinement – iteration ensures that the equations and parameters are repeatedly tested and adjusted until they align with the hypothesis and objectives.
- Handling Complexity – by iteratively applying feedback, the model can adapt to complexities and unexpected variations in the data.
- Improved Accuracy – each iteration reduces errors and increases the precision of the results, leading to more reliable outputs.

Table 3. Q.E. procedure.

Aspect	Details
Purpose	To analyze the relationship between tax revenues and corporate savings, demonstrating the dynamics of the cycle of money using the Q.E. method.
Key Equations	Equations (6)-(13) represent the mathematical foundation for the model, incorporating variables for escaped savings (α_s , α_t), generator coefficients, and cyclical adjustments.
Coefficients	$\alpha_s = 0.6$: Escaped savings related to the system.
	$\alpha_t = 0.7$, escaped savings linked to transfer pricing activities.
	$\mu = 0.9$, generator base value.
	$\alpha_p = 0.8$, additional parameter.
Iterations Conducted	462 iterations were performed to refine the equations and generate accurate graphical outputs.
Key Graphs	Figure 2 (a): Three-dimensional representation of the cycle of money.
	Figure 2 (b): Simplified schematic of the cycle of money.
Q.E. Method Steps	1. Hypothesis Formulation: Defined goals and scope of analysis.
	2. Generator Application: Introduced random values into the equations using fuzzy logic.
	3. Feedback Refinement: Iteratively modified the model.
Programming Used	MATLAB code implemented for random input generation and simulation; Origin used for post-processing results from 462 iterations and 2772 variable outputs.
Key Contributions	Validated the theory of the cycle of money by confirming the alignment of theoretical equations with graphical results.
	Demonstrated the utility of iterative feedback in refining and validating complex economic models.
Challenges	Computational intensity due to large number of iterations.
	Dependence on randomness for generating inputs.
Implications	The framework applies to other fields beyond economics.
	Highlights the effectiveness of iterative feedback for handling complex systems and refining theoretical models.

Further in the text is the code that was used in the second step to apply random values in generating Figure 2 [55]. Through this iterative feedback loop, the Q.E. method dynamically adjusts the model to produce meaningful and accurate representations, ensuring the results are both robust and reflective of the underlying relationships. This code is used for the compilation of the model. The results of MATLAB are modified with Origin (462 iterations for 2 772 results for the variables of the model).

```
as=0;
at=0;
xm=0;
m=0;
m1=0;
ap=0;
cm=0;
ca=0;
cy=0;
t=0;

while t<10
    t=t+1;

    if rand()<9
        as=0.6*rand();
    end

    if rand()<9
        at=0.7*rand();
    end

    if rand()<9
        m1=0.9*rand();
    end

    if rand()<9
        ap=0.8*rand();
    end

    a=as+at;
    m=m1+ap;
    xm=m-a;
    cm=xm/a;
    ca=xm/m;
    cy=cm-ca;

    %initially in the first compile; tab is not used

    tab=[a,xm,m,cm,ca,cy;tab];"
```

Therefore, using the Q.E. method, the prior graph was generated, confirming the validity of the theory presented in this work. This result was achieved through a rigorous iterative process, involving 462 iterations within the feedback loop.

Each iteration played a crucial role in refining the model, systematically adjusting and modifying the equations until they aligned accurately with the theoretical framework. The feedback mechanism ensured that discrepancies between the initial hypothesis and the outcomes were addressed, allowing for progressive improvements in the model's accuracy and reliability. This iterative approach underscores the Q.E. method's capacity to validate complex theories by continuously refining the underlying equations through structured feedback. Through a simulation process and the application of a feedback mechanism, this study

successfully quantified qualitative data and validated the model's behavior. The iterative feedback allowed for continuous checks and refinements of the results against the initial hypothetical equations, ensuring alignment with the underlying theoretical framework.

CONCLUSION

This study demonstrates the application of the Q.E. method in economics, showcasing its ability to transform qualitative data and theoretical frameworks into measurable, quantitative models. The methodology leverages fuzzy logic and iterative feedback mechanisms to refine hypotheses, validate equations, and align results with theoretical expectations. Through this structured process, the study highlights the Q.E. method's flexibility and capacity to address complex scientific challenges, offering a valuable tool for model development across diverse disciplines. The key contribution of this article lies in its demonstration of how theoretical concepts can be systematically converted into mathematical forms, bridging the gap between abstract ideas and practical, data-driven insights. Additionally, the iterative nature of the Q.E. method ensures continuous refinement, improving the accuracy and reliability of the models. However, the study acknowledges certain limitations. The reliance on iterative processes may increase computational demands and require substantial resources for large-scale applications. Moreover, the precision of the results depends on the quality and availability of input data, which may vary across disciplines. Future research could focus on enhancing the efficiency of the iterative feedback mechanism, exploring its applications in fields beyond economics, and integrating advanced technologies like machine learning to further optimize the Q.E. method. By addressing these areas, the methodology's potential for broader scientific and practical contributions can be fully realized.

The current methodology permits the quantification of quality data. The Q.E. method allows the transformation of any theoretical approach that doesn't have mathematical characteristics to a form that has this mathematical characteristic. The transformation of the quality data into quantity form shows that it is plausible to change quality into quantity data. Then, it is plausible to create quantity data from quality data, theorem, theory, and any scientific source. This methodology covers issues that come from the theory of fuzzy logic in combination with rational and behavioral approaches. This scrutiny used themes from axiomatics, and the theory of multiple axiomatics, for the application of the Q.E. quantification method. The current methodology enables the quantification of qualitative data, allowing theoretical approaches that lack mathematical characteristics to be transformed into forms with measurable, numerical representation. The Q.E. method demonstrates that qualitative data, concepts, theories, or scientific frameworks can be converted into quantitative formats, bridging the gap between abstract ideas and measurable analysis. This transformation leverages principles from fuzzy logic, rational analysis, and behavioral methodologies, creating a comprehensive framework for quantification. It also incorporates elements from axiomatics and the theory of multiple axiomatics, forming a strong theoretical foundation for its application across various fields.

The Q.E. method is versatile and extends beyond traditional domains, enabling the integration of mathematical, statistical, econometric, or other analytical techniques. Its flexibility ensures that it can address a wide range of problems and provide robust solutions in diverse disciplines. A key feature of the Q.E. method is its ability to systematically confirm hypotheses through programming and mathematical analysis. The structured feedback mechanism ensures that results are reliable and derived from a well-defined iterative process, offering a consistent approach to hypothesis testing and model validation. The methodology also employs a feedback loop that facilitates repetition and readjustment between the initial hypothesis and the conclusions. This iterative process refines models over time, making it possible to confirm existing scientific approaches or develop entirely new frameworks. Graphical representation is another critical aspect of the Q.E. method. It allows researchers to visualize mathematical

equations, regardless of their complexity, enabling effective analysis and management. This visual approach provides immediate feedback, showing whether the equations align with the hypothesis and whether adjustments are needed.

When initial results are unsatisfactory, researchers utilize a feedback procedure to modify the equations and revisit the analysis. This process of remodification ensures that the methodology evolves to accurately represent the studied phenomena, ultimately leading to robust and meaningful conclusions. The Q.E. method provides a systematic approach to linking qualitative and quantitative data, offering a unique framework for addressing complex scientific challenges. By enabling continuous refinement through iterative feedback, it ensures that models are reliable, adaptable, and capable of uncovering deep insights across various disciplines.

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