

THEORETICAL AND PRACTICAL ASPECTS CONCERNING ROMANIA'S PUBLIC FINANCE MANAGEMENT WITHIN THE PRESENT EUROPEAN CONTEXT

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Abstract: Nowadays, economic actors are demanding more and more efficient government spending, therefore higher fiscal multipliers. As the ratio between public revenues and GDP is low in Romania compared with the European Union average, Romania may not be able to decrease taxes in order to improve its fiscal multipliers. A downward trend of public expenses could affect even more the quality of public services. Rather than changing the size of the public budget relative to GDP, one should consider structure changes of the public budget. The obvious choice for the policymakers would be to increase the capital expenditure and decrease the current expenses. Investment is usually the engine of growth, but in Romania, consumption has been always been considered the driver of economic growth. Firstly, we will check whether investment is an important driver of economic growth. We will confirm this hypothesis by using cross-correlations and Granger causality tests on the Hodrick-Prescott cycles of GDP and Gross fixed capital formation. Afterwards, we can continue our study to test via a multiple linear regression which type of expenditure is better correlated with GDP. After obtaining the results, we will study if the tendency during 2004-2018 was towards maximizing the fiscal multipliers.

Keywords: public finances, public expenditure, public budget, budget execution

1. Introduction

Currently, all economic actors are demanding more efficient public expenditure. Besides the changes in the size of the public budget, policymakers can choose to make shifts regarding the structure of the public budget and obtain increased efficiency in allocating the public expenditure. As Romania tax rate is constantly below the average of EU 28 and EU27, a general decrease of taxes could not attract more investors as many factors are important like public infrastructure and education. Also the quality of public services is low, thus the policymakers should not compress the ratio of general government to GDP.

Instead they should increase the funds to the most efficient type of expenditure.

Within this context, the present research aims at synthesizing some practical aspects concerning public finances, public expenditure, and their efficiency and to econometrically test, in order to understand the evolution of Romania's public budget and how can policymakers maximize fiscal multipliers. The rest of the paper is structured as follows: section 2 includes literature review, section 3 contains research methodology, while in the fourth section we present the results. Finally we conclude in the fifth section.

2. Literature Review

From an economic point of view, public expenditure refers to “all economic processes that ensure the distribution of gross domestic product or financial resources so that actions and objectives of public interest at national level can be achieved” [1]. With the purpose of testing the most efficient types of public spending we will use the economic classification of expenses.

Economic classification of expenses, employed for defining the macroeconomic policies, which include expenses representing forms of final consumption (interest on public debt, operating subsidies, land purchases and assets). It must comply with the IMF's classification of government finance statistics (GFS). Within the economic classification, public expenditure is grouped according to the destination of the financed actions, into:

- Current expenses, which include personnel costs, expenditure on goods and services, subsidies and transfers being considered final GDP consumption.
- Capital expenditure –its purpose is the achievement of public investments that generate growth and modernization of the state public patrimony.

According to the Keynes, changes in investment lead to significant changes in national income (investment multiplier). The forecast of European Commission [2] depict consumption as the main driver of growth in Romania. We will test if gross fixed capital formation (Investments - Investments in inventories) accounts for important changes in business cycle.

3. Research methodology

In order to estimate if gross fixed capital formation is important for the economic activity in Romania we use the Hodrick-Prescott filter in order to obtain the cycles of GDP and Gross fixed capital formation (1995Q1 -2019Q3).

We estimate the HP trend by applying a

minimizing function on equation (1)

$$\text{Min} \left(\sum_{i=1}^n (Y_t - T_i)^2 + \lambda \sum_{i=2}^n [(T_{i+1} - T_i) - (T_i - T_{i-1})]^2 \right) \quad (1)$$

Y_t – actual value expressed in natural logarithm

T_i is the trend

$$\text{Cycle} = Y_t - T_i \quad (2)$$

Lambda, the smoothing parameter λ , serves as a penalty to the acceleration in the trend relative to the cycle component of business [4]. According to Hodrick and Prescott [5], a 5% cyclical component is moderately large as well as the 8th part of 1% change in the growth rate in a quarter. Hodrick and Prescott (1997) have shown that if the cycle and the acceleration of the trend component are identically and independently normal distributed, hence $\sqrt{\lambda}$ is the ratio between the standard deviation of the cycle and the standard deviation of the second difference in the trend component.

Thus, the authors considered optimum $\sqrt{\lambda} = 5 / (1/8) = 40$, $\lambda = 1600$ and we will follow their advice.

We utilize cross-correlations in order to determine the causality between the cycle component of the analysed economic variables.

$$R = \frac{\sum_{i=1}^{n-k} (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2 \sum_{i=1}^n (Y_i - \bar{Y})^2}} \quad (3)$$

The second tool that we use in order to test the causality between the cycle component of the Real Gross Fixed Capital Formation and Real Gross Domestic is the Granger causality. Granger causality was proposed by Granger (1969) and is an instrument with the help of which we can investigate if a variable can be used to make better forecasts of the other variable, than based solely on its past values.

Granger tests can be specified [6]:

$$Y_t = \alpha + \sum_{i=1}^m a_i * (Y_{t-1}) + \sum_{i=1}^m b_i * (X_{t-i}) + u_t \quad (4)$$

$$X_t = \theta + \sum_{i=1}^m c_i * (X_{t-1}) + \sum_{i=1}^m d_i * (Y_{t-i}) + \eta_t \quad (5)$$

The null hypotheses are:

$b_1 = b_2 = b_3 = \dots = b_i = 0$ for equation (4), thus variable X does not Granger cause variable Y

$d_1 = d_2 = d_3 = \dots = d_i = 0$ for 5th equation, which imply Y does not Granger cause X

In the first stage, Y is regressed on its previous values and we obtain the Restricted Sum of Squared Residuals (SSRr) and in the second regression we also include the past values of X from which we acquire the Unrestricted Sum of Squared Residuals (SSRu).

After obtaining SSRr and SSRu we can calculate the F test:

$$F = \frac{SSRr - SSRu}{m} / \frac{[SSRu]}{[N - (2 * m + 1)]} \quad (6)$$

m is number of lags and N is the number of observations

If the tests will confirm that Real Gross fixed capital formation has a large influence on Gross Domestic Product, then we can continue with a multiple linear regression between Real GDP (dependent variable) and Real Current Expenses and Real Capital Expenditure (all time series expressed in natural logs) for period 2004-2018. We use the Least Squares method.

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \dots + \beta_k * X_k + \varepsilon \quad (7)$$

where Y is the independent variable, k stands for the number of independent variables, $X_1, X_2, \dots, X_k$ are the independent

variables, β_0 is the intercept(constant term) and ε is error term.

The least Squares method involves the minimization of the squared residuals. The residuals are the errors estimations.

$$\min \sum_{i=1}^n u_i^2 = \min (RSS) \quad (8)$$

Where u_i represents residuals

Residual Sum of Squares

$$RSS = \sum_{i=1}^n (Y_i - \text{Estimated } Y_i)^2 \quad (9)$$

The null hypothesis is:

$$H_0: \beta_1 = \beta_2 = \dots \beta_k = 0$$

H1 (alternative hypothesis): at least one of $\beta_1, \beta_2, \dots, \beta_k \neq 0$

In order to reject or confirm the null hypothesis we need to calculate the other variances from the variance analysis (see equation 10)

$$TSS (\text{Total Sum of Squares}) = ESS + RSS \quad (10)$$

$$TSS = \sum_{i=1}^n (Y_i - \bar{Y})^2 \quad (11)$$

where $\bar{Y}$ is average of Y

$$ESS (\text{Explained Sum of Squares}) = \sum_{i=1}^n (\text{Estimated } Y_i - \bar{Y})^2 \quad (12)$$

$$MST (\text{mean square total}) = TSS / (n - 1) \quad (13)$$

n is number of observations

$$MSE = ESS / k \quad (14)$$

$$MSR (\text{mean Squared Residual}) = SSR / (n - k - 1) \quad (15)$$

$$\text{Calculated } F = MSE / MSR \quad (16)$$

If calculated $F > F_{\alpha, k, n-k-1}$, we can reject the null hypothesis. α is the selected significance level. All the estimations are made by using Eviews 7.2.

4. Results

After performing the filtering of Real Gross fixed capital formation (L_FBCF_REAL) and of GDP (L_PIB_REAL) we find out that there is a strong positive correlation between GDP and Gross fixed capital formation with the highest correlation at current values (lag 0), however as we can see in figure 1, the correlation between the cycle of Real Gross fixed capital formation (CICLU_FBCF) and the cycle of Real GDP (CICLU_PIB_REAL) at lag „+i” decays much slower than the correlations between the past values of the Real GDP cycle and current values of Real Gross fixed capital

formation. This implies that Gross fixed capital formation determines the GDP. But, we need to confirm the results with the help of Granger causality. We use 2 lags as at one lag, usually the relationships are bidirectional.

The p-value of 0.0151 associated to the first F-test is lower than the selected significance level of 0.05, indicating the null hypothesis according to which CICLU_FBCF does not Granger cause CICLU_PIB_REAL can be rejected. However GDP can not Granger cause Gross fixed capital formation as the associated p-value is 0.0848 (see figure 2). We can conclude that Real Gross fixed capital formation can be used to forecast Real GDP, while the reverse is not true.

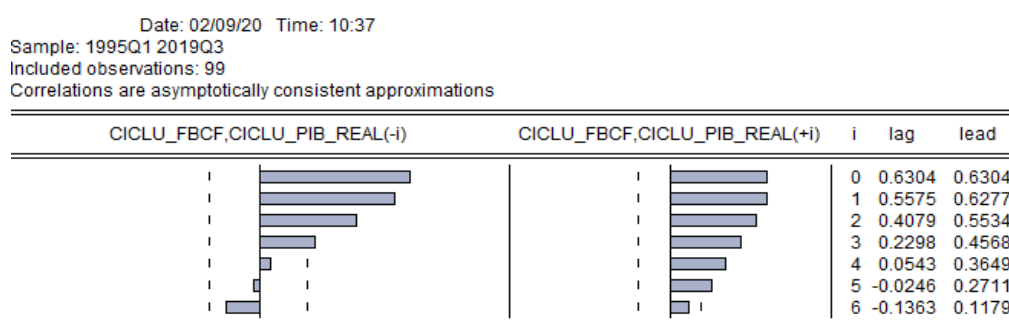


Figure 1: Real GDP Cycles and Real Gross fixed Capital Formation Cycles Cross Correlations

Pairwise Granger Causality Tests
Date: 02/25/20 Time: 11:29
Sample: 1995Q1 2019Q3
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CICLU_FBCF does not Granger Cause CICLU_PIB_REAL	97	4.38692	0.0151
CICLU_PIB_REAL does not Granger Cause CICLU_FBCF		2.53433	0.0848

Figure 2: Granger Causality

As expected, the investment multiplier is also proved correct in Romania. We can carry on with the regression with the purpose of revealing which type of public spending is more efficient and can produce higher growth. Normally, Capital

Expenditure should have a stronger effect on GDP as it can improve Gross fixed capital formation. The time series are expressed in logarithm. We have used the second difference in order to obtain stationary variables.

The probability value associated to the F-statistics is 0.041, under 5% thus the overall model does explain the GDP evolution. The coefficient of Capital Expenditure

DDL_CHELTUIELI_CAPITAL) is 0.10, meaning that an increase with 1% of Capital Expenditure will lead to increase with 0.1% in GDP (see figure 3). The low value could reflect the low quality of public investments in Romania. The coefficient of Current Expenses is higher, however the p-value associated to this coefficient is 0.1311, thus the impact of Current Expenses on GDP is statistically insignificant.

R^2 is the determination of coefficient and measures the weight of the variance of the dependent variable that is explained by the model. 47.1% is a high figure taking into account that we have not used an autoregressive model.

The Durbin-Watson test shows no sign of autocorrelation at lag 1 in the residuals.

The model is valid because the residuals are normally distributed and there is no sign of squared residual autocorrelation.

The model reveals that Capital Expenditure has an influence on GDP. A higher level of Capital Expenditure imply a higher economic growth and it could be used in an

anti-cyclical manner. The trend during 2004-2018 shows a different picture as right before the recession started a downward trend. Public investments which should attract investors are decreasing relative to GDP and have a questionable quality.

5. Conclusions

Sizing public expenditure and allocating budgetary resources to various destinations is one of the ways in which the state intervenes in the economy.

The employed empirical analysis show us that investment is an important economic growth driver and that capital expenditure have a positive effect on GDP, while the relationship between current government expenses and GDP is not statistically significant.

Also during 2004-2018, the trend of Romania's capital expenditure relative to GDP has dramatically decreased, thus the public budget has not been used efficiently in order to produce high fiscal multipliers. To recover the gaps that Romania registered compared to the other states of the European Union, Romania's budget policies should be more investment – oriented.

Dependent Variable: DDL_PIB_REAL
Method: Least Squares
Date: 02/22/20 Time: 06:07
Sample (adjusted): 2006 2018
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002814	0.010814	-0.260271	0.7999
DDL_CHELTUIELI_CUREN...	0.308911	0.187844	1.644510	0.1311
DDL_CHELTUIELI_CAPITAL	0.103905	0.046353	2.241591	0.0489
R-squared	0.470648	Mean dependent var		0.000273
Adjusted R-squared	0.364778	S.D. dependent var		0.048694
S.E. of regression	0.038810	Akaike info criterion		-3.461123
Sum squared resid	0.015062	Schwarz criterion		-3.330750
Log likelihood	25.49730	Hannan-Quinn criter.		-3.487921
F-statistic	4.445517	Durbin-Watson stat		1.991643
Prob(F-statistic)	0.041564			

Figure 3: Regression Analysis

References

- [1] Păun, A., Brezeanu, P., Theoretical aspects regarding public expenditures, Annals of the University of Petroșani. Economics, Petroșani, Vol. 13, 2013.
- [2] European Commission, Spring 2018 Economic Forecast – Romania, 3 May 2018.
- [3] <https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Cross-Correlations.pdf>
- [4] Morten O. Ravn & Harald Uhlig, "On adjusting the Hodrick-Prescott filter for the frequency of observations," The Review of Economics and Statistics, MIT Press, vol. 84(2), pages 371-375, 2002
- [5] Hodrick, Robert; Prescott, Edward C., "Postwar U.S. Business Cycles: An Empirical Investigation, 1997.
- [6] C. W. J. Granger, Investigating Causal Relations by Econometric Models and Cross-spectral Methods, Econometrica, Vol. 37, No. 3, pp. 424-438, Aug., 1969.