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# Velocity of the Escaped Savings and Financial Liquidity (With and Without Minimum Mixed Savings)

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*Abstract*

This paper is about the velocities of the escaped savings and of the financial liquidity, using the minimum mixed savings. This means that it has analyzed the behavior of the cycle of money in normal circumstances subject to the velocity of escaped savings and the velocity of financial liquidity in combination with the minimum mixed savings. Therefore, it has determined how the economy works based on its cycle of money. Thence, it is plausible to conclude about the consumption and the investments in each economy. For this analysis, the Q.E. method approach has been applied.

*Keywords*: velocity of escaped savings, financial liquidity, minimum mixed savings.

## 1. Introduction

This paper analyzes the behavior of the cycle of money in combination with the velocity of escaped savings with the velocity of financial liquidity in combination with the minimum mixed savings. It is concluded through the Q.E. method the behavior of the cycle of money and how it works and then extracted the conclusions about the consumption and the investments in that case. Moreover, it was concluded that the behavior of the velocity of escaped savings and the same happens in the case of the velocity of financial liquidity, subject to the minimum mixed savings.

The allocation of profits and losses are determined with agreements between the participants of controlled transactions (Challoumis, 2020, 2021c; De Araujo et al., 2020; Engström et al., 2020; Fernandez & Raine, 2019; Gangl & Torgler, 2020; Maier, 2012; Syukur, 2020; Van de Vijver et al., 2020)(Baker et al., 2020; Berg et al., 2020; Gangl & Torgler, 2020; Hagenaars et al., 2017; Levi, 2021). 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 comparability analysis. These periodic inspections of the companies that participate in controlled transactions are crucial for the arm's length principle (Burstein, 2020; Cruz-Castro & Sanz-Menéndez, 2016; Haigh, 2020; Jeon et al., 2020; Peres et al., 2020; Rasmussen & Callan, 2016; Torres Salcido et al., 2015). 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


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requirements for the companies to control transactions with the tax authorities should be in the range of the arm's length principle (Challoumis, 2019a, 2019b). 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.

Furthermore, the companies of controlled transactions should be estimated tax authorities' inspections are conducted 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 proportional adjustments condition is that companies that participate in controlled transactions frequently lack the appropriate data and uncontrolled transactions of similar circumstances to compare, so they proportionally adjust their data (Challoumis, 2021a, 2021h, 2023b, 2023c, 2023a, 2021g, 2021f, 2021b, 2021c, 2021e, 2021d, 2022b, 2022a). This means that if the tested parties conclude that the profits and losses of companies from uncontrolled transactions are significantly higher or significantly lower, they use a proportional analogy to compare them with their data.

## 2. Literature review

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) (De Araujo et al., 2020; Gong et al., 2020; Kominers et al., 2017; Maier, 2012; Olcina et al., 2020; Paes-Sousa et al., 2019). For the scope of this analysis below are demonstrated the equations which are:

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

$$x_m = m - a \quad (2)$$

$$\mathrm{m} = \mu + \alpha_p \quad (3)$$

$$\mu = \sum_{\iota=0}^{n} \mu_\iota \quad (4)$$

$$\alpha_p = \sum_{j=0}^{m} \alpha_{pj} \quad (5)$$

$$c_m = \frac{dx_m}{dm} \quad (6)$$

$$c_\alpha = \frac{dx_m}{da} \quad (7)$$

$$c_y = c_m - c_\alpha \quad (8)$$

The variable of α symbolizes 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 $\alpha_s$ symbolizes the case that there are escaped savings that come from transfer pricing activities. The variable of $\alpha_t$ symbolizes the case that there are escaped savings not from transfer pricing activities but from any other commercial activity. For instance, $\alpha_t$ 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 $\mu$ symbolizes the consumption in an economy. The variable of $\alpha_p$ 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 $c_\alpha$ 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.

$$\alpha_p = \alpha_r + \alpha_n{}^* h_n + \alpha_m{}^* h_m \quad (9)$$

$$\alpha_r \geq \alpha_n{}^* h_n \geq \alpha_m{}^* h_m \quad (10)$$

In the prior two equations used some impact factors, which are the $a_p$ which was also presented previously, moreover the variables $\alpha_r$, $\alpha_n$, $h_n$,$\alpha_m$ and the $h_m$. The variable $\alpha_r$symbolizes the impact factor of the rest rewarding taxes. The symbol of $\alpha_n$ is the impact factor of education and any technical knowledge. The symbol of $\alpha_m$ is about the impact factor of health anything relevant and supporting of this issue. The symbol of $h_n$, and of the $h_m$, are the coefficients of the health and the health impact factor accordingly.

The mathematical approach of the utility cycle of money has been used for the prior equations subject to the utilities of the next equations, with their conditions:

$$\widetilde{U}'(t) = \sum_{j=1}^{n} [c_m \widetilde{U}(\mathrm{t}) - c_\alpha U(t)]_j \quad (11)$$

$$U'(t) = -\sum_{j=1}^{n} [c_\alpha U(t)]_j \quad (12)$$

$$U(0) > 0 \quad (13)$$

$$\widetilde{U}(0) > 0 \quad (14)$$

According to the prior definitions should be mentioned that the symbol of $\widetilde{U}$ (t) is about the utility of the authorities and therefore of the public sector. The symbol of $U(t)$ is about the utility of the enterprises that participate in controlled transactions. In addition, including the mixed savings $a_{mi}$:

$$\alpha_r = a_{mi} + \sum_{j=1}^{n} (\alpha_r)_j \quad (15)$$

$$\alpha_s = \sum_{k=1}^{m} (\alpha_s)_k \quad (16)$$

$$\alpha_p = \sum_{j=1}^{n} (\alpha_p)_j = \alpha_r + \alpha_n{}^* h_n + \alpha_m{}^* h_m \quad (17)$$

$$\alpha_t = \sum_{v=1}^{d} (\alpha_t)_v \quad (18)$$

$$a = \alpha_s + \alpha_t = \sum_{k=1}^{m} (\alpha_s)_k + \sum_{v=1}^{d} (\alpha_t)_v \quad (19)$$

$$m = \alpha_p + \sum_{z=1}^{q} m_z \quad (20)$$

$$0 \leq a_{mi} \leq 1 \quad (21)$$

The $\boldsymbol{a_{mi}}$ represents the mixed savings.

General equilibriums of velocities of the cycle of money:

It follows the general mathematical representations of these forms, which stand on these equations about the case of the velocity of the escaped savings:

$$c_\alpha = c_{a0} * ln(c_m - c_{m0}) \quad (22)$$

$$c_{y\alpha} = b_1[(c_a - c_{a0})^2 + c_{y\alpha 0}] \pm b_2\left(\frac{1}{c_a}\right) \pm b_3\left(\frac{1}{ln\, c_a}\right) \quad (23)$$

$b_1, b_2, b_3 = 0$ and $x_i$ (24)

$x_i \geq 0$, where i=1,2

In the prior equations the $c_{a0}$ and the $c_{m0}$ are accordingly the initial values of the velocity of escaped savings and the cycle of money. Moreover, the equation of $c_{y\alpha}$ represents the general equation of the escaped savings. For the acceptation of the financial liquidity:

$$c_{ym} = b_4[(c_m - c_{m0})^2 + c_{ym0}] \pm b_5(\frac{1}{c_m}) \pm b_6(\frac{1}{ln\, c_m}) \quad (25)$$

$$b_4, b_5, b_6 = 0 \text{ and } x_i \quad (26)$$

$$x_i \geq 0 \quad \text{, where i=1,2} \quad (27)$$

Eq. (23) has determined the general form of the velocity of the cycle of money. The coefficients of $b_1, b_2, b_3$ took two of them one constant value $x_i$, and the other one is zero. The same happens with the coefficients of $b_4, b_5, b_6$ which also two of them take one constant value $x_i$ and the other one is zero. In that way, there are all the possible combinations of velocities of escaped savings and financial liquidities to be defined by two concrete equations.

Mathematical approach and analysis of the cycle of money with the velocities of the escaped savings and of financial liquidity subject to minimum mixed savings

Using equations (22) to (27) for the next equations:

$$c_{y\alpha} = -\, b_2(\frac{1}{c_a}) \quad (28)$$

$$c_{ym} = -\, b_6(\frac{1}{ln\, c_m}) \quad (29)$$

The table of coefficients for the cycle of money in the case of mixed savings is this:

Table 1. compiling coefficients

| *Variables* | *Coefficients* |
|---|---|
| $1 - a_{mi}$ | 0.8 |
| $\sum_{k=1}^{m} (\alpha_r)_k$ | 0.6 |
| $\alpha_t$ | 0.7 |

Applying the Q.E. method with the prior coefficients determined the behavior of the cycle of money subject to minimum mixed savings in the following scheme:

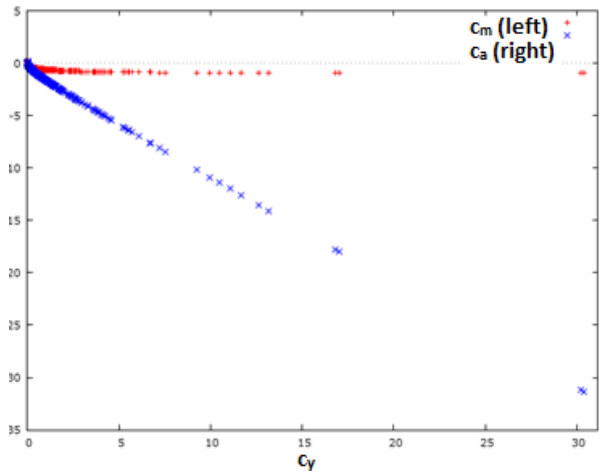


Figure 1. Cycle of money with its velocities

The previous figure clarified that the cycle of money is connected with the velocity of escaped savings, and with the velocity of financial liquidity. The low mixed savings enhance the economy. Therefore, has been concluded that the velocity of financial liquidity is positive, and the

velocity of escaped savings has an opposite orientation. The low mixed savings don't support the economy, because the absence of savings of factories with the research and development centers costs the economy. This explains why the industrial countries have a weaker cycle of money, and therefore lower dynamics in their economy.

Without minimum mixed savings:

$$c_{y\alpha} = b_1[(c_a - c_{a0})^2 + c_{y\alpha 0}] \quad (30)$$

$$c_{ym} = b_4[(c_m - c_{m0})^2 + c_{ym0}] \quad (31)$$

The table of coefficients for the cycle of money is this:

Table 2. compiling coefficients

| *Factors* | *Values* |
|---|---|
| $\alpha_s$ | 0.6 |
| $\alpha_t$ | 0.7 |
| $\mu$ | 0.9 |
| $\alpha_p$ | 0.8 |

Applying the Q.E. method with the prior coefficients we have for the behavior of cycle of money the following scheme:

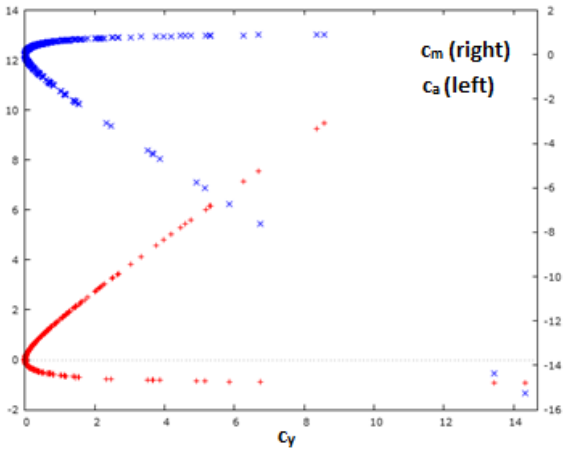


Figure 2. Cycle of money with its velocities

From the previous figure it has been determined that the cycle of money is connected with the velocity of escaped savings, and with the velocity of financial liquidity. Thus, the velocity of financial liquidity is positive, and the velocity of escaped savings has an opposite orientation. It is concluded that initially the velocity of the escaped savings has a stronger impact to the cycle of money, but finally the velocity of financial liquidity has higher impact than the velocity of escaped savings. Then in general the cycle of money in normal economic circumstances has positive orientation.

## 3. Conclusion

In this paper, it is concluded that the cycle of money under economic circumstances has a positive orientation, and with minimum mixed savings, the economy is not enforced appropriately. This means that consumption and investments would not be increased in any economy with these conditions. The mixed savings are at a low level, the escaped savings are increased, and the enforcement savings are decreased, and therefore the economy is not supported appropriately. In the case that there are no minimum mixed savings, the cycle of money under

normal economic circumstances has a positive orientation. This means that consumption and investment would be increased in any economy with normal conditions. But it has determined that initially in normal economic conditions any economy has a weak cycle of money as the escaped savings are stronger than the financial liquidity. Finally, the after that disturbances the economy achieves to track to a positive orientation.

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## 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=0.8*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 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
    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;


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