Center for Open Access in Science

Open Journal for

Research in Economics

2024 ● Volume 7 ● Number 1

https://doi.org/10.32591/coas.ojre.0701

ISSN (Online) 2620-102X

OPEN JOURNAL FOR RESEARCH IN ECONOMICS (OJRE)
ISSN (Online) 2620-102X
www.centerprode.com/ojre.html * ojre@centerprode.com

Publisher:

Center for Open Access in Science (COAS), Belgrade - SERBIA
www.centerprode.com * office@centerprode.com

Open Journal for Research in Economics, 2024, *7*(1), 1-40.
ISSN (Online) 2620-102X

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ISSN (Online) 2620-102X

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ISSN (Online) 2620-102X ▪ https://doi.org/10.32591/coas.ojre.0701.01001c

Velocity of the Escaped Savings and Financial Liquidity on Maximum Mixed Savings

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Received: 3 October 2023 ▪ Revised: 13 February 2024 ▪ Accepted: 20 April 2024

Abstract

This paper is about the velocities of the escaped savings and of the financial liquidity, using and the maximum mixed savings. This means that it analyzes 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 maximum mixed savings. Therefore, it is determined how the economy works based on its cycle of money. Thence, it is plausible to extract conclusions about the consumption and the investments in each economy. For this analysis, a Q.E. method approach is applied.

Keywords: velocity of escaped savings, financial liquidity, maximum 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 maximum mixed savings. It is concluded through the Q.E. method the attitude 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 is clarified the behavior of the velocity of escaped savings and the same happens in the case of the velocity of financial liquidity, subject to the maximum 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. This determination must 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 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.

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

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

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 α_n is the impact factor of education and any technical knowledge. The symbol of α_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:

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

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

$$b_1, b_2, b_3 = 0 \text{ and } x_i \quad (24)$$

$x_i \geq 0$, 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. (25) 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.

The mathematical approach and analysis of the cycle of money with the velocities of the escaped savings and of financial liquidity subject to maximum mixed savings:

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

$$c_{y\alpha} = b_3(\frac{1}{ln\, c_a}) \quad (28)$$

$$c_{ym} = b_5(\frac{1}{c_m}) \quad (29)$$

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

Table 1. compiling coefficients

Variables	*Coefficients*
$1 - a_{mi}$	0.2
$\sum_{k=1}^{m} (\alpha_r)_k$	0.6
α_t	0.7

Applying the Q.E. method with the prior coefficients has determined the behavior of the cycle of money subject to maximum mixed savings:

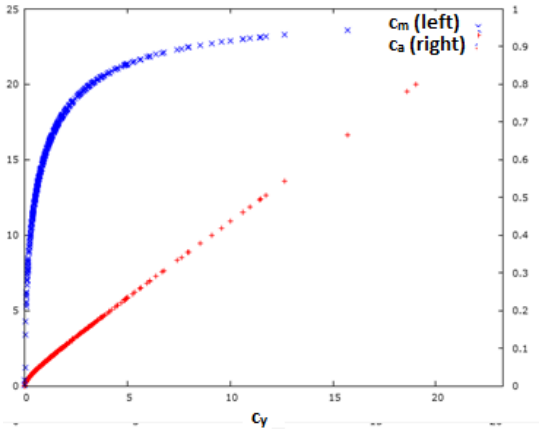

Figure 1. Cycle of money with its velocities

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

positive and the velocity of escaped savings has an opposite orientation. The high mixed savings enforce the economy, because the savings of factories with the research and development centers have a positive role in an economy, as there their transactions could not be substituted by other units, like the middle and the small companies, or by the citizens. This explains why industrial countries have a greater cycle of money, and therefore higher dynamics in their economy.

3. Conclusion

In this paper, it is concluded that the cycle of money under normal economic circumstances has a positive orientation, and with maximum mixed savings, the economy is enforced more. This means that consumption and investments would be rapidly increased in any economy with conditions. The mixed savings have a completely positive role to the consumption, and to the investments, when they are at their maximum level.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The authors declare no competing interests.

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Appendix

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%(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
```

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Open Journal for Research in Economics, 2024, *7*(1), 9-22.
ISSN (Online) 2620-102X ▪ https://doi.org/10.32591/coas.ojre.0701.02009j

A Review on Economic Implications of Nigeria's Border Closure on Rice Importation

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Received: 9 October 2023 ▪ Revised: 2 April 2024 ▪ Accepted: 22 April 2024

Abstract

Nigeria's border closure on rice importation has significant economic implications that require comprehensive analysis. Policymakers must consider both the short-term and long-term effects, as well as broader socioeconomic factors. Balancing economic considerations with employment, food security, and regional disparities is crucial for inclusive and sustainable development. By adopting a holistic approach, Nigeria can navigate the challenges and opportunities presented by the border closure, achieve self-sufficiency in rice production, and promote the well-being of its citizens. Gradually phasing out the border closure while enhancing the competitiveness of local rice producers through incentives and support will ensure market efficiency. Investing in agricultural research, extension services, and infrastructure development will improve productivity and quality. Strengthening border control mechanisms will prevent smuggling. To sustain regional economic partnerships, it is critical to collaborate with neighboring countries. Nigeria's border barrier for rice imports presents numerous obstacles and opportunities. Nigeria has the power to attain rice self-sufficiency and promote all-encompassing and sustainable development by implementing a comprehensive strategy that successfully balances economic considerations with broader social factors. This includes gradually phasing out the border closure while enhancing the competitiveness of local rice producers, investing in agricultural research and infrastructure development, strengthening border control mechanisms to prevent smuggling, and collaborating with neighboring countries to maintain regional trade relationships.

Keywords: border closure, Nigeria, rice sector, food security, regional disparities.

1. Introduction

Understanding how significant events and policy decisions influence diverse industries and stakeholders necessitates an examination of the economic implications. Two instances of significant occurrences are the closure of Nigeria's borders and the varied consequences it had on rice importation (Nwagu, 2023). Understanding the economic consequences of policy acts allows individuals, businesses, and politicians to develop effective strategies and make sound judgements (Carpenter, 2017). A thorough investigation of the consequences of Nigeria's border ban on rice importation is critical for a variety of reasons.

Because rice accounts for such a large amount of the Nigerian diet, the country is significantly reliant on imports to meet its domestic food demands (Gyimah-Brempong et al.,

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2016; Ishaq Ibrahim, 2018). Rice import disruptions might have a substantial impact on food prices and security. Economic ramifications research can give information on potential benefits and obstacles that may result from border closure (Mendoza & Torres, 2019). The rice industry is significantly important in Nigeria's agriculture sector and overall economy. The aforementioned factors lead to the formation of job opportunities, the generation of revenue for farmers, and the acquisition of foreign currency earnings. A full investigation of the economic effects of border closures in connection with rice importation is required to determine the implications on the industry's growth, productivity, and competitiveness (Abbas et al., 2018; Ugwuja & Chukwukere, 2021). Investigating the economic ramifications of the border closure could provide valuable insight into the greater trade dynamics and interdependence between Nigeria and its trading partners. This allows for the evaluation of trade policies' effectiveness and alignment with national objectives (Ekanem, 2021; Enyiazu, 2022; Uwak & Ebong, 2023). Before designing trade policies that encourage both regional integration and economic progress, policymakers must thoroughly understand this concept.

The closure of Nigeria's borders in August 2019, mainly the land borders, had a severe impact on economic activity, particularly rice imports. The strategy was developed with the goal of minimizing illegal smuggling activity, boosting the development of domestic enterprises, and improving the nation's overall security. However, the repercussions of this phenomenon on rice importation have varying periods of economic consequences, including both short-term and long-term effects. The border restriction had an immediate impact on the availability of imported rice on the Nigerian market. Due to a scarcity of resources, fulfilling the domestic rice need through local production became critical. This condition provided a wonderful chance for local rice growers to boost their production capacity and earn a larger market share. However, due of an imbalance between consumer demand and rice supply, this occurrence has resulted in price instability, making rice less economically accessible to consumers (Azifuaku et al., 2020; Ugwuja & Chukwukere, 2021; Sherif et al., 2023).

Market dynamics and trade patterns have also changed as a result of the border closure. Several neighboring countries that acted as centers for rice smuggling into Nigeria have experienced a decrease in supplies to that country. In contrast, domestic rice output increased noticeably, prompting the formation of local rice brands and a significant gain in market recognition. The changes in trade patterns had a significant impact on regional trade alliances and underlined the importance of implementing effective border control techniques (Salik & Aras, 2020; Ekanem, 2021; Udeh & Nwokorobia, 2022; Nwagu, 2023). The border closure has financial ramifications for the government, affecting budgetary and revenue-related issues. Nigeria's customs revenue grew as a result of a decrease in smuggling activities, providing the government with an opportunity to collect more import taxes and levies. However, the suspension of operations had negative impact on enterprises and job opportunities in border regions as a result of a decrease in income from lawful international commerce (Omale et al., 2020; Nwozor & Oshewolo, 2020; Abiodun, 2021; Idoniboye-Obu, 2022).

The major purpose of the border closure was to increase self-sufficiency in rice production and minimize Nigeria's dependency on imported rice in the near future. This goal is congruent with the government's agricultural growth objectives and commitment to economic diversification. It is critical to examine the economic effects of the border closure on rice importation in order to assess progress towards self-sufficiency, recognize the challenges faced by domestic rice farmers, and propose solutions to increase the sector's competitiveness (Johnson et al., 2013; Abbas et al., 2018).

Understanding the effects on various sectors and stakeholders necessitates a full assessment of the economic consequences of Nigeria's decision to close its borders to rice imports. Using data allows governments, corporations, and individuals to make informed decisions and establish successful plans. By focusing on rice imports, we can examine the effects of the border

closure on food security, the rice industry, trade dynamics, and government revenue. The current analysis provides significant information that policymakers may utilize to develop trade policies that promote regional integration, economic growth, and self-sufficiency in rice production.

2. Overview of Nigeria's border closure

In August 2019, the Nigerian government implemented a policy to tighten its borders, with a focus on land borders. This measure was taken to combat smuggling issues, stimulate the development of indigenous businesses, and strengthen national security. The purpose of the effort was to reduce the unlawful transit of items such as rice into the country (Nwozor & Oshewolo, 2020; Udeh & Nwokorobia, 2022). Rice smuggling has long been a problem in Nigeria, slowing the expansion of the domestic rice industry and impeding progress towards rice production self-sufficiency.

The decision to close the border was prompted by the desire to safeguard and support Nigerian farmers, boost domestic production, and lessen the country's reliance on rice imports. The government's reasoning for enforcing import restrictions, according to Emeka and Nwangene, 2021; Enyiazu, 2022, and Idoniboye-Obu, 2022, was based on the expectation that such actions would facilitate the emergence of favorable conditions for domestic farmers to adequately satisfy internal rice demand, thereby fostering agricultural industry expansion. The border closure, which was intended to be a temporary measure, has lingered for an extended period of time and has greatly impacted business activities. The restriction affected not only rice imports, but also other goods and commodities sold across international borders. Consumers, businesses, and dealers in Nigeria and adjacent countries felt the effects. The closure reduced legitimate cross-border trade due to restrictions on goods transportation, and the aforementioned conditions had a negative impact on businesses and employment, particularly in border regions where a large portion of the local economy was dependent on cross-border trade (Abbas et al., 2018; Odebode & Aras, 2019; Abiodun, 2021). Limitations on products and services harmed supply networks, affecting industries and businesses that relied heavily on imported raw materials and inputs.

Nigeria has become a large rice importer on the African continent, with imports meeting a sizable amount of its domestic demand. The border closure reduced the availability of imported rice in the Nigerian market, leading to a rise in demand for locally cultivated rice (Babatunde, 2023). The closing of rival rice fields provided an opportunity for local rice producers to improve production capacity and earn a larger market share. Due to the fall in rice imports, customers were driven to seek for domestically farmed rice as a replacement. The change in customer preferences benefited the local rice industry and was in line with the government's goal of fostering rice production self-sufficiency (Mendoza & Torres, 2019; Alvarez et al., 2022).

To fulfil the rising demand, the region's rice production capacity must be rapidly enhanced. Farmers must contend with difficulties such as inadequate infrastructure, limited financial access, and insufficient mechanization. The restrictions discussed above show the importance of supporting and investing in the local rice value chain in order to achieve sustainable growth and boost competitiveness. The border closure caused price volatility in the rice market. Rice prices grew dramatically as a result of a combination of restricted supply and high demand, making it less affordable for consumers, particularly those with lower incomes (Abbas et al., 2018; Oetgy & Frec Erdw, 2019). The consequences of price fluctuation on food security were observed as cost became a key concern for a sizable portion of Nigerians.

The Nigerian border blockade had a substantial impact on trade activities, particularly rice imports. The shutdown was meant to improve overall national security, allow for increased domestic rice production, and lower the chance of smuggling. According to Ekanem (2021), the rise of the local rice business presented both opportunities and challenges. On the one hand, it

provided prospects for growth and development. On the other hand, it made it difficult to meet rising demand while keeping customer prices affordable. Examining the focus on rice imports in particular provides crucial insights into the domestic rice industry's potential and limitations, as well as the necessity for deliberate actions to encourage its growth and long-term survival.

3. Economic implications of the border closure on rice importation

The Nigerian government's decision to seal the border has had severe economic consequences, particularly for rice imports.

3.1 *Decreased availability of imported rice*

The reduced supply of imported rice was a direct result of the Nigerian market's border restrictions. The implementation of import limits drastically reduced the availability of imported rice. Nigeria, a major rice importer on the African continent, has relied largely on imported rice to meet domestic consumption demands (Coker et al., 2018; Yusuf et al., 2020; Nwagu, 2023). Because imported rice was becoming less available, a market vacuum needed to be filled with alternate sources.

3.2 *Impact on local rice production and farmers*

The border closure offered excellent conditions for the local rice sector to expand and meet the increasing demand caused by the difficulty in obtaining imported rice. Nigerian rice producers reportedly increased production to compensate for the scarcity caused by a lack of rice imports. According to Okodua (2018), this resulted in a substantial increase in agricultural work options, enhancing the economic prospects of farmers in the surrounding area.

However, efforts to increase local rice production have hit a number of stumbling barriers. Farmers faced challenges such as a lack of mechanization, weak infrastructure, and limited financial access. The issues outlined above underlined the need for more investment and assistance in the local rice value chain in order to raise output and competitiveness in the near future.

3.3 *Price fluctuations and affordability for consumers*

The border closure had a substantial impact on the dynamics of rice pricing in the Nigerian market. As a result of the reduced availability of imported rice, demand for domestically cultivated rice has surged dramatically. Rice prices rose dramatically as a result of price volatility induced by a surge in demand and a scarcity of supply. Price changes have a considerable impact on rice availability, particularly for persons with lower socioeconomic status (Lucky, 2020; Sadiq et al., 2021; Udeh & Nwokorobia, 2022). As a result, some parts of the population found it more difficult to get a fundamental necessity, potentially affecting food security.

3.4 *Changes in trade patterns and market dynamics*

The border closure had a substantial impact on rice market dynamics and trading patterns. Previously, Nigeria's neighboring nations were utilized as transit locations for rice smuggling, but this practice has declined. The aforementioned transition necessitated modifications to supply chains and distribution networks, as well as the disruption of pre-existing trade links (Johnson et al., 2013). Local rice growers benefited from the shift in market dynamics,

as their market share increased. As a result, revenue increased noticeably, significantly boosting the domestic rice business.

Concurrently, when activities ceased, there were less legitimate international economic transactions, which impacted businesses and people in border communities that relied heavily on such trade. Restricted movement and market accessibility posed obstacles for small-scale traders and enterprises engaging in authorized cross-border initiatives. Because of the aforementioned disruption, it is now more vital than ever to implement strong border control systems that can combat smuggling while still supporting lawful trade.

The border shutdown had a substantial impact on the government's revenue and spending forecasts. On the one hand, the closure reduced the amount of money earned by legitimate cross-border company activities. The aforementioned drop has a substantial impact on firms, particularly those involved in lawful import and export activity. Reduced rice smuggling, on the other hand, increased customs revenue because rice that was lawfully imported was subject to import duties and taxes. These varied outcomes impacted the government's fiscal status, prompting a full examination of the broad financial ramifications of the border closure.

Nigeria's border shutdown has had a number of severe economic consequences for rice imports. Because of the decrease in the supply of imported rice, domestic rice production has filled the market gap. However, as a result, new difficulties such as price volatility and limited client affordability have evolved. According to the authors Akpan et al. (2015) and Arigor et al. (2015), supply chain adjustments have become required as a result of changes in trade patterns and market dynamics. Divergent outcomes from the establishment's closure were also observed in terms of revenue and government budgetary management. Understanding the economic ramifications stated above is critical for policymakers working to develop successful policies for developing a competitive and sustainable rice sector while also protecting food security and adhering to fair trade agreements.

4. Analysis of short-term and long-term effects

The closure of Nigeria's borders has had an immediate and long-term impact on the rice business. The impacts of the closure on supply and demand dynamics, degrees of self-sufficiency, market stability, and potential benefits and downsides for the rice industry are examined in this paper.

4.1 *Short-term effects on supply and demand*

The supply chain for rice in Nigeria has been temporarily affected due to the border blockage. Foreign rice availability has reduced dramatically as a result of the minor intake of imported commodities. The growing demand has put local rice producers under pressure, causing them to try to satisfy it. Farmers have boosted their output in response to growing demand. However, due to constraints such as insufficient mechanization and inadequate infrastructure (Ajala & Gana, 2015; Ayinde et al., 2017), they have struggled to supply this demand adequately. As a result, there may be short-term constraints on rice supply on the market, causing significant price variations and forcing consumers to make adjustments.

As a result of the limited availability of imported rice, customer behaviors and preferences have shifted. Consumers who were previously reliant on imported rice have been compelled to substitute domestically cultivated rice. Because of the shift in consumer demand, local rice farmers now have the chance to boost their market presence and sales (Nwachukwu & Achike, 2020). Customers, on the other hand, have had to acclimatize to the potentially changing qualities and characteristics of rice in different locations.

4.2 *Long-term effects on self-sufficiency and market stability*

The border blockade may have a long-term impact on Nigeria's ambition of being self-sufficient in rice production. To stimulate indigenous production and lessen reliance on imported rice, the government has imposed import restrictions. According to Ugwuja and Chukwukere (2021), the closure has provided a favorable atmosphere for neighborhood farmers to expand their operating reach and output capacity. The existing situation suggests that future self-sufficiency and reliance on other sources can be increased.

Long-term strategic planning and major financial investment in the rice value chain, on the other hand, are required for long-term self-sufficiency. Farmers' difficulties, including as inadequate infrastructure and limited financial access, must be addressed in order to maintain the local rice industry's long-term existence. It is critical to undertake efforts in Nigeria to expand rice production, stimulate innovation, and improve product quality and competitiveness (van Oort et al., 2015; Uduma et al., 2016). The success of these tactics will determine the level of self-sufficiency that can be attained and maintained.

Border closures also have an impact on market stability. The government is imposing import restrictions in an effort to prevent rice price volatility and establish a more stable market environment. However, price changes are possible in the near future as supply reacts to changing dynamics. Customers, particularly those from lower income groups, may be affected by this issue since they may find it difficult to purchase rice. The ability of the local rice industry to constantly meet demand while maintaining competitive price will be critical to the market's long-term stability.

4.3 *Potential benefits and drawbacks for the rice sector*

The shutdown of the Nigerian border may have both beneficial and negative consequences for the rice business. One of the primary advantages is the potential of local farmers to expand their production capacity while improving their quality of life. The increased demand for rice cultivated locally has the potential to raise farmer incomes, offer job opportunities, and greatly contribute to the development of rural communities. Furthermore, it may encourage investments in agricultural infrastructure and the expansion of auxiliary businesses along the rice value chain.

Closure measures could be employed to lower the trade deficit and safeguard foreign currency reserves. Nigeria has the capacity to utilize its resources efficiently in order to assist indigenous firms, with a focus on the rice industry, by implementing import reduction measures. This phenomenon has the potential to considerably improve the overall state of the economy and encourage economic diversity.

It is, nevertheless, critical to be aware of any potential downsides. The installation of the shutdown may lead to an increase in the number of people attempting to sneak illegal products in order to circumvent the limitations. This issue may stymie the government's efforts to expand the domestic rice industry and achieve self-sufficiency. Farmers' difficulties, such as inadequate infrastructure and mechanization, must be addressed in order to ensure the agricultural sector's long-term viability and competitiveness (Rafeek & Samaratunga, 2011; Mendoza & Torres, 2019).

Economic disruptions have the potential to have a significant influence on economic relations between surrounding countries. The closure of Nigeria's borders has caused diplomatic problems with its neighbors due to disruptions in established trade patterns and the resultant economic impact on these countries. To strike a healthy balance between the need for independence and market stability while retaining strong trade alliances, careful consideration and teamwork are required (Olukunle et al., 2020; Abiodun, 2021; Uwak & Ebong, 2023).

The Nigerian border closure has both short-term and long-term implications for the rice industry. Despite the fact that the current state of affairs provides local farmers with favorable prospects and the opportunity for self-sufficiency, it is vital to understand and solve the associated obstacles and disadvantages. It is critical to engage in extensive long-term planning, offer funding for infrastructure and technology development, and provide major assistance to the local rice industry in order to achieve sustainable self-sufficiency and market stability (Ojo et al., 2019). The effectiveness with which these objectives are managed while maintaining trade links will decide how the border closure affects the rice industry and the economy as a whole.

5. Socioeconomic factors and considerations

Beyond the rice industry, the Nigerian border closure has far-reaching socioeconomic consequences. The main issues of this study are the consequences for jobs and livelihoods, the implications for food security, and any potential injustices encountered by inhabitants living in border regions.

5.1 *Impact on employment and livelihoods*

In terms of livelihoods and jobs, the border closure will have a profound impact on all sectors of the economy. Import restrictions have affected enterprises' cross-border business operations, resulting in undesirable results such as job losses and income drops. Significant repercussions have been documented on the livelihoods of small-scale traders and entrepreneurs, who rely heavily on international trade (Johnson & Dorosh, 2017; Paul et al., 2021).

The shutdown of the rice sector, on the other hand, has created chances for local individuals to find work and make money. The increase in local rice production has resulted in the establishment of new job opportunities in the domains of cultivation, processing, and distribution. The aforementioned plan offers potential in terms of promoting rural development and poverty alleviation, particularly in places where rice growing is common (Emeka & Nwangene, 2021).

However, it is critical to acknowledge that the distribution of the job's immediate rewards may not be equitable. Due to limited access to resources such as land, money, and technology, small-scale farmers may be unable to capitalize on the expanding demand for locally cultivated rice. It is critical to resolve these disparities and support small-scale producers in order to foster equitable socioeconomic progress.

5.2 *Food security implications*

Food security is a major concern in Nigeria, and the country's inability to provide a sustainable supply of rice for its inhabitants is hampered by the closure of its borders (Ozkan & Fawole, 2021). Given the difficulty of getting imported rice, it is critical to prioritize local rice production to close the supply gap and meet domestic demand (Amaechi, 2018). It is critical to improve domestic rice sector growth in order to increase food security by lowering dependency on foreign imports.

Domestic rice production, both in quantity and quality, is required for food security. Increased productivity and a consistent supply of affordable rice for consumers are contingent on adequate investment for agricultural infrastructure, R&D, and comprehensive farmer training programs. To avoid any potential negative consequences from growing rice output, strategies aimed at protecting the production of other key crops must be implemented. This method is essential for maintaining a diverse and well-balanced food supply.

5.3 *Regional disparities and border communities*

The border closure may have various effects in different parts of Nigeria. The shutdown's aims are to promote domestic manufacturing and reduce dependency on imports. However, the impact of this strategy may be higher in places closer to the borders (Mohammed, 2017; Nwozor & Oshewolo, 2020). These geographical locations usually have higher levels of engagement in international trade activities and may encounter more major disruptions.

People who live near borders may face unique challenges as a result of border closures. The economic activities and means of subsistence of these people are heavily reliant on foreign commerce. As a result of certain firms closing, residents in particular regions may notice a decrease in their economic possibilities and income. Prioritizing comprehensive research of border towns' particular requirements and vulnerabilities, officials must then implement tailored measures to strengthen economic resilience and encourage growth (Enyiazu, 2022).

To address regional imbalances, a comprehensive strategy that considers a variety of factors, such as infrastructure development, market access facilitation, and the implementation of inclusive policies that promote economic diversification beyond the scope of cross-border trade, is required. According to Teriba (2014), by targeting resources to these specific areas, the government may reduce any detrimental impacts on regional economies while also promoting equal socioeconomic progress throughout the country.

Beyond the rice trade, Nigeria's border shutdown has socioeconomic ramifications. The subject under consideration has a substantial influence on regional inequality, food security, employment, and other issues. The shutdown of the local rice sector may provide job possibilities, but it is critical to prioritize eliminating inequities and supporting inclusive growth. To attain food security and mitigate any negative impacts on border communities, it is critical to invest in the local rice industry and implement supporting policies (Odunayo, 2014; Adeyinka, 2014; Favour, 2023). Fostering sustainable and equitable growth within the constraints of the border closure would necessitate the implementation of a comprehensive plan that takes socioeconomic considerations into account.

6. Policy implications and recommendations

The closing of the Nigerian border has attracted attention to the need for effective government actions to handle the economic ramifications, notably in the rice business. This section examines the policy implications and offers recommendations to aid decision-making in the aftermath of the closure.

6.1 *Balancing trade protection and market efficiency*

One of the primary policy issues is finding the best balance between trade protection and market efficiency. Border closures are generally used to safeguard local companies, such as the rice sector. Extensive protectionist policies must be applied with considerable caution to prevent strangling market efficiency and competitiveness. To increase the competitiveness of local rice growers, policymakers must carefully consider removing the border restriction gradually (Ugwuja & Chukwukere, 2021; Ajoje & Adegboyo, 2022; Idris et al., 2023). This might involve implementing a slew of regulations aimed at encouraging creativity, simplifying technological adoption, and boosting financial choices for small-scale farmers.

6.2 *Enhancing local rice production and value chains*

It is critical to expand domestic rice farming and develop the entire value chain in order to maintain the benefits of border closure and attain self-sufficiency in rice production. To boost rice production productivity and quality, policymakers must prioritize investments in agricultural research, extension services, and infrastructural development. These initiatives are expected to increase crop yield, decrease harvest-related losses, and raise Nigerian rice's competitive position in terms of both price and quality (Adebowale, 2016; Uduma et al., 2016; Abdulwaheed et al., 2017; Okunlola et al., 2020).

Prioritizing the expansion and upgrading of rice production value chains is critical. This includes allocating cash to build processing facilities, storage infrastructure, and distribution networks to make it simpler to supply locally produced rice to clients promptly and efficiently while keeping specified quality requirements. Improving the value chains of the local rice sector would increase its overall effectiveness and competitiveness.

6.3 *Strengthening border control mechanisms*

It is critical to strengthen border control systems in order to prevent smuggling operations and maintain compliance with trade regulations in light of the relaxing of border restrictions. To offer effective monitoring and enforcement, resources must be allocated to technical upgrades and human capital development (Emodi & Madukwe, 2011). When it comes to effectively fighting smuggling-related concerns, the importance of collaboration with neighboring nations cannot be overstated. It is possible to achieve the desired objective of developing regional trade harmony while boosting local production by doing so (Ugwuja & Chukwukere, 2021).

In order to facilitate lawful commercial activity, efficient and transparent customs procedures are required. The introduction of legislation aimed at speeding trade processes, lowering administrative barriers, and improving transaction visibility will enable more successful cross-border business activities. Furthermore, creating such an environment will make it simpler for informal trade operations to become formalized, encouraging economic integration and decreasing the incentives for smuggling (Igwe et al., 2015; Sherif et al., 2023).

6.4 *Promoting regional trade partnerships*

Prioritizing the protection of small businesses is crucial, but so is developing regional trade alliances. Nigeria's border blockade has strained its diplomatic connections with its neighbors, necessitating coordinated efforts to repair and enhance these bilateral alliances. To deepen regional economic integration and improve the overall business climate, good communication and negotiation are required to resolve difficulties and establish mutually beneficial solutions (Anaele & Ogali, 2022; Nebeife et al., 2022).

Collaboration projects can increase the flow of products and services while simultaneously encouraging fair competition. Implementation of regional trade agreements and trade policy synchronization are two examples. According to Udoh (2021), Nigeria has the ability to leverage regional trade alliances in order to capitalize on the comparative advantages of neighboring nations and benefit from a diverse and resilient regional market.

To handle the economic consequences from the Nigerian border closure, thorough policy considerations and strategic actions are required, particularly in the rice industry. Policy implications and recommendations include the need to strike a balance between trade protection and market efficiency, the strengthening of regional trade alliances, the development of local value chains for rice production, and border control measures. Nigeria has the chance to exploit the

benefits of the border closure by achieving self-sufficiency in rice production, encouraging economic growth, and contributing positively to regional integration and stability by putting these plans into reality.

7. Conclusion

The closure of Nigeria's borders has major and varied economic ramifications for rice imports. The current study looked at the decline in imported rice availability, its effects on domestic rice production and farmers, price fluctuations and consumer affordability, changes in trade patterns and market dynamics, and the implications for taxation and other financial matters. However, these economic implications must be considered in the context of broader socioeconomic concerns.

Finally, the border restriction has restricted the availability of imported rice, as well as the number of options and alternatives available to customers. The aforementioned phenomenon has had a significant impact on local rice production and farmer livelihoods, providing both chances for higher output and employment as well as obstacles due to a lack of resources and support for small-scale farmers. Furthermore, as a result of price increases caused by the closure, many consumers, particularly those in lower socioeconomic groups, now have less access to rice. Changes in trade patterns and market dynamics have impacted not only the rice business, but also countless other industries and the entire economy. The government has seen both good and negative fiscal consequences, as indicated by revenue gains from increased domestic output and potential losses from lower trade with neighboring countries.

Making informed policy decisions and conducting extensive analyses are critical for effectively handling the current economic challenges. Decision-makers must carefully consider the possible benefits and downsides for the rice sector, as well as the short- and long-term effects on supply and demand dynamics. This necessitates a full grasp of the complex dynamics at work, such as the connections between home production and offshore sourcing, the effects on various stakeholders, and the broader economic and social consequences.

Furthermore, it is critical that public policy decisions extend beyond the rice business. It is critical to consider the larger socioeconomic variables associated with border closures. This includes regional inequities, food security implications, employment and livelihood consequences, and employment and livelihood repercussions with a focus on border communities. Adopting a comprehensive plan that takes into account not only economic reasons but also the goal of supporting inclusive and sustainable economic development in Nigeria is critical if these concerns are to be effectively addressed.

It is critical to strike a balance between economic and bigger societal considerations. While increasing rice self-sufficiency is crucial, policymakers must also consider the possible impacts on employment, food security, and regional inequities. Adopting a holistic plan that considers economic, social, and environmental variables can assist policymakers in effectively improving the overall well-being of the population.

The blockade of Nigeria's borders has a significant economic impact on rice imports. In order to make sound policy decisions, these ramifications must be thoroughly examined. It is critical to integrate economic concerns with broader societal issues in order to achieve equitable and sustainable growth. Nigeria has the potential to address the difficulties and opportunities posed by border closures by implementing a comprehensive and coordinated approach. With this method, the country might become self-sufficient in rice production and increase the overall well-being of its people.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The author declares no competing interests.

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Center for Open Access in Science ▪ https://www.centerprode.com/ojre.html
Open Journal for Research in Economics, 2024, *7*(1), 23-32.
ISSN (Online) 2620-102X ▪ https://doi.org/10.32591/coas.ojre.0701.03023c

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

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Received: 3 October 2023 ▪ Revised: 18 April 2024 ▪ Accepted: 26 April 2024

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 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.

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

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

In the prior two equations used some impact factors, which are the a_p which was also presented previously, moreover the variables α_r, α_n, h_n,α_m and the h_m. The variable $\alpha_r$symbolizes the impact factor of the rest rewarding taxes. The symbol of α_n is the impact factor of education and any technical knowledge. The symbol of α_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:

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

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

$$b_1, b_2, \; b_3 = 0 \text{ and } x_i \quad (24)$$

$x_i \; \geq 0$, 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
α_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:

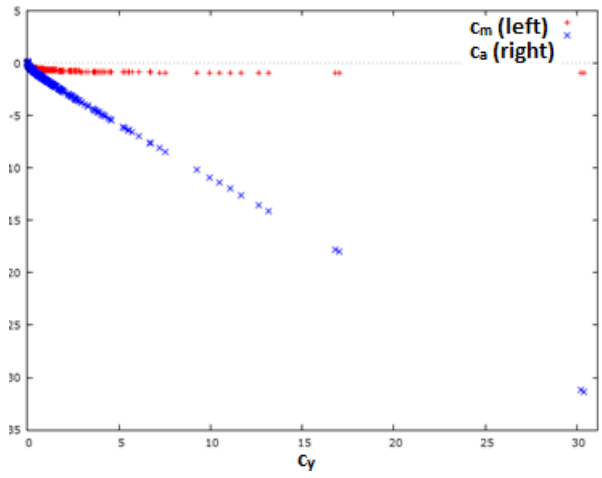

Figure 1. Cycle of money with its velocities

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*
α_s	0.6
α_t	0.7
μ	0.9
α_p	0.8

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

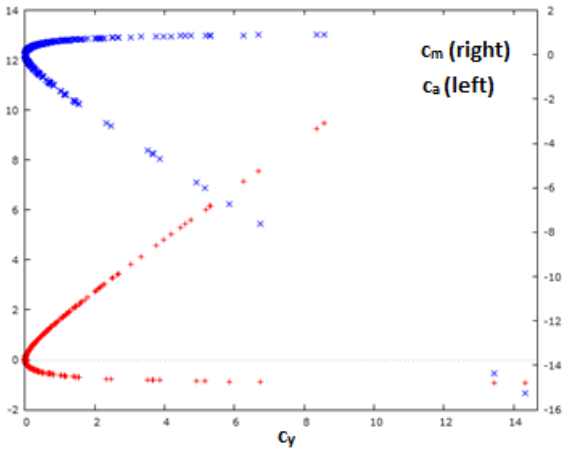

Figure 2. Cycle of money with its velocities

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.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The author declares no competing interests.

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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
```

Center for Open Access in Science ▪ https://www.centerprode.com/ojre.html
Open Journal for Research in Economics, 2024, *7*(1), 33-40.
ISSN (Online) 2620-102X ▪ https://doi.org/10.32591/coas.ojre.0701.04033c

Velocity of the Escaped Savings and Financial Liquidity on Mixed Savings

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Received: 3 October 2023 ▪ Revised: 2 July 2024 ▪ Accepted: 14 August 2024

Abstract

This paper is about the velocities of the escaped savings and of the financial liquidity, using and the mixed savings. This means that it scrutinizes 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 mixed savings. Therefore, it is determined how the economy works based on its cycle of money. Thence, it is plausible to extract conclusions about the consumption and the investments in each economy. For this analysis, the Q.E. method approach has been applied.

Keywords: mixed savings, financial liquidity, cycle of money.

1. Introduction

The case of mixed savings includes in its model both the escaped savings and the enforcement savings. This current work 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 mixed savings. It is obtained through the Q.E. method the attitude of the cycle of money and how it works and then extracted conclusions about the consumption and the investments in that case. Moreover, it is concluded the behavior of the velocity of escaped savings and the same happens in the case of the velocity of financial liquidity, subject to the 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 defines when the savings robust the economy and when the taxes robust the economy. This determination must 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 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.

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

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

In the prior two equations used some impact factors, which are the a_p which was also presented previously, moreover the variables α_r, α_n, h_n,α_m and the h_m. The variable $\alpha_r$symbolizes the impact factor of the rest rewarding taxes. The symbol of α_n is the impact factor of education and any technical knowledge. The symbol of α_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:

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

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

$$b_1, b_2, b_3 = 0 \text{ and } x_i \quad (24)$$

$x_i \geq 0$, 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:

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

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

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

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 be defined by two concrete equations.

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

Using equations (22) to (27):

$$c_{y\alpha} = b_1[(c_a - c_{a0})^2 + c_{y\alpha 0}] \quad (28)$$

$$c_{ym} = b_4[(c_m - c_{m0})^2 + c_{ym0}] \quad (29)$$

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

Table 1. compiling coefficients

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

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

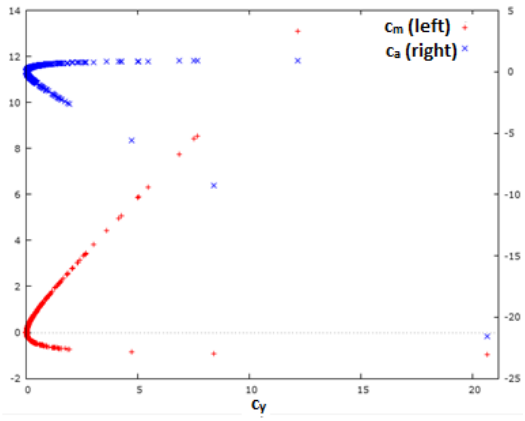

Figure 1. Cycle of money with its velocities

The previous figure has determined that the cycle of money is connected with the velocity of escaped savings, and with the velocity of financial liquidity. The mixed savings enhance the economy. Thence has clarified that 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 on the cycle of money, but finally, the velocity of financial

liquidity has a higher impact than the velocity of escaped savings. Then in general the cycle of money in normal economic circumstances has a positive orientation. The mixed savings helped the economy to overcome these initial disturbances more rapidly.

3. Conclusion

In this paper, it is concluded that the cycle of money under normal economic circumstances has a positive orientation, and with mixed savings, the economy is enforced more. This means that consumption and investments would be increased in any economy with normal conditions. mixed savings have a positive role in consumption and investments.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The author declares no competing interests.

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Appendix

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%(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
```

Open Journal for Research in Economics, 2024, *7*(1), 1-40.
ISSN (Online) 2620-102X

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Open Journal for Research in Economics, 2024, *7*(1), 1-40.
ISSN (Online) 2620-102X

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