Chain of the Cycle of Money with and without Maximum and Minimum Mixed Savings

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Abstract: This paper is about the chain of cycle of money using mixed savings. This means that there are examined the crucial points of tax policy and public policy which are the best for the increase of consumption and investments, subject to the case that there exists maximum and/or minimum mixed savings and the case that there is an absence of the maximum and/or the minimum mixed savings. Thence, there is the classic case of the cycle of money including mixed savings. Therefore, there is an analysis based on the utility of the public sector and the utility of uncontrolled enterprises. Thence, it is plausible to extract conclusions about the cycle of money, showing the points and the behaviors of any economy when there are and when there are not maximum and/or minimum mixed savings. For this scrutiny, the Q.E. method has been applied to the cycle of money.

Keywords: chain of the cycle of money, maximum mixed savings, minimum mixed savings.

Introduction

This paper analyzes the utility of the cycle of money with and without the maximum and/or the minimum mixed savings. There have that the impact factor of the balanced tax income is decreased in the case that there have omitted the factories, the research centers, the development centers, and any other non-substitute transactions by the middle/small enterprises and the citizens (Challoumis, 2021i, 2021a, 2022b, 2023a, 2023c, 2023b, 2021d, 2021c, 2021b, 2021f, 2021g, 2021e, 2021h, 2022a). In contradiction, there are the opposite results when these factors are included in the analysis of the cycle of money (Abate et al., 2020; Baker et al., 2020; Challoumis, 2019a; Gilens & Page, 2014; Lucchese & Pianta, 2020; Olcina et al., 2020; TUTER, 2020; Tvaronavičienė et al., 2018; Urwannachotima et al., 2020; Van de Vijver et al., 2020). The chain of the cycle of money shows the interaction between the controlled and the uncontrolled transactions with the tax and public policy of the authorities. The growth or the decline of the economy depends on the cycle of money, which indicates the situation of consumption and investments in any economy. These are illustrated in the next scheme:
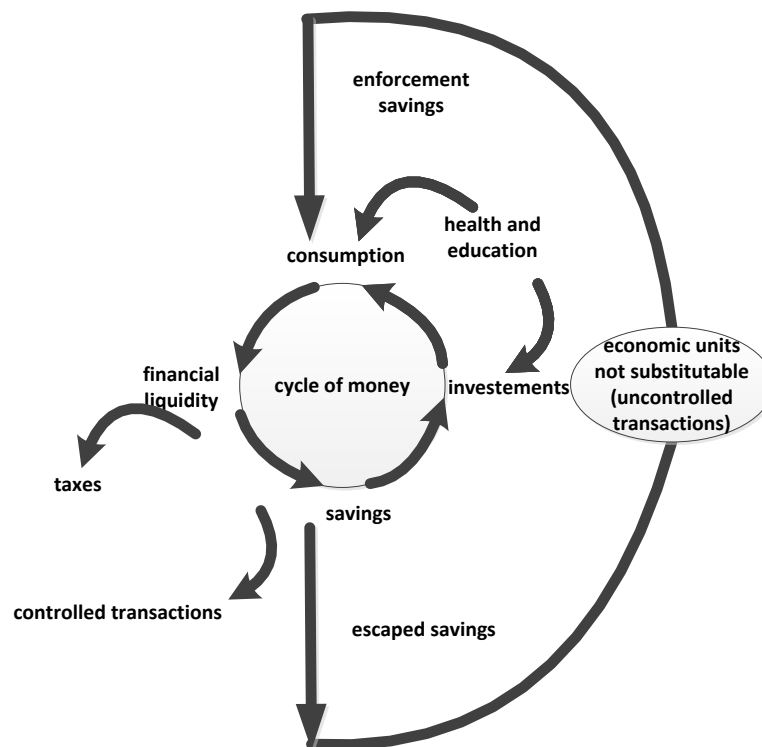
Figure 1: Chain of cycle of money with the mixed savings

The contracts and the agreements between the participants of control transactions are those that determine the allocation of profits and losses. The agreements should mention changes that happen in the contracts. This is the reason why the tax authorities should make periodic inspections (Carattini et al., 2018; Carfora et al., 2021; Cascajo et al., 2018; Castaño et al., 2016; Castro & Scartascini, 2019). The periodic specification of contracts is important for the comparability analysis. These periodic inspections of the companies that participate in controlled transactions are crucial for the arm's length principle (Challoumis, 2019b, 2019c). Then, the determination of the cost-sharing depends on the periodic check of companies that are tested parties. The scope of the companies of controlled transactions is to face the issues that are connected with the taxation of their activities (Challoumis, 2023d, 2023e). Therefore, the requirements for the companies of controlled transactions with the tax authorities should be in the range of the arm's length principle. Thereupon, the appropriate agreement of the companies of controlled transactions is that which permits them the maximization of their profits in tax environments with low tax rates, and the maximization of costs in economic environments with high tax rates.

Moreover, should be notified that the companies of controlled transactions and the same time the inspections of tax authorities are done under the condition of proportional adjustments (Fernandez & Raine, 2019; Siegmeier et al., 2018; Urwannachotima et al., 2020; Van de Vijver et al., 2020; Παπακωνσταντίνου et al., 2013). The interpretation of the condition of the proportional adjustments is that the companies that participate in controlled transactions many times don't have the appropriate data and uncontrolled transactions of similar circumstances to compare and therefore they proportionally adjust their data (Challoumis, 2021a, 2021h, 2023b, 2023c, 2023a, 2021g, 2021f, 2021b, 2021c, 2021e, 2021d, 2022b, 2022a). This means that if the companies that are tested parties conclude that the profits and losses of companies from uncontrolled transactions are much higher or much fewer then they make a proportional analogy to compare them with their data.

The production of goods or services creates profits and costs for the companies:

$$u = s(zf + \tilde{z}d) \tag{1}$$

$$z = |\tilde{z} - 1| \tag{2}$$

The symbol u is about the impact factor of the comparability analysis which has any method to the s. The symbol z is a coefficient that takes values between 0 and 1. What value could be received is determined by the influence of the method (using the best method rule) on the s. The symbol of f is about the cost which comes up from the production of goods, and the symbol of d is about the cost which comes from the distribution of the goods. According to prior equations, it is plausible to determine the following equations:

$$u_c = zf + \tilde{z}d \tag{3}$$

$$b = (p - u_c) * j_1 \tag{4}$$

The symbol of b in the prior equation is about the amount of taxes that should be paid to the companies of controlled transactions in the application of the arm's length principle. The u_c is the amount of tax obligations that can be avoided through the allocations of profits and losses. Moreover, j_1 is a coefficient for the rate of taxes. Then, the Eq. (4) shows the case of the arm's length principle. In addition, the case of the fixed length principle:

$$v = p * j_2 \tag{5}$$

The symbol of v in the previous equation shows the taxes that should be paid to the enterprises of controlled transactions in the application of the fixed length principle. Then, j_2 is a coefficient for the rate of taxes in the case of the fixed length principle:

$$v \geq b \tag{6}$$

The tax for the companies that participate in controlled transactions of transfer pricing in the case of the fixed length principle is higher or at least equal to that of the case of the arm's length principle. Thereupon, with the fixed length principle the enterprises of controlled transactions can tackle issues that come from the allocation of the profits and losses. Therefore, the tax authorities can face the transfer pricing effects on the global tax revenue.

The fixed length principle permits to recovery of the tax losses of the global tax revenue from the controlled transactions of the transfer pricing.
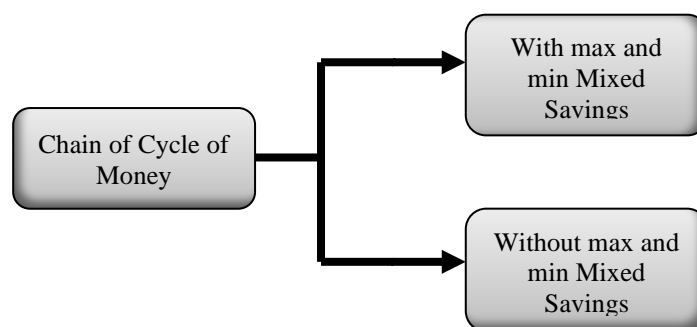

Figure 2: Chain of the cycle of money with and without maximum and minimum mixed savings

The next section presents the theory of the cycle of money. Moreover, the methodology which followed stands on the Q.E. method.

Literature Review

The tax revenues correspond to the savings that the companies could have if the taxes were avoided. The way that these savings are administrated is different from case to case. Then the

benefits of the companies could be managed in a completely different way, as could be saved or taxed (De Araujo et al., 2020; Gong et al., 2020; Kominers et al., 2017; Maier, 2012; Olcina et al., 2020; Paes-Sousa et al., 2019). The theory of the cycle of money shows when the savings robust the economy and when the taxes robust the economy/ It is crucial for this determination to be a separation of savings into the non-returned savings (or escaped savings) and the returned savings (or enforcement savings). For the scope of this analysis below are demonstrated the equations which are:

$$\alpha = \alpha_s + \alpha_t, \text{ or, } \frac{1}{v} + \alpha_t \tag{7}$$

$$x_m = m - a \tag{8}$$

$$m = \mu + \alpha_p \tag{9}$$

$$\mu = \sum_{\iota=0}^{n} \mu_\iota \tag{10}$$

$$\alpha_p = \sum_{j=0}^{m} \alpha_{pj} \tag{11}$$

$$c_m = \frac{dx_m}{dm} \tag{12}$$

$$c_\alpha = \frac{dx_m}{da} \tag{13}$$

$$c_y = c_m - c_\alpha \tag{14}$$

The variable of α is symbolized the case of the escaped savings. This means that there are savings that are not returning to the economy or come back after a long-term period. The variable of α_s symbolizes the case that there are escaped savings that come from transfer pricing activities. The variable of α_t symbolizes the case that there are escaped savings not from transfer pricing activities but from any other commercial activity. For instance, α_t could refer to the commercial activities that come from uncontrolled transactions. The variable of m symbolizes the financial liquidity in an economy. The variable of μ symbolizes the consumption in an economy. The variable of α_p symbolizes the enforcement savings, which come from the citizens and small and medium-sized enterprises. The variable of x_m symbolizes the condition of financial liquidity in an economy. The variable of c_m symbolizes the velocity of financial liquidity increases or decreases. The variable of c_α symbolizes the velocity of escaped savings. Therefore, the variable of c_y symbolizes the term of the cycle of money. Thereupon, the cycle of money shows the level of the dynamic of an economy and its robustness.

Then, the following basic principles about the cycle of money:

1. The citizens, the small and the middle-sized enterprises substitute the services and the property of the companies which save their money and not invest them or consume it proportionally in the economy. Thereupon, the companies of the controlled transactions are the main cause of the escape savings.

2. The escaped savings are responsible for the decline of the economic dynamic of the economy. The key point of escape savings is that the companies of controlled transactions of transfer pricing are responsible for not reentering these amounts of money in the market. This situation causes a lack of financial liquidity in an economy.

3. The substitution-controlled transactions are not substituted from the citizens and the small and middle-sized companies when it is not plausible to offer the same added value to the products and the services. This case happens especially in the instance of factories, in the research centers, etc. Therefore, these cases in the appropriate tax policy should taxed as uncontrolled transactions independently if they participate in controlled transactions (using the fixed length principle).

4. The enforcement savings are responsible for the high economic dynamic of the economy. Therefore, investments and consumption are elements that come from the savings of the citizens and small and middle-sized companies.

5. The velocity of financial liquidity shows how rapidly the economy's robustness grows or declines accordingly. Then is an index for how well structured is any economy.

6. The velocity of escaped savings shows how rapidly the non-return savings are lost from the market, or by the lack of investments, or by the lack of consumption.

7. The cycle of money represents the condition of the economy. The level of a well-structured tax system, and in general the dynamic of the economy. If this indicator is high then the economy could have high robustness otherwise has low financial liquidity.

8. Controlled transactions in the theory of the cycle of money are considered not only the cases of transfer pricing, but any kind of administration of profits and losses to avoid taxation.

9. Uncontrolled transactions in the theory of the cycle of money are the case of the commercial activity of citizens, small and medium-sized enterprises, factories, research centers, and any kind of commercial activity that cannot be substituted by the companies of controlled transactions.

10. The fixed length principle tackles issues subjects like the case cycle of money. But, this doesn't mean that restriction must apply the fixed length principle as the cycle of money is more widely theory which exceeds the transfer pricing scope.

Therefore, it is obtained that the cycle of money grows when there is a tax system like the case of the fixed length principle which permits the low taxation of uncontrolled transactions and the higher taxation of controlled transactions. Should be mentioned that as uncontrolled transactions are considered the same happens with the cases of the financial liquidity of citizens and the small and middle-sized companies.

Moreover, there are three basic impact factors of the rewarding taxes. The rewarding taxes are the only taxes that have an immediate and important role in the market of any economy. These factors are affiliated with education, with the health system of each society, and with the rest relevant structural economic factors of the prior two impact factors. This issue is illustrated in the next scheme:
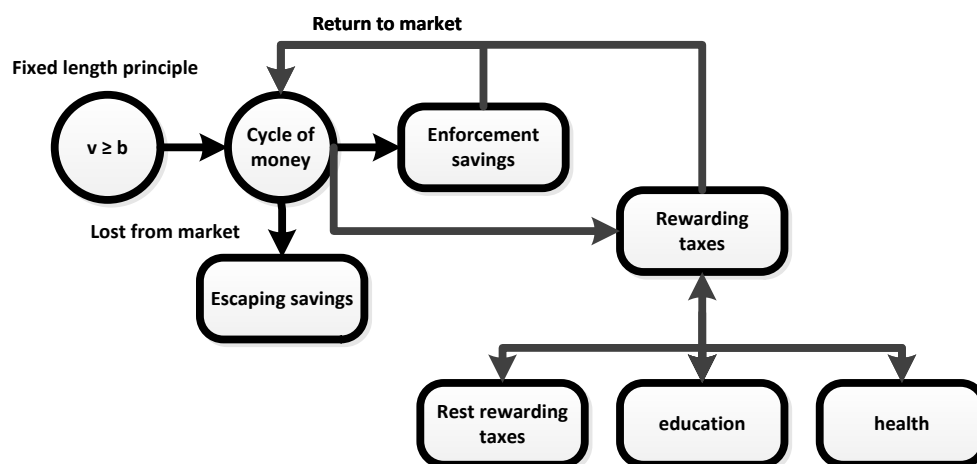

Figure 3: The cycle of money with rewarding taxes

In the previous figure, it is the case that the tax system includes all the tax factors and all the rewarding tax factors.

Chain of the cycle of money with and without maximum and minimum mixed savings

For the mathematical approach to the cycle of money:

$$\mu > \alpha_p > \alpha_t > \alpha_s \tag{15}$$

Moreover, including the mixed savings a_{mi}:

$$\alpha_r = a_{mi} + \sum_{j=1}^{n}(\alpha_r)_j \tag{16}$$

$$\alpha_s = \sum_{k=1}^{m}(\alpha_s)_k \tag{17}$$

$$\alpha_p = \sum_{j=1}^{n}(\alpha_p)_j = \alpha_r + \alpha_n * h_n + \alpha_m * h_m \tag{18}$$

$$\alpha_t = \sum_{v=1}^{d}(\alpha_t)_v \tag{19}$$

$$a = \alpha_s + \alpha_t = \sum_{k=1}^{m}(\alpha_s)_k + \sum_{v=1}^{d}(\alpha_t)_v \tag{20}$$

$$m = \alpha_p + \sum_{z=1}^{q} m_z \tag{21}$$

$$0 \leq a_{mi} \leq 1 \tag{22}$$

From this point, it seems that both elements of recapitalization and reinvestment are important, as it is concluded that industries and large enterprises in general engaged in the primary sector have a mixed character. Of course, there is a basic condition, it is that they do not carry out controlled transactions. If they participate in controlled transactions then their savings are mainly non-supportive and therefore belong to the excess savings (Ruiz et al., 2017; "The East Asian Miracle: Economic Growth and Public Policy," 1994). Thus, in the case of industrial units which do not participate in triangular transactions, it is considered that their savings are partly supportive, and partly deferred savings (generally economic units which are not substituted by medium or medium-dynamic economic data). Also, if it is considered that companies engaged in product research and development have a large volume of transactions, then it is understood that they are substituting medium-dynamic research units that would have boosted savings. For this reason, it is considered that this type of savings belongs to mixed savings. They have characteristics of both boosting savings due to their research nature, but also excessive savings because they concern a large volume of transactions.

Thus, in the previous equations, there have the a_{mi} which represents the mixed savings. The role of mixed savings is to represent that simultaneously the factories, the research, and the development centers have escaped savings. The rest symbols are already defined.

Definition and mathematical approach of the cycle of money with and without mixed savings:

For the case of the case of the cycle of money with and without mixed savings, there are that:

Variables	Coefficients	Coefficients'
$1 - a_{mi}$	0.6	-
$\sum_{j=1}^{m}(\alpha_r)_j$	0.6	0.6
α_t	0.7	0.7

Table 1: Compiling coefficients

The generator of this procedure used the coefficients which appeared in the previous table. Therefore, the factors have an upper limit of 1, and a lower limit of 0, but s and $\tilde{s}$ are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations the following diagram:
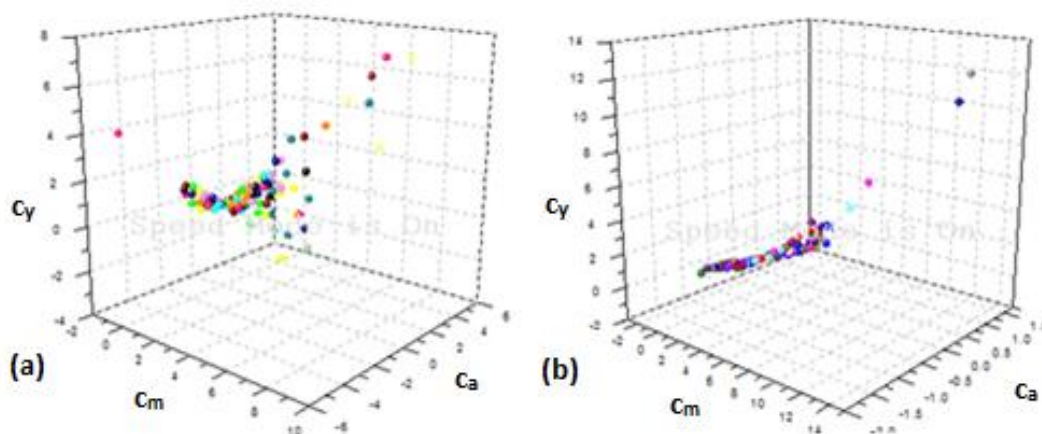
Figure 4: Cycle of money with and without mixed savings in three-dimension representation

In the previous scheme is obtained that in the normal case of the cycle of money (the version that included the escaped and the enforcement savings) is at a positive level as it grows. Thence, there is the next diagram:
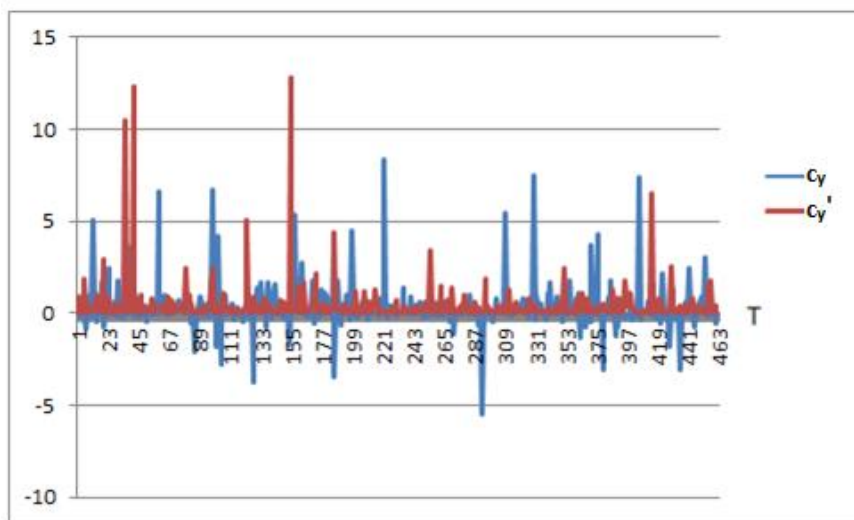

Figure 5: Cycle of money with and without mixed savings in a two-dimensional representation

In the prior figure, there is obtained that the cycle of money is at a positive level as shown in Fig. 4. Thence, there has the velocity of financial liquidity is at a higher level than the effect of the velocity of escaped savings. They conclude that mixed savings increase the cycle of money, this is more obvious in the diagrams in Fig. 4.

Definition and mathematical approach of the utility cycle of money with and without the maximum mixed savings:

For the case of the case of the cycle of money with and without the maximum mixed savings, there are that:

Variables	Coefficients	Coefficients'
$1 - a_{mi}$	0.2	-
$\sum_{j=1}^{m} (\alpha_r)_j$	0.6	0.6
α_t	0.7	0.7

Table 2: Compiling coefficients

The generator of this procedure used the coefficients which appeared in the previous table. Therefore, the factors have an upper limit of 1, and a lower limit of 0, but s and $\tilde{s}$ are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations the following diagram:
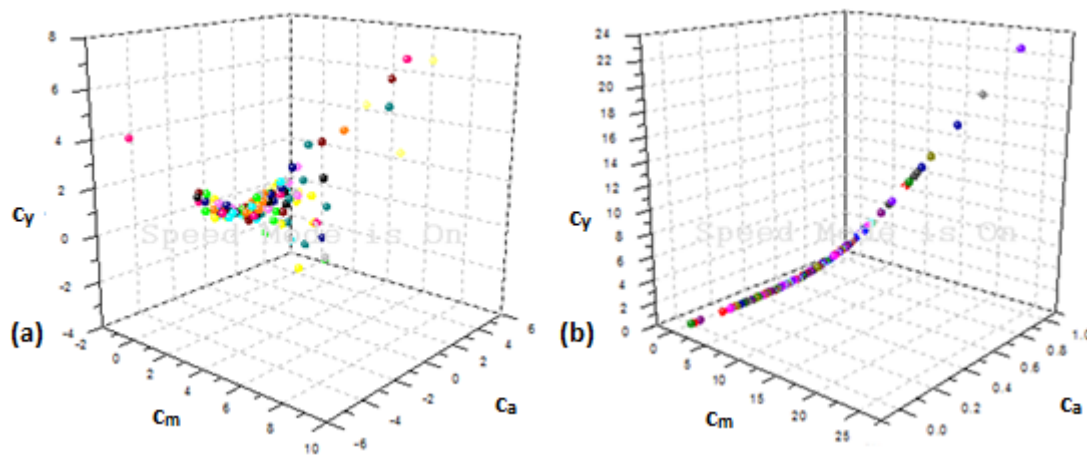

Figure 6: Cycle of money with and without maximum mixed savings in a three-dimensional representation

In the previous scheme of Fig. 6 (a) it is obtained that in the normal case of the cycle of money (the version that included the escaped and the enforcement savings) is at a positive level as it grows. In the scheme of Fig. 6 (b) is determined that the maximum mixed savings increase rapidly the cycle of money (this shows that countries with factories, research, and development centers grow their economies immediately). Thence, there is the next diagram:
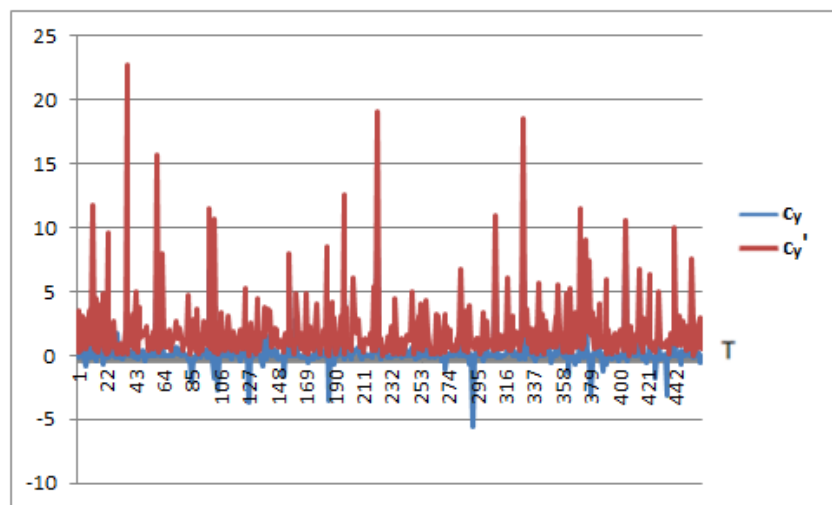

Figure 7: Cycle of money with and without maximum mixed savings in two dimension representation

The prior figure concluded that the cycle of money is at a positive level as shown in Fig. 6. Thence, there has the velocity of financial liquidity is at a higher level than the effect of the velocity of escaped savings. They conclude that the maximum mixed savings increase the cycle of money, this is more obvious in the diagrams of Fig. 6.

Definition and mathematical approach of the utility cycle of money with and without the minimum mixed savings:

For the case of the case of the cycle of money with and without the minimum mixed savings, there are the:

Variables	Coefficients	Coefficients'
$1 - a_{mi}$	0.8	-
$\sum_{j=1}^{m} (\alpha_r)_j$	0.6	0.6
α_t	0.7	0.7

Table 3: Compiling coefficients

The generator of this procedure used the coefficients which appeared in the previous table. Therefore, the factors have an upper limit of 1, and a lower limit of 0, but s and $\tilde{s}$ are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations the following diagram:
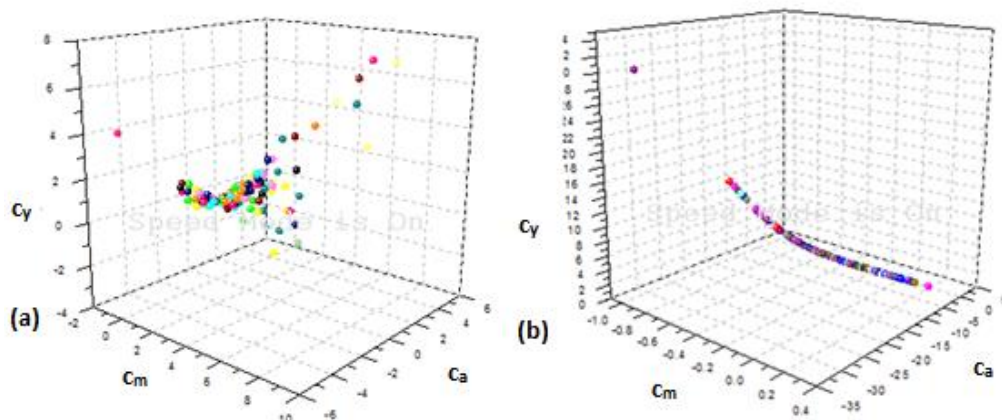

Figure 8: Cycle of money with and without minimum mixed savings in a three-dimensional representation

In the previous scheme of Fig. 8 (a), it is obtained that in the normal case of the cycle of money (the version that included the escaped and the enforcement savings) is at a positive level as it grows. In the scheme of Fig. 8 (b) is clarified that the minimum mixed savings decrease the cycle of money (this shows that countries with factories, research, and development centers grow their economies, and in this version, their avoidance declines the dynamic of these economies:
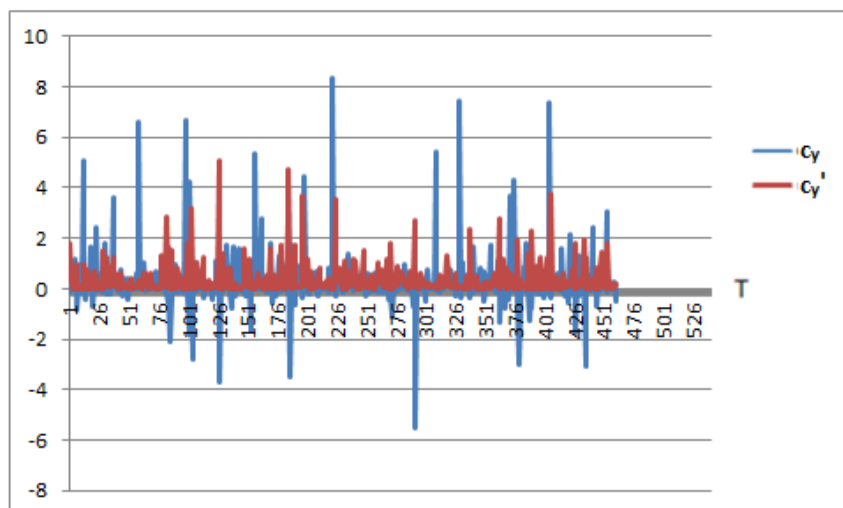

Figure 9: Cycle of money with and without minimum mixed savings in two dimension representation

The prior figure concluded that the cycle of money is in a negative orientation as shown in Fig. 8. Thence, there have the velocity of financial liquidity is at a lower level than the effect

of the velocity of escaped savings. They concluded that the minimum mixed savings decrease the cycle of money, this is more obvious in the diagrams of Fig. 8.

Definition and mathematical approach of the utility cycle of money with and without the maximum and/or the minimum mixed savings:

For the case of the case of the cycle of money with and without the maximum and/or the minimum mixed savings:

Variables	Coefficients	Coefficients' (max. of c_y)	Coefficients''(min. of c_y)
$1 - a_{mi}$	0.6	0.2	0.9
$\sum_{j=1}^{m} (\alpha_r)_j$	0.6	0.6	0.6
α_t	0.7	0.7	0.7

Table 4: Compiling coefficients

The generator of this procedure used the coefficients which appeared in the previous table. Therefore, the factors have an upper limit of 1, and a lower limit of 0, but s and $\tilde{s}$ are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations the following diagram:
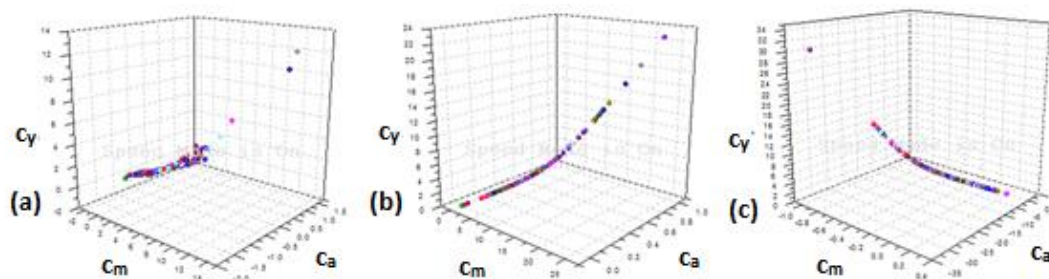

Figure 10: Cycle of money with and without maximum and minimum mixed savings in a three-dimensional representation

The previous scheme of Fig. 10 (a) revealed that in the normal case of the cycle of money (the version that included the escaped and the enforcement savings) is at a positive level as it grows. In the scheme of Fig. 10 (b) determined that the maximum and/or the minimum mixed savings increased rapidly the cycle of money (this shows that countries with factories, research, and development centers growing their economies have high growth). In Fig. 10 (c), there is the opposite economic situation in of case of Fig. 10 (b), because the mixed savings are at their minimum level:
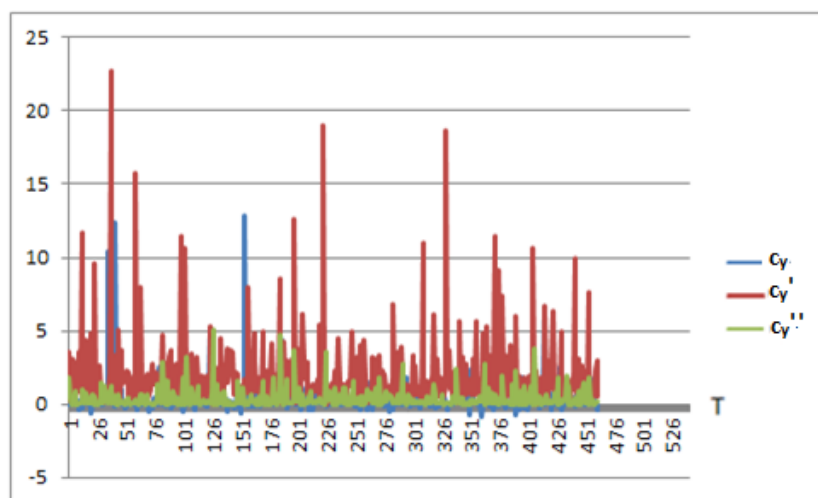

Figure 11: Cycle of money with and without maximum and/or minimum mixed savings in two-dimension representation

In the prior figure is obtained the cycle of money is in a negative orientation as revealed in Fig. 11. Then, is concluded as was expected that the case of c_y' is where is the highest cycle of money, because the mixed savings are at their maximum level. Moreover, it is concluded that the minimum mixed savings decrease the cycle of money, as it is revealed in the case of c_y''.

Conclusions

The chain of cycle of money including mixed savings shows the behavior of the economy when included in the classic model of the chain of cycle of money mixed savings. Therefore, factories, research, and development centers serve the growth of the economy. Additionally, concluded that the minimum mixed savings harms the economy, as the economic dynamic of this economy is lower when the minimum mixed savings exist. On the other hand, the maximum mixed savings bust the economy to a higher level. Thence, the consumption and investments in this economy are at lower levels, when there are minimum mixed savings. In addition, consumption and investments are at their higher level, when there are maximum mixed savings. In general, the chain of cycle of money including the mixed savings shows how each part of the economy interacts between them., and with the whole economy, indicating the appropriate tax and public policy.

Appendix I

```
%(C)(R)2017 Constantinos Challoumis Q.E. method

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
    am=0.2*rand();
end

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

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

m=(1-am)+ar;
a=at;
xm=m-a;
cm=xm/m;
```

```
ca=xm/a;
cy=cm-ca;


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

Appendix II

```
%(C)(R)2017 Constantinos Challoumis Q.E. method

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
   am=0.8*rand();
end

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

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

m=(1-am)+ar;
a=at;
xm=m-a;
cm=xm/m;
ca=xm/a;
cy=cm-ca;


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

Appendix III

```
%(C)(R)2017 Constantinos Challoumis Q.E. method

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
   am=0.6*rand();
end

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

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

m=(1-am)+ar;
a=at;
xm=m-a;
cm=xm/m;
ca=xm/a;
cy=cm-ca;



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

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