



## Sensitivity Plot of $c_y: \{(m^4 + 3 * m^2) * 10^{-4}\}$ - Cycle of Money

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### ABSTRACT

In this work, financial liquidity predominates over escape savings. The velocity of financial liquidity is twice as high as the velocity of escape savings. It uses mathematical definitions by the cycle of money and shows the sensitivity plot of  $c_y: \{(m^4 + 3 * m^2) * 10^{-4}\}$ . In this case, financial liquidity is identical to the cycle of money. The applied methodology is the S.M. (Sensitivity Method).



## INTRODUCTION

Economic growth is the process by which a country's real per capita income increases over a long period, provided that the level of social welfare rises. The theory of the Money Cycle answers this, as it seems to achieve the welfare of citizens because it deals with the issue of GDP per capita, through marginal GDP. If our interest in the development of a country comes from the desire to raise the standard of living of the population, then the primary purpose of development should be to increase real income per capita rather than simply to increase real national income. If the objective were to increase real national income, this might not imply an increase in living standards if population growth was higher than or equal to national income growth. The result would be declining or stable income per capita, which could not be considered economic growth. The money cycle achieves the strength of an economy through the reuse of money. The reuse of money is defined as the case where a quantity of money is reused in an economy. In other words, is there any chance that money will not be reused in an economy, one might ask. The answer seems to be yes, as there is a version and it is extremely common for a quantity of money to be lost from the economy due to controlled transactions.

Also, the long period, because what matters in terms of growth is a sustained increase in real income and not just an increase over a short period. The theory of the Money Cycle points out that the structural characteristics of an economy are inextricably linked to the functioning of an economy, which concerns both the long and short term. An upward trend in income over two or three decades is the most important indicator of economic growth. Here, the condition under which long-term growth in real output per capita constitutes economic growth should be highlighted. The term increase in social welfare means the parallel achievement of certain other goals, such as a fairer distribution of income, raising health and education levels, increasing employment, etc. The use of all economic units of an economy is something that is highlighted in the money cycle. Finally, it should be emphasized that the term economic development is broader than economic growth and includes, in addition to the increase of a country's material goods, significant changes in the structure and functioning of the economy and society.

Some bibliographic information on economics about the money cycle is used in this study (Challoumis, 2023j): The following article looks at the money cycle case both with and without the escaping savings. The savings for enforcement employ the same methodology (Arai et al., 2018; Biernaski & Silva, 2018; Brownell & Frieden, 2009; dos Santos Benso Maciel et al., 2020; Ewert et al., 2021; Fan et al., 2020; Kikitenko, 2020; Kreft & Sobel, 2005; Mackean et al., 2020; Rizzo & Throsby, 2006; Sánchez et al., 2020; Shamah-Levy et al., 2019; Turner, 2010). Both when there are returned savings and when there aren't could result in this. This economic comparison has led to the conclusion that, subject to public policy and taxation, consumption, investments, and savings all play significant roles in the market (Altman, 2012; Arabyan, 2016; Guardino & Mettler, 2020; Haigh, 2020; Kananen, 2012; Muñoz & Flores, 2020; Ng, 2018; Reeves et al., 2019; Snow, 1988; Williamson & Luke, 2020). As a result, the crucial component of an

acceptable public policy is the proper tax rate. It is followed by a figure that explains the current study's goal:

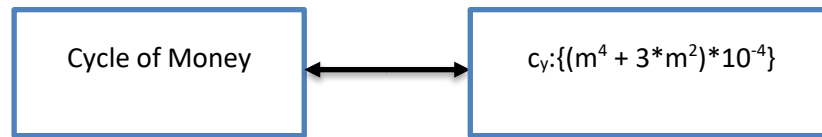


Figure 1: Cycle of money for  $c_y: \{(m^4 + 3 \cdot m^2) \cdot 10^{-4}\}$

When public policy is implemented that levies greater taxes on controlled transactions and lower taxes on uncontrolled transactions, the fixed length principle is upheld.

### THEORETICAL REVIEW

While the terms "economic development" and "growth" are sometimes used interchangeably, they are not the same. Increases in output and per capita income are indicators of economic growth. Whatever that implies, a country is experiencing economic growth when its production of products and services increases. Growing per capita income and economic growth both require a fundamental restructuring of the economy's structure. The money cycle, which is the evolution of GDP as its marginal case, describes the structure of the economy and demonstrates how an economy functions while also taking into account its overall structure. The increase in industry's share of the national product at the expense of agriculture's share and the rise in the proportion of the population living in cities are the two most important of these structural changes. Furthermore, nations that are starting to see economic growth frequently have phases of rapid and then sluggish population increase, which drastically alters the population composition of the nation. People in the nation must play a significant part in the process that results in these structural changes if economic growth is to occur. Taking part in the development process entails taking part in both the creation and the enjoyment of development's advantages. We won't have development if economic expansion solely serves an affluent, local or foreign minority. The ability to ensure the basic needs of man. The basic necessities that are absolutely necessary to sustain life are food, housing, health and education. Since the main aim of all economic activity is to secure the means to satisfy basic needs, we can say that economic growth is a necessary condition for general growth. Human dignity, all people, in whatever society they live in, seek a kind of dignity, although this dignity may vary from society to society. Human freedom, in this case, should be considered in the broadest fundamental sense of the term, i.e. freedom from the material conditions of life that alienate man and freedom from man's social subordination to other people, ignorance, social institutions, misery, etc (Βαλοσαράκης, 2018).

Agreements are reached by the participants regarding the control transactions that decide how profits and losses are distributed. The modifications to the contracts should be indicated in the agreements (Challoumis, 2018c, 2019c, 2023d, 2023u, 2023f, 2023b, 2023q, 2024g, 2024a, 2024l, 2024k, 2020d, 2020b, 2021f, 2021k, 2021a, 2022e, 2022c, 2022b; Challoumis & Savic, 2024): The tax authorities

should carry out regular inspections because of this. The periodic formulation of contracts is essential for comparative analysis. These periodic reviews of the companies engaged in controlled transactions are necessary for the arm's length concept to remain valid. The cost-sharing is then decided by a periodic evaluation of the tested parties' enterprises. Businesses engaged in controlled transactions must handle issues pertaining to how their operations are taxed. Therefore, the requirements that companies must fulfill in order to participate in controlled transactions with tax authorities ought to be governed by the arm's length concept. Therefore, the businesses involved in regulated activities should have a suitable agreement that enables them to maximize their costs in economic contexts with high tax rates and to maximize their revenues in tax environments with low tax rates.

They should also be advised that, subject to the necessary adjustments, tax authority inspections are concurrently applicable to the enterprises engaged in restricted transactions (Challoumis, 2018g, 2018b, 2023ag, 2023p, 2023ah, 2023ab, 2023g, 2024e, 2019e, 2019f, 2020c, 2020a, 2021d, 2022d, 2023ac, 2023e). The condition of the proportional adjustments is interpreted as follows: organizations that engage in controlled transactions frequently lack the necessary data and uncontrolled transactions with comparable circumstances to compare, therefore they proportionally alter their data (Arbel et al., 2019; Hasselman & Stoker, 2017; Hausman et al., 2016; Islam et al., 2020; Jensen, 2020; Menguy, 2020; Oueslati, 2015; Scholvin & Malamud, 2020; Spiel et al., 2018; Tummers, 2019). According to bibliography (Challoumis, 2024a): This means that the companies that are being evaluated will create a proportionate parallel to compare them with their data if they determine that the earnings and losses of companies from uncontrolled transactions are much higher or lower. For businesses, producing goods or services results in expenses and income.

$$u = s(zf + \tilde{z}d)$$

$$z = |\tilde{z} - 1|$$

The variable  $u$  relates to the comparability analysis's impact factor, which can be calculated using any method. A coefficient denoted by the symbol  $z$  has values ranging from 0 to 1. The method's influence on the  $s$  (using the optimal method rule) determines what value could be obtained. Costs associated with the manufacturing of commodities are represented by the symbol  $f$ , whereas costs associated with the distribution of goods are represented by the symbol  $d$  (Challoumis, 2019g, 2019a, 2023m, 2023w, 2023h, 2023c, 2023y, 2023ai, 2023i, 2024c, 2024m, 2021h, 2021e, 2021c, 2023v, 2023s, 2023n, 2023l, 2023z). The following equations can be determined based on Eqs. (1)-(2):

$$u_c = zf + \tilde{z}d$$

$$b = (p - u_c) * j_1$$

The previous equation's symbol  $b$  stands for the amount of taxes that, when the arm's length principle is applied, must be paid to the businesses engaged in controlled transactions. The  $u_c$  is the amount of taxes that can be avoided by dividing profits and losses. Furthermore,  $j_1$  is a coefficient that

represents the tax rate. Eq. (5) then shows the arm's length principle instance. In addition, with reference to the fixed length principle:

$$v = p^*j_2$$

The symbol  $v$  of the above equation indicates the taxes that are paid to enterprises involved in control transactions when using the fixed length principle (Blundell & Preston, 2019; Challoumis, 2018c; Dancygier & Laitin, 2014; Dollery & Worthington, 1996; Fronzaglia et al., 2019; Grabs et al., 2020; Jeon et al., 2020; Laplane & Mazzucato, 2020; Mancuso & Moreira, 2013; Saleem et al., 2017). Then,  $j_2$  is a coefficient for the tax rate in the case of the constant length principle:

$$v \geq b$$

For corporations that participate in controlled transfer pricing transactions, the tax under the fixed length principle is greater or at least equal to that under the arm's length principle. As a result, regulated transaction firms can handle issues related to profit and loss allocation thanks to the fixed length principle. As a result, the tax authorities may have to deal with the impact of transfer pricing on overall tax collection. The fixed length principle allows the worldwide tax revenue's tax losses from the transfer pricing's regulated transactions to be recovered (Challoumis, 2018a, 2019d, 2024b, 2024i, 2024j, 2024h, 2019b, 2021j, 2021g, 2023o, 2023r, 2023t, 2023j, 2024n). The purpose of the hypothesis is to show that a financial liquidity velocity twice as high as the velocity of savings escape provides a high value for the money cycle.

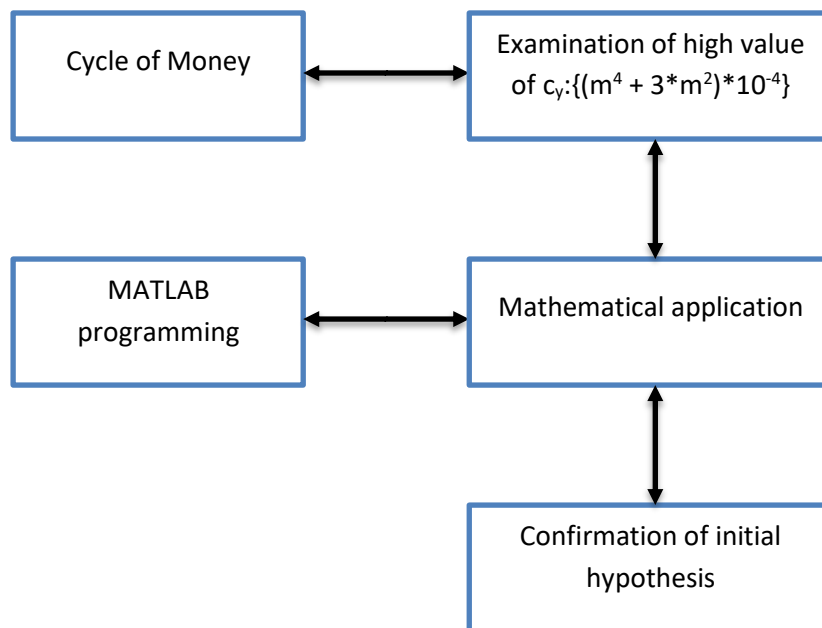


Figure 2: Diagrammatic Presentation

Diagrammatically, the process that validates the first hypothesis is determined in Figure 2.

## METHODOLOGY

This methodology is based on the S.M. (Sensitivity Method). The method uses qualitative data to convert them into quantitative ones. The process is followed through the application of algorithms to extract the appropriate results.

In the equations examined in each model, quantitative methods are applied to perceive the results diagrammatically. The S.M. (Sensitivity Method) allows conclusions to be drawn by deleting a variable that was initially taken into account. Thus, it becomes possible to determine what change was made in the results. As far as the money cycle is concerned, the S.M. is applied to determine the effect of liquidity on the economy when there are no foregone savings. The amount collected in taxes is equivalent to the savings that the businesses could have if they had not paid the taxes. Previous mathematical research defines the definitions (Challoumis, 2018h, 2018d, 2018c, 2018e, 2019g, 2019f, 2019e, 2020d, 2020a): The administration of these savings varies depending on the circumstances. The companies' benefits may thus be managed quite differently, with savings or taxes being possible (Challoumis, 2018f, 2018i, 2023k, 2023a, 2024d, 2024f, 2021i, 2021b, 2022a, 2023af, 2023aa, 2023ae, 2023x, 2023ad). The theory of the money cycle demonstrates that the economy is strong when savings are high and when it is strong when taxes are high (Bartels, 2005; Béland, 2017; Bowling et al., 2019; Carfora et al., 2021; John, 2018; Kalambokidis, 2014; Ladvoat & Lucas, 2019; Leckel et al., 2020; Maestre-Andrés et al., 2019; Mohindra, 2007; Smętkowski et al., 2020; Ustinovich & Kulikov, 2020). In making such a determination, it is necessary to distinguish between the non-returned cash (also called escaped savings) and the returned money (also called enforcement savings). The equations that are illustrated for the sake of this analysis are listed below:

$$\alpha = \alpha_s + \alpha_t \text{ or } \frac{1}{v} + \alpha_t$$

$$x_m = m - a$$

$$m = \mu + \alpha_p$$

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

$$\alpha_p = \sum_{j=0}^m \alpha_{pj}$$

$$c_m = \frac{dx_m}{dm}$$

$$c_\alpha = \frac{dx_m}{d\alpha}$$

$$c_y = c_m - c_\alpha$$

The case of the escaped savings is represented by the  $\alpha$  variable. This indicates that certain savings are either not entering the economy at all or are entering it only gradually. The  $\alpha_s$  variable represents the scenario in which transfer pricing operations result in savings that are lost. The  $\alpha_t$  variable represents the scenario where savings can be obtained from any commercial activity, rather than transfer pricing activities. For example, the commercial activities resulting from uncontrolled transactions could be denoted by  $\alpha_t$ . An economy's level of financial liquidity is represented by the variable  $m$ . The  $\mu$  variable represents consumption within an economy. The enforcement savings, which originate from citizens and small and medium-sized businesses, are represented by the variable  $\alpha_p$ . The state of an economy's financial liquidity is

represented by the  $x_m$  variable. The  $c_m$  variable represents an increase or decrease in the velocity of financial liquidity. The velocity of escape savings is represented by the variable  $c_a$ . As a result, the term of the money cycle is represented by the variable  $c_y$ . As a result, the money cycle reveals an economy's degree of dynamic and resilience.

## RESULTS

The current section examines the following equations. The purpose is to show that the two times higher magnitude of the velocity of financial liquidity compared to escape savings gives a high cycle of money. Case study analysis of  $c_y$ :

$$c_m = (m^4 + 4 * m^2) * 10^{-4}$$

$$c_a = 10^{-4} * m^2$$

$$\log c_m = \log[(m^4 + 4m^2) * 10^{-4}]$$

$$\log c_a = \log(m^2 * 10^{-4})$$

Based on Eq. (14) - (18):

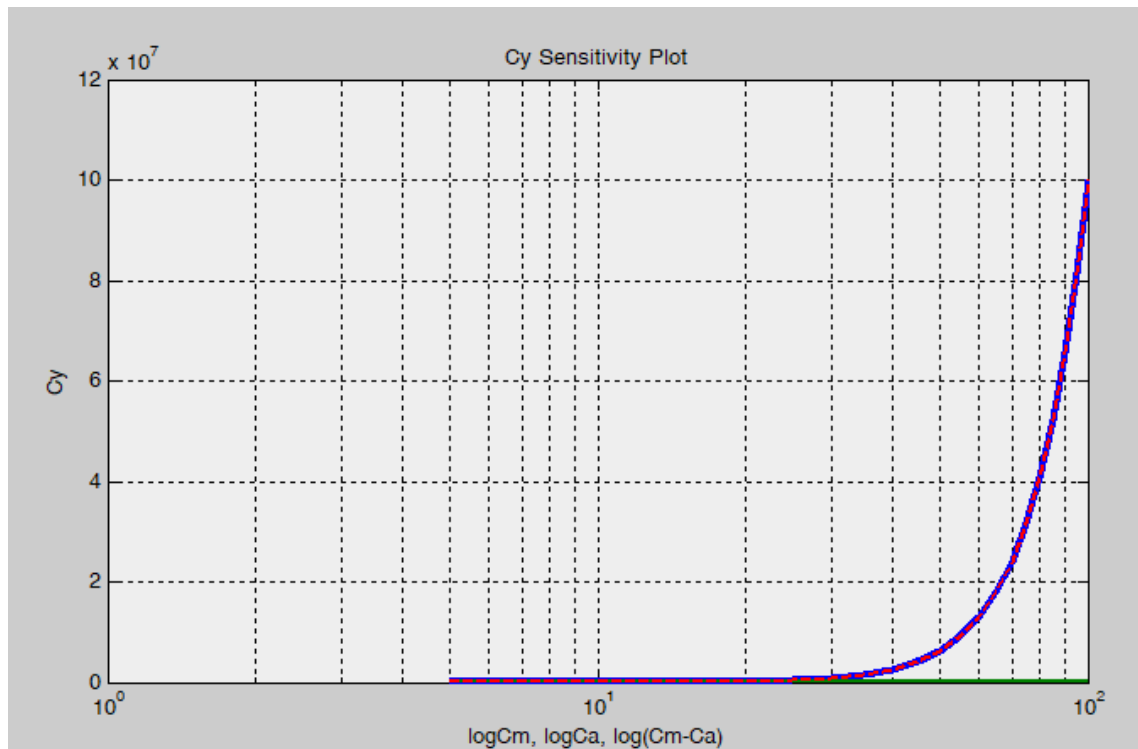


Figure 3:  $c_y = f(\log c_m, \log c_a)$

The money cycle is represented by the red line, and the velocity of financial liquidity is represented by the blue line. It is clear that financial liquidity and the money cycle are exactly the same due to the enormous strength of financial liquidity's velocity.

## DISCUSSION

It is clear from the previous graph that the money cycle increases exponentially when the velocity of financial liquidity exceeds the escape savings. The importance of an order of magnitude of financial liquidity secures that the cycle of money is at its higher level, according to  $c_y = (m^4 + 4 * m^2 - m^2) * 10^{-4} = (m^4 + 3 * m^2) * 10^{-4}$ . From prior research, the result is the same as in the case that there  $c_a = 10^{-4} * m$ . The outcome is the same regardless of whether the financial liquidity velocity is two or three times larger. Because the velocity of financial liquidity has a far larger power than the velocity of escape savings, the money cycle and financial liquidity are similar.

Economic growth involves increasing a country's real per capita income over time, providing social welfare increases. The Money Cycle theory addresses this by focusing on GDP per capita through marginal GDP. The primary purpose of development should be to increase real income per capita, rather than just national income. The money cycle strengthens an economy through the reuse of money, which is common in controlled transactions. However, there is a possibility that money may not be reused in an economy.

## CONCLUSIONS AND RECOMMENDATIONS

Economic growth refers to the increase in per capita income and output, while economic development involves fundamental changes in the economy's structure. The money cycle describes the money cycle, which reflects the economy's structure and factors. Key structural changes include increasing industry, reducing agriculture, and increasing city population. Economic growth often involves periods of accelerated and decelerating population growth. Participation in development involves enjoying the benefits and producing them, while a small, wealthy minority benefits from economic growth.

The Money Cycle theory emphasizes the long-term relationship between an economy's structural characteristics and its functioning. A sustained increase in real income over two or three decades is crucial for economic growth. This growth is accompanied by social welfare goals such as fair income distribution, improved health and education, and increased employment. Economic development encompasses not just material goods but also significant changes in the economy and society. The presence of high financial liquidity indicates that the economy's structure is appropriate, with larger companies not outpacing their smaller counterparts in terms of economic activity and directing their operations into the factoring or high-know-how sectors.

## FURTHER STUDY

Since numerous alternative equations could be explored using the same notion in an effort to disclose various instances, the current work and methodology offer a wide range of applications.

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