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The Cycle of Money (C.M.) Considers Financial Liquidity with Minimum Mixed Savings

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Abstract

This paper discusses the velocities of escaped savings and financial liquidity, as well as the minimum mixed savings. This means that examined the behavior of the money cycle under normal conditions, due to the velocity of mixed savings at their lower level and the velocity of financial liquidity. As a result, the money cycle determines how the economy operates in this case. Thence, it is plausible to extract conclusions about the consumption and investments in each economy. For this analysis a Q.E. method approach is used.

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

JEL codes: A10, E0, E1.

1. Introduction

This work compares the behavior of the money cycle with the velocity of escaped savings with the velocity of financial liquidity with the minimum mixed savings. It is obtained the attitude of the money cycle and how it works through the Q.E. method and then draws conclusions about consumption and 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 minimum mixed savings (Azar, Maldonado, Castillo & Atria, 2018; Liu, Liu, Huang & Chen, 2018; Marques, 2019; Miailhe, 2017; Montmarquette, 2020; Prestianawati, Mulyaningsih, Manzilati & Ashar, 2020; Sánchez, Rodríguez & Espitia, 2020; Schram, 2018; Ustinovich & Kulikov, 2020). Mixed savings are defined as cash reserves that fall somewhere in between the escaped savings and the enforcement savings. When mixed savings reach near to enforcement savings, the economy benefits (Andriansyah, Taufiqurokhman & Wekke, 2019; Cai, 2017; dos Santos Benso Maciel, Bonatto, Arango & Arango, 2020; Driver, 2017; Farah, 2011; Gong, Zhang, Yuan & Chen, 2020; Moreno-Jiménez, Pérez-Espés & Velázquez, 2014; Suslov & Basareva, 2020; Tummers, 2019; Zamudio & Cama, 2020). On the contrary, once the mixed savings approach escaped savings, the economy suffers. Savings that have escaped the country's economic system are referred to as escaped cash reserves. Enforcement savings, on the other hand, are savings that remain in the nation's economy (Berchin et al., 2019; Carfora, Pansini & Scandurra,

2021; Evans, Ringel & Stech, 1999; Korenik & Wegrzyn, 2020; Levi, 2021; Marenco, Strohschoen & Joner, 2017; Tvaronavičienė, Tarkhanova & Durglishvili, 2018).

Contracts and agreements between participants in control transactions determine how profits and losses are allocated. The changes in the contracts should be mentioned in the agreements. This is why tax authorities should conduct regular inspections. The periodic specification of contracts is critical for the comparability analysis. These periodic inspections of companies that participate in controlled transactions are critical for the arm's length principle. The cost-sharing is then determined based on a periodic review of companies that are tested parties. The context of controlled transaction companies is to face issues related to the taxation of their activities. As a result, the requirements for companies conducting controlled transactions with tax authorities should fall within the scope of the arm's length principle (Androniceanu, Gherghina & Ciobănaşu, 2019; Bergquist, Mildenberger & Stokes, 2020; Castro & Scartascini, 2019; Corti, Roldán & Benito, 2020; Farah, 2011; Tummers, 2019). As a result, the appropriate agreement for controlled transaction companies allows them to maximize profits in tax environments with low tax rates while minimizing costs in tax environments with high tax rates.

2. Literature review

Furthermore, the companies of controlled transactions should be notified that tax authorities are inspecting them under the condition of corresponding adjustments. The interpretation of the condition of the proportional adjustment is that companies that participate in controlled transactions frequently lack the appropriate data and uncontrolled transactions of similar circumstances to compare, so they adjust their data in a proportional manner (Challoumis, 2021e, 2021d, 2021b, 2021c, 2021f). This implies 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 to their data. Profits and costs are generated by the production of goods or services. It is known from the prior investigation:

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

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

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

According to equations from (1) to (2) is plausible to determine the following equations:

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

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

The symbol of b in the prior equation is about the amount of taxes that should pay the companies of controlled transactions in the application of the arm's length principle. The u_c is the amount of tax obligations that can avoid through the allocations of profits and losses. Moreover, j_1 is a coefficient for the rate of taxes. Profits and costs are generated by the production of goods or services by businesses. It is known from the previous investigation:

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

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The symbol v in the preceding equation represents the taxes that should be paid by controlled transaction enterprises when the fixed length principle is applied. Thus, j_2 is a coefficient for the rate of taxes in the case of the fixed length principle. As a result of the preceding theory:

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

The tax on companies that participate in controlled transactions of transfer pricing under the fixed length principle is higher or at least equal to the tax on companies that participate under the arm's length principle (Challoumis, 2018c, 2018b, 2019, 2020a, 2020b). As a result, using the fixed length principle, controlled transaction enterprises can address issues arising from profit and loss allocation. As a result, tax authorities can confront the transfer pricing effects on global tax revenue (Anderson, Mckee & Mossialos, 2020; Franko, Tolbert & Witko, 2013; John, 2018; Jomo & Wee, 2003; McIsaac & Riley, 2020; Miljand, 2020; OECD, 2020).

The fixed length principle allows for the recovery of global tax revenue losses from transfer pricing controlled transactions (Bestari, Sinaga & Saudi, 2019; Cascajo, Diaz Olvera, Monzon, Plat & Ray, 2018; Cornelsen & Smith, 2018; Cruz-Castro & Sanz-Menéndez, 2016; Ginsburgh & Weber, 2020; Muñoz & Flores, 2020; Ud Din, Mangla & Jamil, 2016). The following scheme depicts the procedure that companies of controlled transactions use for profit and loss allocations, proportional data adjustments, and the fixed length principle:
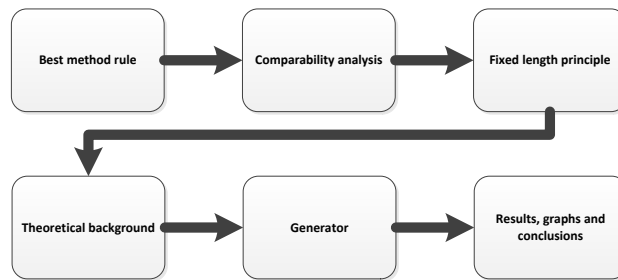
Figure 1. Cost sharing and application of fixed length principle

Fig. 1 depicts the procedure of the fixed length principle and its quantity analysis for determining the model's behavior. The theory of the money cycle is presented in the following section. The Q.E. method and its econometric approach are used as the methodology.

3. The cycle of money

The mathematical background of the theory of the circle of money is listed. Calculations of the money cycle are defined by the following mathematical formulas:

$$c_y = c_m - c_\alpha \tag{7}$$

$$c_y = \frac{dx_m}{dm} - \frac{dx_m}{da} \tag{8}$$

$$i_{cy} = Y * b_d \tag{9}$$

$$g_{cy\ Country} = \frac{c_{y\ coyntry's}}{c_{y\ Average} + c_{y\ coyntry's}} \ \text{or} \ \frac{i_{cy\ coyntry's}}{i_{cy\ Average} + i_{cy\ coyntry's}} \tag{10}$$

$$g_{cy\ Average} = \frac{c_{y\ Average}}{c_{y\ Average} + c_{y\ Average}} \ \text{or} \ \frac{i_{cy\ Average}}{i_{cy\ Average} + i_{cy\ Average}} = 0.5 \tag{11}$$

It is the speed of c_m financial liquidity, it is the speed of emancipatory transactions, and it is the c_α speed of c_y the money cycle. It is the i_{cy} indicator of the money cycle, it is GDP,

and it Y is the bank reserves of each country b_d. In addition, symbolizes the general indicator of the money cycle of each country, is the indicator of the $g_{cy\ Country}$ the economy of each country c_y, and $i_{cy\ coyntry's}$ or $c_{y\ coyntry's}$ c_y is the international indicator of $i_{cy\ Average}$ or $c_{y\ Average}$ i_{cy}. In conclusion, it is the general international $g_{cy\ Average}$ indicator and is perceived as an international constant. The appropriate assumption is c_y aimed at establishing the link between the indicator of the international (global) average, c_y bank holdings and per capita GDP, taking into account econometric approaches. Subsequently, the initial assumption of the money cycle is verified in the context of real economic scenarios in most countries internationally, divided by the international average of the money cycle index. Eq. (10) and (11) mean that an economy close to 0.5 can directly address an economic crisis. The perfect economy takes a value of 1. Every 0.1 that an economy loses from the unit, means that it takes 3 to 5 years for that economy to recover from an economic crisis (this was identified by the results obtained from this survey). The results approaching the value of 0.5 represent an appropriate indicator of the money cycle, revealing an adequate economic structure for society and the proper distribution of money among citizens – consumers. The ex. (1) the money cycle, used to define it $c_{y\ coyntry's}$ and $c_{y\ Average}$.

The money cycle in quantitative analysis, in the light of GDP, is an expression of $\frac{\partial(GDP)}{\partial(S+I+X)}$, according to $\frac{dx_m}{dm}$ the and $-\frac{\partial(GDP)}{\partial(S'+I'+M)}$ according to the $\frac{dx_m}{da}$. Next, the -, $c_y = d(GDP) = \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X)$ rests on $\frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'I'+M)$ the, $c_y = \frac{dx_m}{dm} - \frac{dx_m}{da}$ of eq. (2). Where S is savings, I is investments and X is about exports. Then, S', are the savings directed to banks outside the financial system, I', are the investments directed to banks outside the financial system, and M is the imports. Hence, the money cycle expresses GDP under the following relationship:

$$Y = S_T + I_T + (X - M), or\ Y = (S - S') + (I - I') + (X - M)\ \acute{\eta}\ Y = \Delta S + \Delta I + (X - M).$$

According to the theoretical background of the theory of the cycle of money, money lost from an economy, as a result of economic transactions, can be controlled and under the supervision of an agency that will observe money transfers between the economies of different countries, by comparing economies internationally, through ΔS, ΔI, and (X-M).

Because there is no data from an organization for these activities, the application of the money cycle indicator $c_{ytotal} = \sum_{i=1}^{n} \sum_{t=1}^{m} c_{yi,t} = \sum_{i=1}^{n} \sum_{t=1}^{m} [\frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M)]_{i,t}$ is bottled. The money cycle is an expression of the difference between the differential equations of the amount of money used in an economy and the quantity of money lost from the economy. That is why the money cycle theory advocates higher taxation of companies.

As a result, concluded that the money cycle grows when there is a tax system, such as the case of the fixed length principle, which allows for low taxation of uncontrolled transactions and higher taxation of controlled transactions. It should be noted that when uncontrolled transactions are considered, the same thing happens in the cases of citizens and small and medium-sized businesses' financial liquidity. Furthermore, there are three primary impact factors of the rewarding taxes. Only rewarding taxes play an immediate and significant role in any economy's market. These factors are related to education, the health system of each society, and the remaining relevant structural economic factors of the previous two.

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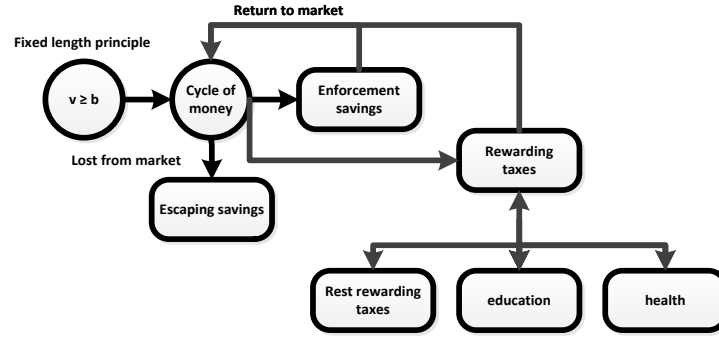
Figure 2. The cycle of money with rewarding taxes

In the previous scheme, the money cycle is represented along with all the rewarding tax factors. Then there are the rewarding taxes:

$$\alpha_p = \alpha_r + \alpha_n * h_n + \alpha_m * h_m \tag{12}$$

$$\alpha_r \geq \alpha_n * h_n \geq \alpha_m * h_m \tag{13}$$

The prior two equations used some impact factors, which are the a_p which also demonstrated, moreover the variables $\alpha_r, \alpha_n, h_n, \alpha_m$ and the h_m. The variable α_r shows the impact factor of the rest rewarding taxes. The case of α_n is the impact factor of education and any technical knowledge. The symbol of α_m is the impact factor of health anything relevant and supportive 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. It is possible to proceed to the mixed savings using equations (1) to (13). Then, considering the mixed savings:

$$\alpha_r = a_{mi} + \sum_{j=1}^{n} (\alpha_r)_j \tag{14}$$

$$\alpha_s = \sum_{k=1}^{m} (\alpha_s)_k \tag{15}$$

$$\alpha_p = \sum_{j=1}^{n} (\alpha_p)_j = \alpha_r + \alpha_n * h_n + \alpha_m * h_m \tag{16}$$

$$\alpha_t = \sum_{v=1}^{d} (\alpha_t)_v \tag{17}$$

$$a = \alpha_s + \alpha_t = \sum_{k=1}^{m} (\alpha_s)_k + \sum_{v=1}^{d} (\alpha_t)_v \tag{18}$$

$$m = \alpha_p + \sum_{z=1}^{q} m_z \tag{19}$$

$$0 \leq a_{mi} \leq 1 \tag{20}$$

Where a_{mi} is mixed savings. After which proceed to general mathematical representations of these forms based on these equations for the velocity of the escaped savings:

$$c_\alpha = c_{a0} * ln(c_m - c_{m0}) \tag{21}$$

$$c_{y\alpha} = b_1[(c_a - c_{a0})^2 + c_{y\alpha0}] \pm b_2\left(\frac{1}{c_a}\right) \pm b_3\left(\frac{1}{ln\ c_a}\right) \tag{22}$$

$$b_1, b_2, b_3 = 0 \text{ and } x_i \tag{23}$$

$$x_i \geq 0, \text{ where i=1,2}$$

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 (Challoumis, 2018a, 2020c, 2021a, 2022). The equation of $c_{y\alpha}$ represents the general equation of the escaped savings. For the acceptance of the financial liquidity:

$$c_{ym} = b_4[(c_m - c_{m0})^2 + c_{ym0}] \pm b_5(\frac{1}{c_m}) \pm b_6(\frac{1}{\ln c_m})] \tag{24}$$

$$b_4, b_5, b_6 = 0 \text{ and } x_i \tag{25}$$

$$x_i \geq 0, \text{ where i=1,2} \tag{26}$$

In the eq. (24) we have 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 takes one constant value x_i and the other one is zero. All the possible combinations of velocities of escaped savings and financial liquidities are to be defined by two concrete equations.

4. Methodology

Using prior formulas for that case is applied:

$$c_{ya} = -b_2(\frac{1}{c_a}) \tag{27}$$

$$c_{ym} = -b_6(\frac{1}{\ln c_m}) \tag{28}$$

The coefficient table for the money cycle in the case of mixed savings is as follows:

Table 1. compiling coefficients

Variables	Coefficients
$1 - a_{mi}$	0.8
$\sum_{k=1}^{m} (\alpha_s)_k$	0.6
α_t	0.7

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

Figure 3. Cycle of money with its velocities
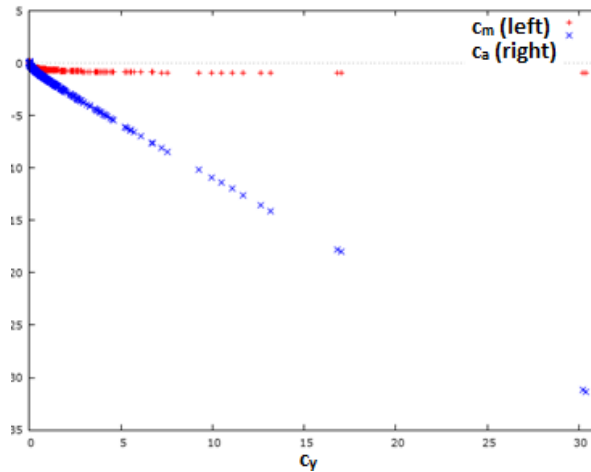
According to the previous figure, the money cycle is linked to the velocity of escaped savings and the velocity of financial liquidity. Low mixed savings benefit the economy. As a result, the velocity of financial liquidity is positive, while the velocity of escaped savings is oriented in the opposite direction. Low mixed savings do not benefit the economy because the absence of savings

from factories with R&D centers costs the economy. This explains why industrial countries have a weaker money cycle and, as a result, a lower economic dynamic.

5. Conclusions

In this article, it is concluded that the money cycle has a positive orientation under economic conditions and that with minimal mixed savings, the economy is not enforced appropriately. This appears to mean that under these conditions, no economy's consumption or investment would increase. When the mixed savings are lesser, the escaped savings increment and the enforcement savings reduce, and the economy is not properly supported.

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Appendix

```
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

am=0.2;

a=(1-am)+as+at;%consider am+as as one variable
m=m1+ap+am;
xm=m-a;
cm=xm/a;
ca=xm/m;
cy=cm-ca;


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

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External Debt and Internal Debt Impact
on the Growth of the Nepalese Economy

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Abstract

The study examines the relationship between internal debt, external debt, and economic growth in Nepal. Debt plays a crucial role in capital formation that contributes to economic growth. Therefore, this study aims to examine the influence of internal and external debt on Nepal's economic growth between mid-July 1975 and mid-July 2022, utilizing the Ordinary Least Square method to determine the relationship between the variables, Augmented Dickey-Fuller techniques to test for unit root, and Granger causality test to establish causation between GDP, external debt, and internal debt. The unit root test results indicate that the GDP variable is stationary, while the variables of external and internal debt are non-stationary in the model. The causality results show a bidirectional relationship between external debt and GDP, but no causation exists between internal debt and GDP. The Johansen Co-integration test shows that there is no long-term correlation between external debt, internal debt, and GDP (Constant Price). This results in the null hypothesis of no co-integration being rejected and indicates that there is insufficient evidence to support the idea that external debt, internal debt, and economic growth (GDP) are co-integrated. Additionally, external debt does not Granger-cause internal debt, indicating a unidirectional relationship. The OLS results indicate that external debt has a negative impact on economic growth, whereas internal debt has a positive impact on the growth of the Nepalese economy (GDP). The findings of the study also suggest that external debt has a greater adverse impact on economic growth compared to internal debt. The study suggests that the government should prioritize the use of internal debt over external debt to foster economic growth in Nepal.

Keywords: internal debt, external debt, economic growth (GDP).

1. Introduction

The term "public debt" was first used in the 18th century (Taylor, 1961 as citied in Upadhyaya, 2021). The majority of classical economists opposed borrowing and thought that the government should only have a minimal role in promoting responsible lending. But because of the government's swift economic development and resource utilization following the Great Depression of the 1930s, growing government expenditure resulted in a rise in the public debt. The US public debt had been rapidly increasing since the early 1980s, with the exception of a short period of budget surpluses in the late 1990s, and it had exploded since the start of the global

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financial crisis of 2007-2008 (Hager, 2016). With the exception of World War II, the public debt first crossed the 100 percent threshold of GDP in 2013 and has remained over it ever since. The "spectacle of a highly centralized public debt" was demonstrated by Adams' study. He found that in the late 19th century, the richest individuals and the largest businesses held a greater proportion of the public debt (Hager, 2016). These two organizations made up the "bondholding class," which he described as having significant influence over the government and society due to their ownership of the public debt. While internal debt only transfers resources within the country, internal debt can boost a country's access to resources (Panizza, 2006). Therefore, only foreign debt causes a "transfer" concern. Foreign borrowing is usually accompanied with vulnerability that may result in debt crises since central banks in developing countries are unable to produce the hard currency required to repay external debt. Governmental responsibilities have significantly increased as the welfare state concept has developed (Sharma, 2014). Furthermore, international pressure is gradually expanding social welfare functions. A budget deficit should exist due to the government's high spending and low revenue. The sources of government revenue include taxation, money printing, taking out domestic or foreign loans, or utilizing previous budget surpluses. However, compared to the national GDP, expenditure on various economic activities and security is increasing rapidly. Only through income collection is it possible to pay the government's increasing expenses. The question of whether or not foreign borrowing under the prevailing circumstances is beneficial for developing economies has been raised in consideration of the high level of debt and the poor rate of economic growth. Borrowing for consumption is perfectly acceptable for countries with significant assets or a reliable source of future revenue (Kröller, 1978). Poor countries, on the other hand, have very little prospect of raising living standards. They get caught in a vicious cycle if there isn't enough grant aid to repay their debts. The fact that certain emerging nations with more dynamic economies borrowed more money than was necessary to fund their current account deficits had an impact on the trajectory of debt, particularly in 1976. Debt will play a crucial role in the capital formation that will contribute to economic growth (Sharma, 2014).
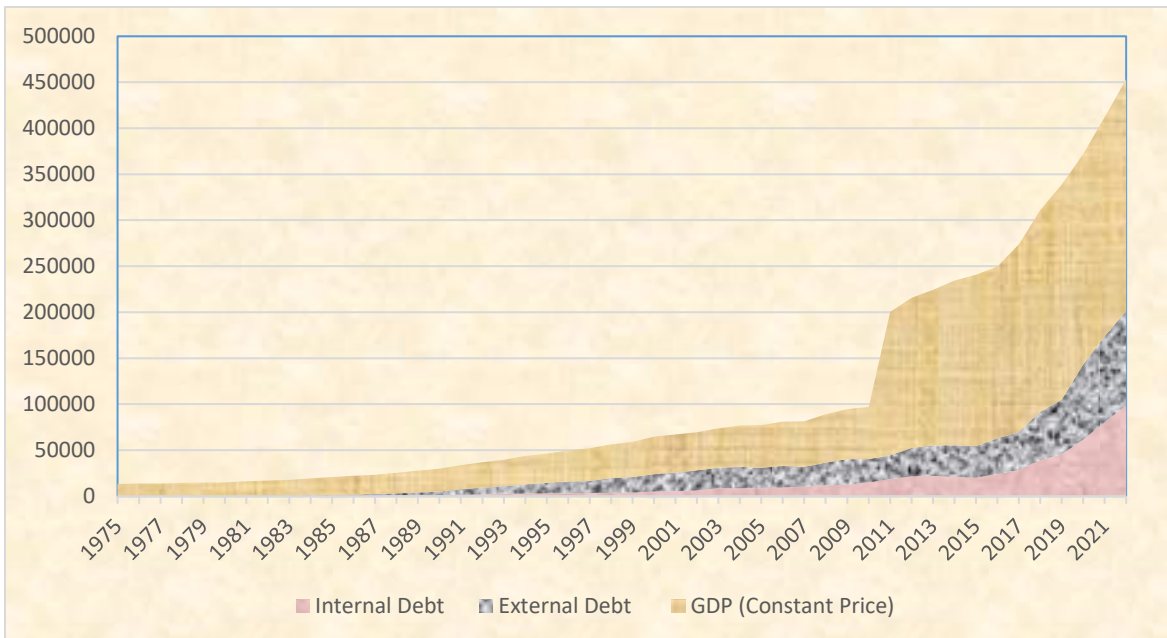
Sources: Authors' calculation

Chart 1. Gross Domestic Product (Constant Price), Internal Debt
and External Debt trend in Nepal (in Nepalese Rupees Ten Million)

The government is collecting internal debt from different sources, i.e., issuing Treasury Bonds, Treasury Bills, Development Bonds, National Savings Certificates, and Special Bonds. Similarly, the external debt is being received through bilateral and multilateral sources. Since much of the government's borrowing has been used to fund unproductive sectors, the public debt and its interest are rapidly rising. Therefore, it is essential to use debt effectively in productive areas rather than having it drag us into a negative situation. Cooke thought that any attempts to cancel the public debt would be highly harmful to all the widows, orphans, and inexperienced investors who had invested their little money into the market for federal government bonds (Hager, 2016).
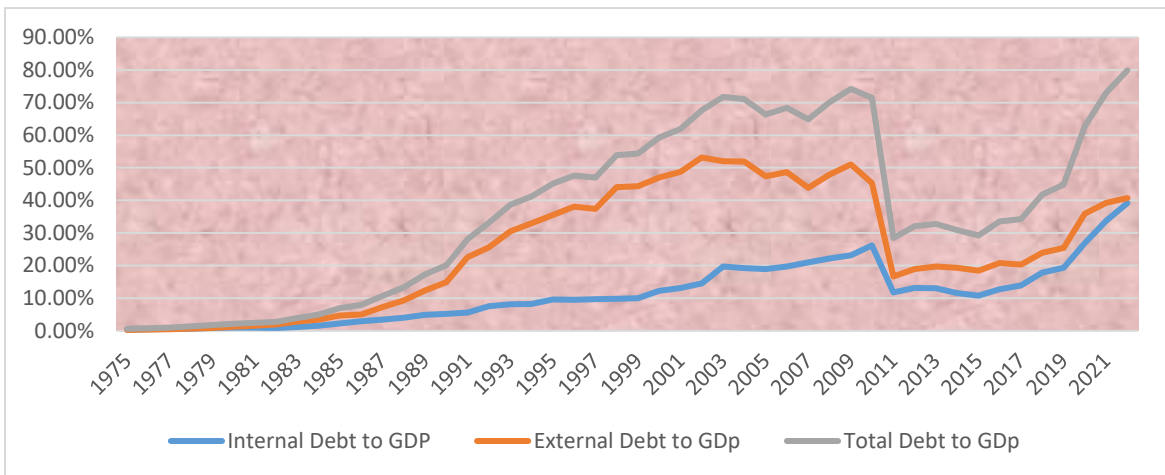
Sources: Authors' calculation

Chart 2. Internal Debt to GDP, External Debt to GDP and Total Debt to GDP percentage

The above findings in charts 1 and 2 indicate the trend of gross domestic product (constant price), internal debt, and external debt over the period of 1975 to 2022. The contribution of internal debt, external debt, and total debt to the GDP of the country has been steadily rising over the years. Thought there was a slight fall between 2010 and 2011. The findings show that there has been a rising and falling trend in the values of internal and external debt relative to gross domestic product over the past 47 years.

1.1 *Objectives*

1. To examine the impact of internal debt on economic growth of Nepal.

2. To measure the impact of external debt on economic growth of Nepal.

3. To identify whether the internal debt is impact on economic growth more or the external debt.

1.2 *Research questions*

1. Is there relationship between the internal debt and economic growth of Nepal?

2. Is there relationship between external debt and economic growth of Nepal?

3. How to identify whether the internal government debt is impact on economic growth more or the external government debt?

2. Literature review and theoretical foundation

In Amassoma (2011), the result revealed that the variables are reliable at the first differencing. A co-integration test was also performed, and the results indicated that while there was no co-integration between domestic debt and economic growth, there was co-integration between external debt and growth. The co-integration finding showed the validity of the causality test methodology. In Nigeria, the outcomes of the VEC model showed a unidirectional relationship from economic growth to external debt, but the results of the VAR model showed a reversible correlation between internal debt and economic growth. According to the analysis, the government should depend very little on external debt to promote economic development and more on internal debt.

The study of Rabia and Kamran (2012) demonstrated an inverse relationship between domestic debt and economic growth, and it was also found that there was an adverse relationship between external debt and economic growth. These relationships were also found to be significant. The findings also showed that the amount of external debt reduces economic growth more than the amount of domestic debt. In comparison to domestic debt, the negative effect of external debt on economic growth is higher. There are also some policy implications for avoiding the current external debt situation.

The research of Umaru et al. (2013) found that domestic debts, if managed well, can result in significant levels of economic development. A significant policy implication of these findings is that policymakers should make a concentrated effort to manage the debt properly by allocating funds to productive activities (the real sector) in order to increase Nigeria's productivity levels and therefore achieve the desired level of growth. The study's other policy conclusion is that most nations incur debt for selfish reasons as opposed to promoting economic growth by investing in capital formation and other forms of social overhead capital. Fiscal discipline and a strong sense of responsibility in managing public finances should be the keys to the success of these countries' leaders if debt is to support prosperity in Nigeria and other highly indebted countries. The only way to drastically reduce external debt is to boost output (GDP).

In Njimanted et al. (2014), results from a system estimation approach using the estimation method Two Stage Least Squares in the case of Cameroon over a 34-year period (1980-2013) demonstrate that while domestic investment boosts economic growth, external debt slows economic growth in Cameroon, demonstrating the impact of public debt. The authorities are expected to improve the performance of the external debt through proper debt management, a complete debt relief, and using the debt in productive sectors for the production of goods and services. It was thus concluded that external debts negatively affect economic growth in Cameroon.

The report of Panizza (2006) indicates that there are conceptual and practical problems with the conventional external/domestic debt divide and identifies potential challenges and opportunities emerging from the new debt management strategy implemented by some emerging and developing countries. For doing so, the research examines possible trade between domestic and external borrowing and emphasizes that, while moving toward greater domestic borrowing might assist lower the risks associated with sovereign financing, policymakers shouldn't become comfortable in the process.

According to the findings of Ayokunle (2020), domestic debt had a statistically significant positive impact on economic growth, but external debt with a negative sign was not statistically significant.

According to the findings of the error correction approach (Sulaiman & Azeez, 2012), Nigeria's economy has benefited from external debt. According to the study, the government

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should maintain political and economic stability and acquire external debt mainly for business-related purposes rather than social or political reasons.

3. Methodology of analysis

The research is based on secondary time series data collected from the years 1975 to 2022 A.D., and Nepal's GDP base year is 2000 A.D., so there were data sources from the ministry of finance, such as economic survey reports for various years. The internal debt, external debt, and real gross domestic product were all ten million Nepalese rupees.

In Hansen (2014), the focus of econometric theory revolves around the creation and refinement of tools and techniques, as well as the examination of the characteristics of these methods. Econometrics relies on the creation of statistical techniques for estimating economic relationships, testing economic theories, and evaluating and implementing government and business policies (Wooldridge, 2009). While econometrics is commonly used for forecasting macroeconomic variables like interest rates, inflation rates, and gross domestic product, it can also be applied in various other economic domains beyond macroeconomic forecasting.

3.1 *Econometric model specification*

The objective of this study is basically to examine whether or not internal debt and external debt causes economic growth in Nepal. To achieve the above objective, the multiple regression, correlation, Johansen co-integration and granger causality test is utilized. The SPSS and EViews statistical software have been used for the outcomes of the study. Causality said to be essential in econometrics analysis in the sense that it makes us to know whether a past change in one variable X has a corresponding impact on current variables Y or whether the relation works in the opposite direction. The model is specified as follows:

$LOGGDP = \Sigma\phi_i LOGEXTDEBT_{t-1} + \Sigma \phi_j LOGDOMDEBT_{t-1} + \Sigma \phi_k LOGGDP_{t-1} + \mu_{t1}$ ---------------1

$LOGEXTDEBT = \Sigma\alpha_i LOGEXTDEBT_{t-1} + \Sigma\alpha_j LOGDOMDEBT_{t-1} + \Sigma\alpha_k LOGGDP_{t-1} + \mu_{t2}$ ---------- 2

$LOGDOMDEBT = \Sigma\beta_i LOGEXTDEBT_{t-1} + \Sigma\beta_i LOGDOMDEBT_{t-1} + \Sigma\beta_k LOGGDP_{t-1} + \mu_{t3}$ ----------3

4. Results and discussion

Table 1. Multiple regression results table without log

Dependent Variable: GDP__CONSTANT_PRICE_
Method: Least Squares
Date: 02/18/23   Time: 12:16
Sample: 1975 2022
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTERNAL_DEBT	0.281772	1.040419	0.270826	0.7878
EXTERNAL_DEBT	2.653843	0.902368	2.940978	0.0052
C	14249.87	8358.678	1.704799	0.0951

R-squared	0.803336	Mean dependent var		73057.73
Adjusted R-squared	0.794596	S.D. dependent var		77354.05
S.E. of regression	35058.05	Akaike info criterion		23.82786
Sum squared resid	5.53E+10	Schwarz criterion		23.94481
Log likelihood	-568.8686	Hannan-Quinn criter.		23.87206
F-statistic	91.90855	Durbin-Watson stat		0.295141
Prob(F-statistic)	0.000000			

Source: Authors' computation

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Table 2. Multiple regression after taking the natural log

Dependent Variable: LOG_GDP__CONSTANT_PRICE_
Method: Least Squares
Date: 02/18/23   Time: 22:16
Sample: 1975 2022
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_INTERNAL_DEBT	1.021212	0.078130	13.07070	0.0000
LOG_EXTERNAL_DEBT	-0.583279	0.073941	-7.888401	0.0000
C	7.630204	0.146315	52.14902	0.0000

R-squared	0.936029	Mean dependent var	10.71258
Adjusted R-squared	0.933186	S.D. dependent var	0.960648
S.E. of regression	0.248313	Akaike info criterion	0.112204
Sum squared resid	2.774660	Schwarz criterion	0.229154
Log likelihood	0.307098	Hannan-Quinn criter.	0.156400
F-statistic	329.2217	Durbin-Watson stat	0.445415
Prob(F-statistic)	0.000000		

Table 3. Correlation results

	GDP__CON...	INTERNAL_...	EXTERNAL...
GDP_...	1.000000	0.874949	0.896112
INTER...	0.874949	1.000000	0.971662
EXTE...	0.896112	0.971662	1.000000

Table 4. Unit root test for GDP

Null Hypothesis: D(GDP__CONSTANT_PRICE_) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.273701	0.0000
Test critical values:	1% level	-3.581152	
	5% level	-2.926622	
	10% level	-2.601424	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP__CONSTANT_PRICE_,2)
Method: Least Squares
Date: 02/19/23   Time: 14:13
Sample (adjusted): 1977 2022
Included observations: 46 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP__CONSTANT_PRICE_(-1))	-0.947237	0.150985	-6.273701	0.0000
C	4924.996	2339.356	2.105279	0.0410

R-squared	0.472165	Mean dependent var	291.2546
Adjusted R-squared	0.460168	S.D. dependent var	20490.08
S.E. of regression	15054.73	Akaike info criterion	22.11928
Sum squared resid	9.97E+09	Schwarz criterion	22.19878
Log likelihood	-506.7434	Hannan-Quinn criter.	22.14906
F-statistic	39.35932	Durbin-Watson stat	1.996693
Prob(F-statistic)	0.000000		

Table 5. Unit root test for external debt

Null Hypothesis: D(EXTERNAL_DEBT) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.253535	0.6428
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXTERNAL_DEBT,2)
Method: Least Squares
Date: 02/19/23   Time: 14:13
Sample (adjusted): 1978 2022
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXTERNAL_DEBT(-1))	-0.168591	0.134493	-1.253535	0.2169
D(EXTERNAL_DEBT(-1),2)	-0.467214	0.147707	-3.163120	0.0029
C	671.5164	534.8060	1.255626	0.2162

R-squared	0.338807	Mean dependent var	202.2216
Adjusted R-squared	0.307321	S.D. dependent var	3759.739
S.E. of regression	3129.130	Akaike info criterion	18.99924
Sum squared resid	4.11E+08	Schwarz criterion	19.11968
Log likelihood	-424.4829	Hannan-Quinn criter.	19.04414
F-statistic	10.76075	Durbin-Watson stat	1.869276
Prob(F-statistic)	0.000169		

Table 6. Unit root test for internal debt

Null Hypothesis: D(INTERNAL_DEBT) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.122682	0.9999
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTERNAL_DEBT,2)
Method: Least Squares
Date: 02/19/23   Time: 14:14
Sample (adjusted): 1978 2022
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTERNAL_DEBT(-1))	0.218130	0.102762	2.122682	0.0397
D(INTERNAL_DEBT(-1),2)	-0.482757	0.192074	-2.513385	0.0159
C	223.6319	335.4538	0.666655	0.5086

R-squared	0.137291	Mean dependent var	409.7107
Adjusted R-squared	0.096210	S.D. dependent var	2141.389
S.E. of regression	2035.773	Akaike info criterion	18.13948
Sum squared resid	1.74E+08	Schwarz criterion	18.25992
Log likelihood	-405.1383	Hannan-Quinn criter.	18.18438
F-statistic	3.341940	Durbin-Watson stat	1.990532
Prob(F-statistic)	0.044993		

Table 7. Causality test

Pairwise Granger Causality Tests
Date: 02/18/23   Time: 12:49
Sample: 1975 2022
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INTERNAL_DEBT does not Granger Cause GDP__CONSTANT_PRICE_	46	0.39696	0.6749
GDP__CONSTANT_PRICE_ does not Granger Cause INTERNAL_DEBT		0.26473	0.7687
EXTERNAL_DEBT does not Granger Cause GDP__CONSTANT_PRICE_	46	2.38812	0.1045
GDP__CONSTANT_PRICE_ does not Granger Cause EXTERNAL_DEBT		3.00053	0.0608
EXTERNAL_DEBT does not Granger Cause INTERNAL_DEBT	46	0.20948	0.8119
INTERNAL_DEBT does not Granger Cause EXTERNAL_DEBT		2.67007	0.0813

Table 8. Johansen co-integration test

Date: 02/18/23   Time: 13:02
Sample (adjusted): 1980 2022
Included observations: 43 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP__CONSTANT_PRICE_ INTERNAL_DEBT EXTERNAL_DEBT
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.688020	73.86672	29.79707	0.0000
At most 1 *	0.416194	23.77956	15.49471	0.0023
At most 2	0.014716	0.637512	3.841465	0.4246

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.688020	50.08716	21.13162	0.0000
At most 1 *	0.416194	23.14205	14.26460	0.0016
At most 2	0.014716	0.637512	3.841465	0.4246

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP__CONS...	INTERNAL_...	EXTERNAL_DEBT
5.07E-06	0.000368	-8.50E-05
0.000114	-0.000995	7.98E-05
-6.20E-05	0.000935	-0.000329

Unrestricted Adjustment Coefficients (alpha):

D(GDP__CO...	3917.520	-4409.549	-241.7901
D(INTERNAL...	1422.286	33.57103	53.18716
D(EXTERNAL...	1608.281	825.9329	-44.13342

1 Cointegrating Equation(s):	Log likelihood	-1170.900

Normalized cointegrating coefficients (standard error in parentheses)
GDP__CONS...	INTERNAL ...	EXTERNAL_DEBT
1.000000	72.65247	-16.77080
	(13.3929)	(6.61402)

Adjustment coefficients (standard error in parentheses)
D(GDP__CO...	0.019847
	(0.00714)
D(INTERNAL...	0.007205
	(0.00099)
D(EXTERNAL...	0.008148
	(0.00161)

2 Cointegrating Equation(s):	Log likelihood	-1159.329

Normalized cointegrating coefficients (standard error in parentheses)
GDP__CONS...	INTERNAL_...	EXTERNAL_DEBT
1.000000	0.000000	-1.177805
		(0.42636)
0.000000	1.000000	-0.214624
		(0.04092)

Adjustment coefficients (standard error in parentheses)
D(GDP__CO...	-0.480935	5.829418
	(0.13048)	(1.21770)
D(INTERNAL...	0.011018	0.490090
	(0.02225)	(0.20766)
D(EXTERNAL...	0.101947	-0.229855
	(0.03175)	(0.29630)

Table 1 displays the multiple regression results of the growth model, which reveal that the constant and the coefficient of internal debt are both statistically insignificant, while the coefficient of external debt is statistically significant. Specifically, the coefficient of internal debt is statistically insignificant at 78.78 percent with a probability value of 0.7878 and is positively signed. On the other hand, the coefficient of external debt is statistically significant at a 1 percent level with a probability value of 0.0052. This low probability value suggests that the likelihood of an effect that could invalidate the parameter is low (1 percent). Consequently, a unit change in external debt would increase economic growth (GDP) by 2.65 units, while a unit change in internal debt would increase the economy's performance by 0.28 units. The coefficient of internal debt is statistically insignificant and inconsistent with the theoretical expectation, as it is positive (B>0), while the coefficient of external debt is statistically significant and consistent with the theoretical expectation. The F-statistics, which measures the joint significance of the explanatory variables, is 91.90855 and found to be statistically significant at a 1 percent level with a corresponding probability value of 0.000000.

The R^2 value of 0.8033 (80.33%) indicates that 80.33 percent of the total variation in economic growth (GDP) is explained by the regression equation. Interestingly, even after adjusting for the degree of freedom, the goodness of fit of the regression remains high, as indicated by the adjusted R^2 value of 0.7946 (79.46%). However, the Durbin-Watson statistic of 0.2951 in the table is lower than the R^2 value of 0.8033, indicating that the model is spurious (meaningless) and implying the presence of serial correlation. Thus, this justifies the need for a unit root test.

Table 2 presents the results of the regression analysis after taking the natural logarithm of the model. The study reveals that the constant, internal debt, and the coefficient of foreign debt are all statistically significant at the 1% level. Although the coefficient of internal debt is positively signed and consistent with the theoretical assumption, the coefficient of external debt is not in line with this expectation. The findings indicate that a 1% increase in domestic debt would result in a 1.02% rise in GDP, while a 1% increase in foreign debt would lead to a 0.58% reduction in GDP. The F-statistic of 329.22, which is statistically significant at the 1% level, represents the combined significance of the explanatory variables.

The regression equation reveals that the R^2 value of 0.9360 or 93.60% indicates that it explains a significant portion of the variance in GDP. However, it is noteworthy that even after accounting for the degree of freedom, the corrected R^2 value (R^2 =0.9332 or 93.32%) remains excessively high, indicating that the goodness of fit of the regression is still too high. Additionally, the Durbin-Watson value in the table is lower than the R^2 value, indicating the presence of serial correlation and rendering the model meaningless. This underscores the need for conducting a unit root test to further assess the validity of the results.

Table 3 presents the correlation coefficients, revealing that internal debt has a correlation value of 0.874949 or 87.49% with GDP, while external debt has a correlation value of 0.896112 or 89.61% with GDP. This suggests that GDP is more strongly correlated with external debt compared to internal debt. Furthermore, the high correlation value of 0.971662 between external debt and internal debt indicates a strong correlation between these two variables at 97.16%.

Table 4, 5, and 6 present the results of the unit root test, indicating that all variables in the model are stationary at 1%, 5%, and 10% levels with a first difference (d(1)), as shown by the ADF results. The ADF value for GDP is -6.2737, and the critical values are -3.511, -2.9266, and -2.6014 at 1%, 5%, and 10%, respectively. The ADF value for internal debt is 2.1227, and the critical values for internal debt are -3.5847, -2.9281, and -2.6022 at 1%, 5%, and 10%, respectively. The ADF value for external debt is -1.2535, and the critical values for external debt are -3.5847, -2.9281, and -2.6022 at 1%, 5%, and 10%, respectively. The null hypothesis of the presence of the unit root in GDP is rejected at the 1% level, as indicated by the probability value of 0.0000.

Similarly, the null hypothesis of the presence of the unit root in internal debt and external debt is accepted at the 1% level, as indicated by their probability values of 0.9999 and 0.6428, respectively.

Table 7 displays the results of causality tests, revealing that there is bidirectional causation between external debt and GDP, with the null hypothesis rejected at the 10% level, as indicated by the probability value of 0.1045. This is supported by the F-statistics values of 2.3881 and 3.0005, respectively. The results also indicate that there is no causation between internal debt and GDP, with the null hypothesis accepted at 67.49% and 76.87%, as indicated by the high probability values of 0.6749 and 0.7687, respectively. This is confirmed by the F-statistics values of 0.3970 and 0.2647, respectively. Furthermore, the results show that external debt does not Granger cause internal debt, indicating a unidirectional relationship, as confirmed by the F-statistics values of 0.2095 and 2.670, respectively.

Based on the information presented in Table 8, the co-integration test using both the trace and max-eigen test statistics indicates that there is no long-term relationship among the three variables at a 5% level of significance. This leads to the rejection of the null hypothesis of no co-integration, suggesting that there is no evidence to support the co-integration of external debt, internal debt, and economic growth (GDP).

5. Conclusion

The main objectives of this study is to specifically examine the impact of internal debt and external debt on economic growth in Nepal from mid July 1975 to mid-July 2022. The co-integration test, which utilized both the trace and max-eigen test statistics, revealed that there is no long-term association between the three variables at a 5% level of significance. Therefore, the null hypothesis of no co-integration is rejected, indicating that there is evidence to suggest that external debt, internal debt, and economic growth (GDP) are not co-integrated. The study utilizes the Ordinary Least Squares (OLS) method to establish a simple relationship between the variables under study. The results reveal that external debt possesses a negative impact on the economic performance of Nepal, while internal debt has a positive impact on economic growth through encouraging productivity and output levels, as well as the evolution of total factor productivity. On the other hand the external debt is slowing down the economy more as compared to internal debt.

6. Recommendation

Based on the findings of the study, recommendations are made. Firstly, the government should ensure economic and political stability in order to enjoy the benefits of external and internal debt and make the debt burden minimal. Secondly, the government should acquire internal debt largely for economic reasons rather than social or political ones. This would increase the productivity of the nation. Further, the government should focus on internal debt rather than external debt to boost the economic growth of Nepal.

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Maximum Mixed Savings on the Cycle of Money

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Abstract

This work is about the utility of the cycle of money with the maximum mixed savings. This means that have examined the crucial points of tax policy and public policy which are the best for the increase of consumption and of investments, subject to the case that there exists mixed savings in the maximum level. Therefore, follows an analysis which stands on the utility of the public sector and the utility of the uncontrolled enterprises. Thence, it is plausible to extract conclusions about the utility of the cycle of money, showing the points and the behaviors of any economy when there are mixed savings and escaped savings. For this analysis, the Q.E. method and its econometrical approach have been applied.

Keywords: maximum mixed savings, cycle of money.

1. Introduction

This paper analyzes the utility of the cycle of money with the maximum mixed savings. The examination of the cycle of money with mixed savings is plausible through the use of factories, research centers, development centers, and any kind of transactions that cannot be substituted by the middle/small enterprises and by the citizens (and generally the uncontrolled transactions). Thence, after estimations, the utility graphs, which used to obtain the behavior of the cycle of money with the maximum mixed saving.

The contracts and the agreements between the participants of control transactions are those that determine the allocation of profits and losses(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 the 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 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

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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.

The tax revenues correspond to the savings that businesses could realize if taxes were avoided. How these savings are administered varies from case to case. The benefits of the companies could then be managed in a completely different way, such as savings or taxation (De Araujo et al., 2020; Gong et al., 2020; Kominers et al., 2017; Maier, 2012; Olcina et al., 2020; Paes-Sousa et al., 2019). The theory of the cycle of money shows when the savings robust the economy and when the taxes robust the economy. It is crucial for this determination to be a separation of savings into the non-returned savings (or escaped savings) and the returned savings (or enforcement savings). For the scope of this analysis below are demonstrated the equations which are:

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

$$x_m = m - a \tag{2}$$

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

$$\mu = \sum_{\iota=0}^{n} \mu_\iota \tag{4}$$

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

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

$$c_\alpha = \frac{dx_m}{da} \tag{7}$$

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

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.

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$$\alpha_p = \alpha_r + \alpha_n * h_n + \alpha_m * h_m \tag{9}$$

$$\alpha_r \geq \alpha_n * h_n \geq \alpha_m * h_m \tag{10}$$

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 α_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.

2. Maximum mixed savings on the Cycle of Money

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:

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

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

$$U(0) > 0 \tag{13}$$

$$\tilde{U}(0) > 0 \tag{14}$$

According to the prior definitions should be mentioned that the symbol of $\tilde{U}(t)$ 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}:

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

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

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

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

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

$$m = \alpha_p + \sum_{z=1}^{q} m_z \tag{20}$$

$$0 \leq a_{mi} \leq 1 \tag{21}$$

The a_{mi} represents the mixed savings. The role of mixed savings is to represent that simultaneously the factories, the research, and the development centers have escaped savings:

Table 1. Compiling coefficients

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

The generator of this procedure used the coefficients which appeared in the previous table. The factors have an upper limit of 1 and a lower limit of 0, but *s* and *s̃* are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations the following diagram:
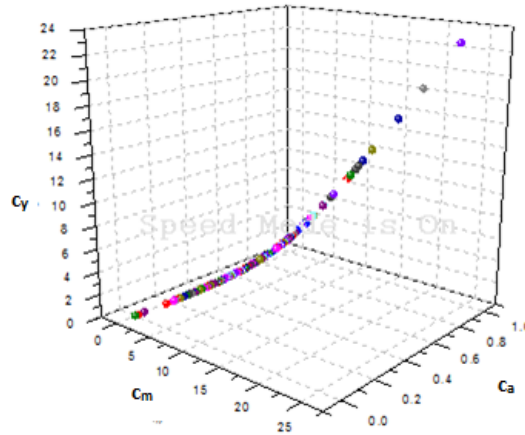
Figure 1. Cycle of money with maximum mixed savings in three-dimension representation

In the previous scheme is concluded that in the maximum case of the cycle of money (the version that included the escaped and the enforcement savings) is at a positive level as it grows.
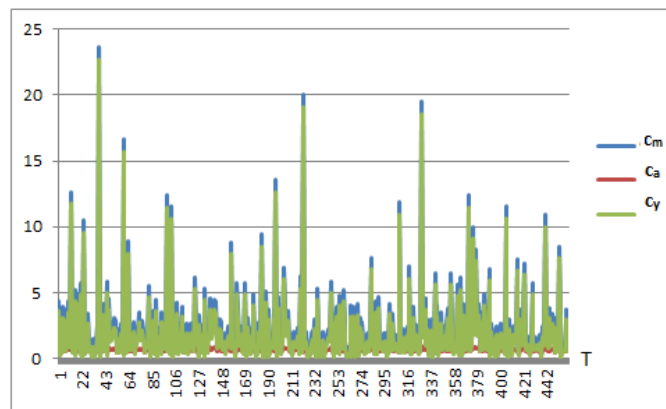

Figure 2. Cycle of money with maximum mixed savings in three-dimension representation

In the prior figure, it is concluded that the cycle of money is at a positive level as this is also revealed in Fig. 1. Thence, the velocity of financial liquidity is at a higher level than the effect of the velocity of escaped savings (with high mixed savings). Thence, it follows an analysis of the sustainability of the model, using the Q.E. method on its econometric approach:
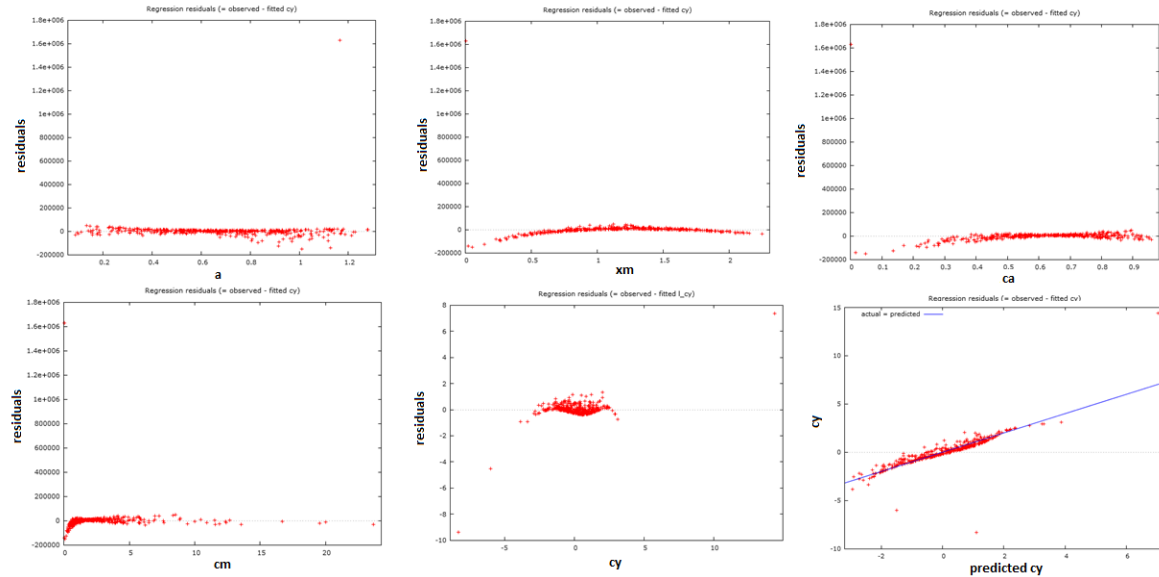
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Figure 3. Econometric analysis

From the econometric analysis of the model, it is obtained that it is sustainable as in all cases there is no diversion between the predicted values with the existing ones. Therefore, it is revealed that the model is stable.

3. Conclusion

In this paper, it is concluded that mixed savings, in general, serve the economy, as the economic dynamic of this economy is very high because mixed savings are increased. Therefore, consumption and investments in this economy are at the top level. The velocity of financial liquidity is higher than the velocity of escaping savings, then the cycle of money increases proportionally with the growth of mixed savings.

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Appendix

```matlab
%(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
```

The Contribution of Religious Monuments
to Local and Tourist Development

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Abstract

This article examines religious tourism in Greece and how it can contribute to the country's tourism development. Religious tourism is a growing sector in Greece and this is the reason why specific policies have now begun to be formulated in this field. multitude of religious monuments in Greece is a very important factor for the development of this form of tourism and gives the possibility of extending the tourist season throughout the year.

Keywords: culture, religious monuments, tourist development, Greece, local development.

1. Introduction

The concept of the divine and the sacred is completely connected to the human psyche and their search, at least the local one, is the driving force for religious journeys, since ancient times. Nowadays, the phenomenon of the movement of believers (or non-believers) in order to visit religious monuments and the economic, cultural and social consequences that this implies is called "religious tourism" and is a more specialized form of cultural tourism, as religion is one of the elements of a culture, the majority of religious monuments also have an aesthetic value and religious events are part of the broader category of cultural events (Rapti, 2011). Religious travel does not work in isolation but in combination with other wishes and needs of the tourist-traveler, such as accommodation, entertainment, gastronomy (Poulaki & Lagos, 2013), visiting other attractions and for this reason it is a multidimensional tourist a phenomenon that also affects other sectors of alternative tourism (Papakostidis, 2015).

Accepting that religious tourism is a more special manifestation of cultural tourism, it should be separated from pilgrimage tourism, as a broader category of it (Moira, 2003), as it is structured exclusively around religious faith, the pilgrimage. Pilgrims move to places of worship motivated mainly by their religious faith, with the main purpose of connecting with the Divine (Rapti, 2011) and usually fulfilling a sacred wish or worshiping a religious relic. The pilgrim is not "distracted" from other activities in the place of his movement and does not seek his acquaintance with culture, gastronomy, people or nature during his journey. On the contrary, the religious tourist, moving between the simple tourist and the pilgrim, according to Robichaud (Moira, 2003), combines other activities of cultural interest, which makes religious tourism a dynamically developing industry, with enormous economic benefits for a society.

2.The religious tourists

Religious tourists could be divided into four subcategories, according to the places of visitation: (a) tourists who visit places of purely religious interest, with little general attendance, (b) tourists who visit religious places, which contain both historical and cultural interest and attract a large number of tourists, (c) tourists who visit places where purely religious interest is combined with that for the art or style of the religious monument. The motive in this case is to visit monuments of high artistic value and not religious feeling, which may be completely lacking. The last category (d) includes tourists who are attracted to places where religious festivals take place, which are a pole of attraction both for those who attend them motivated by their religious faith and for those who participate detached from religious sentiment, as an action that contains sociological and cultural elements (Papakostidis, 2015).

In terms of their characteristics, religious tourists have great discrepancies regarding their age, profession, educational level and financial capabilities (Papakostidis, 2015), although the majority of them have a good education, medium to high income, spend large sums of money and belong to all ages, with the main one being 30-40 years old (Gouni, 2020). The above finding is also confirmed by Ojo and Busayo (2017), who identify the specificity of religious tourism in its ability to attract globally different tourist profiles.

Religious tourists are repeaters, a word used in tourism terminology to describe committed travelers who will seek to visit a religious tourist site more than once. This results in religious tourism having low resilience to economic and social upheavals, which occasionally affect the rest of tourism. Finally, religious tourists seek group travel (Gouni, 2020), which has as a consequence the specialization of many tourist agencies in religious tourism and the development of mass tourism oriented towards religious and pilgrimage tours (Rapti, 2011), thus creating a strong economic activity in the area of interest.

3. Contribution of religious tourism to tourism development

Religious tourism, precisely because of the motivation that activates it and the profile of the traveler who chooses it, is considered consistently profitable and particularly resilient, especially in times of crisis. According to the World Trade Organization (Lachlali, 2012), the worldwide turnover amounts to 15 billion euros, approximately 300 million tourists annually travel to religious destinations and approximately 3 billion people are potential religious travelers due to their religious orientation. These figures demonstrate that religious tourism is a bright field of glory for the regions that will decide to invest in this alternative form of tourism, as they will achieve economic and social development (Vardopoulos et al., 2023).

According to Polyzos (2017), among the most important socio-economic changes brought about by religious tourism in an area are (a) the increase in income from tourism for those directly or indirectly involved in it (b) the increase in employment, due to the new opportunities created (c) the increase in government revenue through tourist traffic and the consequent taxation of increased transactions, (d) the increase in revenue from holy pilgrimages and (e) the cultural development of the region, through the exchange of cultural elements between locals and visitors but also through the improvement of the offered religious tourism product, with the aim of further attracting tourists.

The contribution of religious tourism is felt more in areas that are disadvantaged in terms of tourism, compared to large urban centers (Polyzos, 2010). They are usually located in the periphery, have low growth rates, low average per capita income, high unemployment rates and a declining productive base (Terzidou et al., 2008). These regions, however, which have natural beauty and religious resources – which is very likely due to the dispersion of religious monuments throughout Greece – could invest in the development of religious tourism, given that this type of

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destination has a direction from urban centers to the periphery (Mitoula & Maniou, 2020). They should, therefore, act in the direction of recording and promoting the religious monuments in their area, increasing the size of religious flows and highlighting religious holidays, with the aim of creating an attractive tourist product that will connect religious tourism and with other types of special forms of tourism, such as cultural, gastronomic or nature tourism. The goal should be to increase the visitor's daily consumption expenditure, increase the length of stay and reduce the seasonality of the phenomenon (Terzidou et al., 2008).

In addition to the economic dimension of the contribution of religious tourism to a (developing) region, its contribution to the sustainable development of the region should not be underestimated (Lachlali, 2012). Economic development, through this alternative form of tourism, will simultaneously ensure the protection of the environment with the ultimate goal of maintaining sustainability. Religious tourism is a mild form of tourism development, which emphasizes the protection of the environment, maintaining a state of balance between the elements – economic and social – that make up a social structure. A necessary condition is the preparation of a strategic plan for tourism development, in order to make rational use of the existing religious, cultural and environmental resources. Of course, the form of religious tourism does not in itself guarantee sustainability but should be combined with practices, such as maintaining a maximum number of visitors that can catalyze in the area, the use of mild forms of energy and the use of food products that they are produced in the area with crops on the smallest possible scale (Lachlali, 2012).

4. Religious tourism in Greece

Characteristics of religious tourism in Greece Religious tourism in Greece is inextricably linked to the Orthodox faith, given that the Greeks, compared to other peoples, demonstrate high rates of religiosity as they declare themselves Orthodox Christians. This connection of the country with this particular faith, as early as the Byzantine years, contributed decisively to the creation of a multitude of religious monuments in all regions of Greece without exception (Manola & Trikalitis 2021), forming a diverse mosaic of churches, monasteries, metochias, hermitages, pilgrimages and chapels, the which constitute a network of religious resources suitable for the development of religious tourism. The holy images, wall paintings, mosaics and architectural creation compose a religious wealth of unparalleled religious and historical value, which is visited by both believers and tourists with historical and cultural interests (Moira, 2018). Also, the Christian holidays are a pole of attraction and a reason for the movement of tourists (mainly domestic) to the places where they take place (Manola & Papagrigoriou, 2020).

Indicative of this wealth is the enumeration by the World Tourism Organization of a total of 280 areas of religious interest in Greece (Rapti, 2011), although only 6 of them have been designated by UNESCO as world heritage sites: Mount Athos, the early Christian and Byzantine monuments of Thessaloniki, Meteora, Mystras, the Daphni Monastery in Chaidari, the Monastery of Saint Loukas in Boeotia and the New Monastery of Chios on the island of the same name, the Monastery of Agios Ioannis the Theologians in Patmos and the Cave of the Apocalypse in Patmos (Panagiou, 2020).

However, there are many pilgrimages, which, although they are not included in the UNESCO monuments, mainly due to lack of visibility and due to unorganized actions on the part of the state in the direction of their recognition, are not at all inferior to religious and historical value. Examples include: the Holy Monastery of Eikosifonissa in Drama, the Virgin Mary Sumela in Veria, the Virgin Mary of Tinos, the Holy Monastery of Leimonos in Mytilini, the Monasteries of Agia Lavra and the Great Cave in Kalavryta, Virgin Mary Kosmosoteira in Evros, Arkadi in Rethymno etc. The list is inexhaustible, with at least 889 religious monuments recorded in Greek territory (Antosidou, 2015).

The majority of religious tourists in Greece (about 85%, according to the Association of Tourist and Travel Agencies in Greece (HATTA) are Greek Orthodox Christians, precisely because the connection of faith with religious monuments is particularly strong. Also, Greeks abroad visit religious monuments, according to data from the Ministry of Foreign Affairs and the Greek Orthodox Church, mainly during the periods of major Christian holidays, when they visit Greece and the feeling of taste and connection with the roots is particularly strong. The largest percentage of foreign religious tourists, as is to be expected, comes from Orthodox countries, mainly from Russia (Lachlali, 2012).

Regarding the time of visit, the largest movement of religious tourists is found in the summer (Polyzos, 2017), as it is combined with vacations and increases due to the religious holidays that, due to the climate, mainly take place during the summer months. Also, because religious trips are usually short, they usually take place during "three-day" holidays. This seasonality could be bent, as there are religious festivals and holidays throughout the year and most religious pilgrimages are not associated with a specific time period. After all, religious belief as a motivation for the development of religious tourism does not have a specific time of manifestation.

5. The Church of Greece and its attitude towards religious tourism

Greece, as mentioned above, has an excellent cultural and religious background, in order to develop religious tourism dynamically. This cannot go unnoticed by the Church of Greece, rather the ecclesiastical world must actively participate in the organization and promotion of the country's religious monuments.

In this direction, the "Synodical Office for Monitoring European Issues" was founded and operated in Brussels and in the year 2000 (Derezoglou, 2020) by decision of the Holy Synod of the Church of Greece, the Synodical Office of Pilgrimages. According to the newest statute with number 281/2015, "the Church of Greece wished to highlight the religious, historical, cultural and ecological wealth stored in the Holy Tabernacles of our Faith, i.e., the Holy Monasteries and other Holy Pilgrimages of our Fatherland, constitutes instead of the Holy Synod a service unit at the level of an Office with the name "Synodical Office of Pilgrimage Tours of the Church of Greece." The purpose of this Synodal Office is the organization and promotion, inside and outside Greece, of pilgrimage tours and the development of all forms of tourism of religious interest, for the promotion of the various sacred religious Monuments and Holy Monasteries (Manola & Teliopoulou, 2023) and Pilgrimages of the Church of Greece and for the benefit and spiritual edification of the visitors.

This Office has developed action regarding the recording of most (if not all) of the religious monuments of the Orthodox tradition in the country and proceeded to publish books and guides of pilgrimage content, and in collaborations with travel agencies, in order to become it is possible to organize religious tourism at local (Manola et al., 2020), interregional and national level and to develop this type of tourism on the basis of alternative forms. Also, characteristic is the attempt to connect religious tourism with religious gastronomy, which has been developed in recent years mainly through the recipes of Agios Georgios.

The Church of Greece, through the above office, seeks to create partnerships with Christian churches, Orthodox and non-Orthodox, abroad. For example, in 2014 it was agreed to set up a joint Commission-Working Group between the Synodal Office of Pilgrimage Tours of the Church of Greece and the Roman Catholic Tourism Organization OPERA ROMANA PELLEGRINAGGI of the Vatican with the aim of shaping trips of religious interest in Greece, the organization of exhibitions at the headquarters of the Roman Catholic Church for the Holy Pilgrimages in Greece and the cooperation with domestic travel agencies.

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As far as the recording and promotion actions are concerned, since 2019 the Church has been participating in a transnational program entitled "Highlighting and Dissemination of the cultural heritage through the development and institutional strengthening of Religious Tourism in the island region of Greece and Cyprus." It concerns the recording and digitization of all Holy Monasteries, Monuments and Pilgrimages of the Northern Aegean islands. The Church of Greece also enters into partnerships with other bodies, such as the Association of Tourist and Travel Agencies in Greece (HATTA). In 2015, a "Joint Committee for Study and Actions" was established, with the aim of the coordinated highlighting and promotion of religious monuments, increasing the number of visitors and facilitating the access of pilgrims. Finally, the Synodal Office of Pilgrimage Tours of the Church of Greece regularly organizes conferences on religious tourism, the topics of which are published on its website.

6. Conclusion

Religious tourism in Greece could be a dynamic factor in increasing tourist demand, strengthening local societies, even the least developed ones, due to the diffusion of religious monuments throughout the Greek area. Precisely for this reason, in the last period of time the local government seems to be strongly interested in this type of tourism.

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