Cyprus Economy in the Light of Debt Problem

Ergin Akalpler (akalpler@yahoo.com)
Onbes Kasim Kibris University: Onbes Kasim Kibris Universitesi
https://orcid.org/0000-0002-9547-7842

Research Article

Keywords: RGDP, government expenditure, total saving, total revenue, Cyprus, unrestricted VAR, employment, total capital

Posted Date: November 29th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-1100511/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License
Abstract

The model created by using the independent variables of total income, total capital, total savings, government expenditures, and employment, which I think has a significant impact on the growth of the Cyprus economy, has been examined in the light of the debt problem. Annual time-series data from 1995Q to 2017Q were obtained from the Cyprus State Planning Office in Cyprus. Unrestricted VAR (Vector Autoregression) model was used to test the causal relationship of the variables considered.

Empirical findings revealed that some variables such as Wald test results for 78 lags, respectively, affect the GDP growth rate together. In particular, it was observed that there are bidirectional influences between employment, government expenditures, total capital, and savings which are not estimated in former studies. In addition, total income and total savings coefficients have a unidirectional influence on employment. It has been observed that the expenditure and savings coefficients also affect the total income.

Introduction

In Cyprus, the government's tax policy promotes domestic production to support a sustainable economy and increase the power of local producers. Especially the lowest corporate tax rate, which is around 12 percent, provides an attractive environment for both domestic and foreign entrepreneurs. In addition, the state provides the necessary regulations and support for manufacturers to create innovative and high-tech productions with their educated workforce and to become an assertive power in international markets. However, as can be seen in Table 1, quite high import capacity affects the trade balance negatively and the negative fluctuating current account deficit and debt problem create significant problems for the Cypriot economy.

The Cyprus debt problem and current account deficit are also affected by public finances, and unsustainable fiscal policy measures that undermine the government's confidence in investors also affect economic growth (World Bank, 2007).

Despite the debt problem, Cyprus' economic performance is better than some other EU countries. However, during the banking crisis in 2013, the bailout program adopted by the EU's Troika members with heavy austerity measures was that the current account deficit should be closed and the debt problem should be reduced. It is known that the current account deficit was -292,062 million dollars in 2003, -957,946 million dollars in 2013 and -1,577,489 million dollars in 2019 and is still high today, and needs to be reduced to maintain sustainable economic performance (see table 1).

Table 1: Key economic and financial indicators Cyprus
| parameters                  | 2003-07 average | 2008-12 average | 2013-14 average | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------|----------------|----------------|----------------|------|------|------|------|------|
| RGNP % y-o-y                | 4.9            | 0.1            | -1.8           | 4.8  | 4.2  | 3.8  | 3.3  | 2.7  |
| Total capital % y-o-y       | 2.1            | 1.5            | 0.0            | 0.6  | 1.2  | 1.3  | 1.4  | 1.5  |
| Saving /Investment (%of GDP)| 10.9           | 8.2            | 4.1            | 4.9  | 5.7  | --   | --   | --   |
| Inflation rate %            | 2.1            | 2.7            | -0.5           | -1.2 | 0.7  | 0.8  | 0.7  | 1.2  |
| Capital account %           | --             | 0.3            | 0.8            | 0.2  | 0.5  | --   | --   | --   |
| Export % y-o-y              | 3.5            | 0.4            | 3.8            | 4.6  | 6.0  | --   | -15.1| -18.25|
| Current account balance (% of GDP) | -5         | -8             | -10            | -4   | -5   | -3.8 | -6.7 | -12  |
| Import mio $                | 5.9            | -1.0           | 2.5            | 6.6  | 12.2 | --   | -30.49| -22.14|
| Net export mio $            | -1.4           | 0.5            | 0.6            | -1.3 | -4.1 | --   | --   | --   |
| unemployment %              | 4.6            | 7.0            | 15.7           | 13.0 | 11.1 | 8.2  | 6.3  | 4.8  |

Source: EU commission report, https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-cyprus_en.pdf (in main economic and social indicators) and, https://trendeconomy.com/data/h2/Cyprus/TOTAL, https://knoema.com/atlas/Cyprus/topics/Economy/Balance-of-Payments-Current-accounts/Current-account-balance-percent-of-GDP, Worldbank.org, https://wits.worldbank.org/CountryProfile/en/CYP

Cyprus is the only EU Member state with separate administrative offices for the Department of Customs and Excise for Internal Revenue and VAT responsible for direct taxes (EU Commission 2013). In the last decade, fiscal policy measures, especially higher taxes, have been used by the Troika to save the crisis during the austerity program. However, it was also planned to reform the public sector and increase the efficiency of the state-owned and semi-public sectors for the operation of a cost-effective system (Central Bank of Cyprus, 2012). In order to contribute to the program, various regulations such as fiscal and fiscal consolidation measures, VAT rates and some other property taxes have been increased. However, the contributions to increase the tough power of the entrepreneurs such as the improvement of competition law and anti-dumping measures were also restructured for economic efficiency.

It was clear that the financial incapacity of the Cypriot government required a sustainable financing policy. In this context, the inefficient savings account results of the banking crisis reduced the incomes and fees for investment transfer and caused some decrease in capital formation. As a result, the high use of taxes, fees and penalties, which are used as the most important fiscal policy tools of the state in raising capital, had to be implemented even though it was not desired.

It is clear that inefficient resources cannot be covered by borrowing, which will increase the public debt and the burden of governments (Ogunmuyiwa, 2010). Paying off debt with debt is also a method used to
meet the needs of governments in the short-term or long-term to cover public debt, which is not a good situation at all. However, domestic or foreign borrowing caused a debt crisis and economic recession, as observed in many countries in 2010 (Donayre and Taivan, 2017). These challenges are analyzed in the study of Gómez-Puig and Sosvilla, Rivero, 2018, which causes debt and questions the causal relationship between investment and GDP and economic growth. In another study, Adom (2016) showed that it is not possible to have a positive current account. As observed in my study, neither capital nor income has a significant positive effect on the GDP growth rate (see Table 6 and Table 7). The results of the austerity program implemented in Cyprus, declining salaries and incomes, seem to be aimed at investing in increasing the savings account by increasing the reserves in the banks. However, the regulations that emerged as a result of heavy public policy and austerity policies increased the tax burden on producers and especially on high-income and consumers. While Adom (2016) states that shifting public debt to an undesirable level will stop economic growth and hard power, it has been supported by some other studies that the absorption of international demand shocks will be prevented (Cochrane, 2011; Castro et al., 2015; Soydan and Bedir, 2015).

The dominant sectors contributing to GDP in Cyprus, wholesale and retail trade, tourism, transport, food services and accommodation, and small and medium-sized economic activities play a significant role in the overall production and GDP growth rate. However, public administration and social work activities and education also have significant effects on the GDP growth rate.

The implemented bailout program contributed to creating a condition for repayment of loans, correcting the macroeconomic imbalance in public and external debt and creating a sustainable labor market and job environment for attracting domestic and foreign investment and increasing productivity in Cyprus.

Literature Reviews and Theoretical Considerations

Developed on the Keynesian expenditure output model and the unrestricted VAR (Vector Autoregression) model for GDP growth rate estimation, this study was used to test the causal relationship between the parameters considered.

In the model used in this study, consumption (C), investment (I), government expenditures (G) and net exports (NX) are considered from the Keynesian spending approach, while Modern Monetary Theory (MMT) is also taken into account. MMT is a macroeconomic theory that focuses on the control of the local currency. Since government expenditures are affected by tax collection and other financial instruments, it is not a formation similar to the household budget. It is argued that public debt arises as a result of non-taxation of money circulating for economic activities (Mosler 1993). Insufficient capital in the financial sector negatively affects public debt. Total Capital expenditures represent long-term expenditures and it is the right approach to include them in this Keynesian expenditure output model.

Total revenues differ from total capital, and short-term expenses consist of taxes, fees, income from state-owned enterprises and foreign aid.
Unemployment (Un) is also included in the model. The most important factor affecting productivity in the production of goods and services and affecting the real GDP growth rate is labour force. And the importance of this in production is already known. Therefore, the employment rate also means the success of economic growth. In addition, it should not be forgotten that unemployment rate and GDP growth rates are among the most important variables to obtain information about the performance of countries at first glance.

The independent variables taken into account directly affect the public debt, which affects economic growth. While some researchers found a positive causal relationship between public debt and economic growth, others found a negative causality relationship.

Borrowing in the classical economy and financing public expenditures by borrowing capital does not fully offset the negative effects of private investment, which reduces economic growth (Domar 1944, Saungweme and Odhiambo 2019). While the increase in public expenditures is achieved by borrowing from individuals and companies, interest rates increase as the demand for borrowing in the market increases. The fact that increasing interest rates cause a decrease in private investment expenditures is defined as exclusion by monetarists. Therefore, government borrowing from the domestic market causes liquidity problems and deters private investments by raising interest rates (Modigliani, 1961; Mankiw, 2000).

In this study, it is emphasized once again that bank reserves are very important for investment and economic development. The savings rate becomes an important role in development in the classical school of economics. The classical school also argued that debt problems and insufficient resources reduce financing capacity, which in turn hinders private sector access to borrowing credit (Modigliani 1961, Diamond 1965, Krugman 1988).

In Keynesian economics, capital saving is the non-consumable portion of disposable income. So as income increases, this will also encourage savings capital. But in Keynesian economics, it is assumed that if private consumption increases, this will reduce saving capital. In neoclassical economics, Solow (1956) argued in his model that saving only stimulates growth in the short run. In the permanent income hypothesis, Friedman (1957) assumed that the expectation of future income growth would reduce the current desire to save. However, in Keynes' prediction, there is the view that increasing income will not increase people's consumption at the same rate, on the contrary, it will increase savings. This view is a more correct approach from an economic point of view. Today, the savings rate is also insufficient in low-income countries. In Cyprus, the high tax rates applied after the Troika measures reduced incomes and savings account. Low savings means low investment and growth. This is also stated by Lewis (1954), he hypothesized that weak economic growth may be due to low savings account in a country. Romer (1986) and Lucas (1988) stated that higher savings and capital accounts stimulate economic growth. This positive relationship between savings and growth is also supported in the 2011 investment report.

Savings and investment accounts are low in Cyprus (see Table 1). Past research shows that sustainable public debt and adequate capital savings increase strength and competitiveness. As in Adom's (2016)
study, he stated that public debt should be brought to a sustainable level in order to accelerate economic growth. The capital formation can be done with reasonable capital through savings and investment. Capital savings and public debt problems, which cause skepticism to the country against international shocks, create problems in terms of development (Cochrane 2011, Soydan and Bedir 2015, Costas et al. 2015). Not only economic problems but also political problems negatively affect economic growth in Cyprus.

From the 1980s to the 1990s, public debt and savings capital remained a major challenge for long-term lending and investment, as most investment bank loans for long-term projects were made without the borrower’s capital to repay these loans.

Despite the EU and other international institutions, financial supports could not prevent the financial crisis and debt problem in 2013. According to the 2016 Central Bank report, the private debt of households and non-financial institutions and intermediaries is estimated at 358% of GDP, estimated to be around 110% of GDP, and when public debt is added to this, the total debt has increased 5 times of its GDP. The debt problem affects the financial ability to meet public debt obligations, while at the same time the sustainable financial system for economic growth decreases. This is also seen in many other developing countries, where short-term loans are used to finance long-term projects that have difficulty meeting their debt obligations on time (Marquez, 2000). A similar problem was observed in Stambuli's 1998 study of large-scale investments with loans borrowed for economic growth.

Political issues affecting most of the government programs and regulations regarding the liberal economy in Cyprus increased the trading capacity in favor of imported products and adversely affected the export capacity of domestic producers who were unable to maintain a sustainable production operation process. This has been the result of inefficient production and limited market capacity for Turkey and other similar neighboring countries. However, political isolation, embargoes, and other sanctions mostly affect Turkish Cypriots in the northern part of the Island. The result of political problems and isolation in the island trade deficit magnified the results of negative net exports between 2000 and 2020. During this period – according to the state planning office in Cyprus, the trade balance was mostly negative from 2003 to 2007 – 292,062 and in 2019 it was -5,658,263.56 in US dollars (see Table 1).

The trade balance and debt problem in Cyprus created problems in the economy, as was the case with the 2013 financial crisis. According to Wray (2015), governments that lend in their own currency in the domestic market cannot default. This statement is also supported by Driessen and Gravelle (2019), where central banks set a near-zero nominal interest rate and contributed to the deficit in weak economic growth. After EU accession, central bank regulations in Cyprus were adapted to EU regulations and Cyprus pound was replaced with Euro. Despite the low nominal interest rate, most people, producers, entrepreneurs, proprietors, and others prefer to hold, use, and lease the currency, which brings the savings account well below the desired level (see Table 1).

Inadequate tax policy, tax evasion and tax collection accelerated after the crises in 2013 (Mesimeri Ioanna, 2017). Troika arrangements had come into play to improve financial stability in Cyprus. However,
the high tax rate that the Troika increased in order to increase resources in the financial sector brought along problems such as tax evasion and/or capital outflow. These practices reduce the savings capital and increase the debt account, which negatively affects economic growth.

Previous studies such as Saungweme and Odhiambo (2019) also observed a strong relationship between economic growth and total capital formation. Donayne and Taivan (2017) have similar results in their study. It has been stated that the level of total capital or public indebtedness affects the rate of economic growth. However, the causality between total public debt and economic growth is bidirectional and evaluated under the name of the Feedback hypothesis. This hypothesis is supported by Ferreira (2019), Ericson and Owusu Nantwe (2016), Abbas and Christensen (2007).

According to Keynesian economics, which supports state intervention to increase state efficiency in his hypothesis, he mentioned that an increase in government spending increases economic growth and private investment (Wagner 1911 Saungwee and Odhiamba2019). The Keynesian school favors the demand side of the economy and government intervention to stimulate economic growth through tax cuts and/or income growth. Doing so will also stimulate the production and supply side of the economy, and the economy will revive as its demand has already been stimulated. In Cyprus, on the other hand, producers are supported by lower tax rates, especially the corporate tax rate is considerably lower than in other countries, around 12 percent in Cyprus, but around 20 percent in other countries (see KPMG's corporate tax rates table). However, taxes, which are a burden for consumers and most of the citizens working with minimum wage, have increased especially during the troika period, while increases have been observed in driver's license fees, real estate fees for each year, public education, health, municipality and some other fees for public services. This means narrowing the demand while encouraging the supply, which is not a very correct approach for the economy.

**Research Data And Methodology**

In this study, to estimate the effects on GDP growth rate (Y), total capital (TC), government expenditure (G), total income (TR), total savings (TS) and employment (E) affect the independent variables considered. Unrestricted VAR (Vector Autoregression) model, which is a stochastic process, was used to estimate the effects of the parameters.

After performing unit root tests for the estimation integration order for the considered data series, the probability value becomes smaller as it implies that the null hypothesis is rejected. This means that there is no cointegration between the variables and the variables will not be in equilibrium in the long run. The Ordinary least squares (OLS) method was then used to determine the significance of the variables. Finally, unrestricted VAR (Vector Autoregression) is estimated.

Annual time series data between 1980 and 2018 are from the Cyprus State Planning Office.

\[ Y = TC+G+TR+TS+Un \]
GDP_t = \alpha + \beta_1 Tc_t + \beta_2 G_t + \beta_3 TR_t + \beta_4 TS_t + \beta_5 E \quad \text{--------------------------------- (eq1)}

**Empirical Findings: Unit Root Test Results**

After conducting the unit root tests for estimating of considered data series, where all variables become stationary at first difference. Then I employed the Unrestricted VAR model which is also supported by Johansen cointegration test results when probability values become less than 0.05 and trace and maxeigen statistics values become more than test critical values. (See table 2 and table 3). These results and interpretations are also consistent with the literature of stationarity of data (Dickey and Fuller, 1979; 1981; Erickson C. and Owusu Nantwi (2016).

**Ho:** variables have a unit root

**H1:** variables have no unit root

**Table 2:** ADF Unit Root Test results

| Variables | Level       | First difference | Level       | First difference |
|-----------|-------------|-------------------|-------------|-------------------|
| Capt      | -2.894716   | -3.511262*        | -3.4661686 | -4.072415***      |
|           | (0.5630)    | (0.0000)          | (0.8506)    | (0.0000)          |
| Emp       | -2.584738   | -3.507394***      | -3.157475  | -4.066981***      |
|           | (0.4017)    | (0.0001)          | (0.1401)    | (0.0001)          |
| T. Save   | -2.584579   | -3.509281***      | -3.157121  | -4.069631***      |
|           | (0.5169)    | (0.0000)          | (0.7668)    | (0.0000)          |
| Gdp       | -2.583931   | -3.506484***      | -3.56109   | 4.065702***       |
|           | (0.0612)    | (0.0001)          | (0.1809)    | (0.0000)          |
| T.Rev     | -2.584529   | -3.511262***      | -3.157836  | -4.072415***      |
|           | (0.7443)    | (0.0000)          | (0.8288)    | (0.0000)          |
| G. Expnd  | -2.584529   | -3.512290***      | -3.158586  | -4.073859         |
|           | (0.5630)    | (0.0000)          | (0.9990)    | (0.0000)          |

Note: *, ** and *** indicates the rejection of the null hypothesis of non-stationarity at 10%, 5% and 1% significance levels, respectively.

Source: Author’s Calculations

**Cointegrarion results for employing unrestricted VAR**

Below is the probability value for the Trace statistics and the Max Eigenvalues well below 0.05, and the trace and eigenvalues statistics show that our variables are higher than the test critical values, implying that they are not cointegrated. That’s why we use the unrestricted VAR model.

**Lag length selection**
In this study, all series become stationary at first difference I (1)- first order, I keep estimating the lag length. The following table lists three of the four lag length selection criteria, which are the lowest values for the 4 lag lengths (Final Prediction Error (FPE), Akaike Information Criterion (AIC), and Hannan-Quinn Information Criterion (HQ)). Analysis of the VAR model for lag 4 will continue. Table 3 below shows the delay sequence selection test results.

| Lag | LogL     | LR     | FPE    | AIC     | SC     | HQ     |
|-----|----------|--------|--------|---------|--------|--------|
| 0   | -3262.569| NA     | 1.01e+26| 76.90750| 77.07992| 76.97685|
| 1   | -3145.040| 215.6996| 1.49e+25| 74.98918| 76.19614| 75.47465|
| 2   | -3088.383| 95.98460| 9.28e+24| 74.50312| 76.74461| 75.40471|
| 3   | -2971.509| 181.4972| 1.43e+24| 72.60022| 75.87625*| 73.91793|
| 4   | -2906.039| 92.42880*| 7.59e+23*| 71.90680*| 76.21736| 73.64063*|
| 5   | -2881.222| 31.53247| 1.10e+24| 72.16992| 77.51502| 74.31987|
| 6   | -2852.278| 32.68906| 1.52e+24| 72.33596| 78.71559| 74.90203|

* indicates lag order selected by the criterion
Source: Author’s Calculations

### Cointegration

The Johansen test for Cointegration of variables that are non-stationary at the level is utilized to verify the presence of a long-run relationship. According to the below-given table 4 cointegration test results, we have the probability value for Trace statistics and Max Eigenvalues well below 0.05, and trace and max-eigenvalues statistics values are higher than the test critical values, which imply our variables are not cointegrated. Due to this reason we employ an unrestricted VAR model.

Due to the probability value which is less than 0.05 then we reject the null hypothesis means there is no cointegration among variables and variables will not become in equilibrium in long run. Then we will employ the unrestricted VAR.

Results of the unrestricted cointegration rank tests, we reject the null hypothesis means there is no cointegration among variables and variables will not become in equilibrium in long run. Then we employ the unrestricted VAR model for this study.

Ho: variables have unit root (means there is cointegration equation is available)
Hi: variables have no unit root (means cointegration equation cannot be created.)

**Table 4: Johansen cointegration test**

| Null hypothesis | (Trace) | (Maximum Eigenvalue) |
|-----------------|---------|----------------------|
| Trace Statistic | Critical Value (5%) | Probability** | Max-Eigen Statistic | Critical Value (5%) | Probability** |
| r ≤ 0 *          | 467.4385 | 103.8473 | 0.0000 | 250.2245 | 40.95680 | 0.0001 |
| r ≤ 1 *          | 217.2140 | 76.97277 | 0.0000 | 79.33922 | 34.80587 | 0.0000 |
| r ≤ 2 *          | 137.8748 | 54.07904 | 0.0000 | 58.38277 | 28.58808 | 0.0000 |
| r ≤ 2 *          | 79.49201 | 35.19275 | 0.0000 | 39.21826 | 22.29962 | 0.0001 |
| r ≤ 3 *          | 40.27375 | 20.26184 | 0.0000 | 22.54190 | 15.89210 | 0.0039 |
| r ≤ 4 *          | 17.73185 | 9.164546 | 0.0010 | 17.73185 | 9.164546 | 0.0010 |

Source: Author’s Calculations

We need to know the probability value for the following equations. If the probability value is less than 0.05, it is significant, and if it is greater than 0.05, influencing the dependent variables is not significant. Therefore, we have to estimate the probability values for the 78 coefficients given below. When we observed each of these variables, in order to see which variables affect the dependent variable, the relationship between the dependent variable and other independent variables according to the equation of each variable was estimated with the ordinary least squares method and the results were evaluated below.

\[
\begin{align*}
DGDP &= C(1)*DGDP(-1) + C(2)*DGDP(-2) + C(3)*DCAPT(-1) + C(4)*DCAPT(-2) + C(5)*DEMP(-1) + \\
&\quad + C(6)*DEMP(-2) + C(7)*DEXPND(-1) + C(8)*DEXPND(-2) + C(9)*DREVN(-1) + C(10)*DREVN(-2) + \\
&\quad + C(11)*DSAVE(-1) + C(12)*DSAVE(-2) + C(13) \quad \text{-----------------------------} \quad (eq \ 2)
\end{align*}
\]

\[
\begin{align*}
DCAPT &= C(14)*DGDP(-1) + C(15)*DGDP(-2) + C(16)*DCAPT(-1) + C(17)*DCAPT(-2) + C(18)*DEMP(-1) + \\
&\quad + C(19)*DEMP(-2) + C(20)*DEXPND(-1) + C(21)*DEXPND(-2) + C(22)*DREVN(-1) + C(23)*DREVN(-2) + \\
&\quad + C(24)*DSAVE(-1) + C(25)*DSAVE(-2) + C(26) \quad \text{-----------------------------} \quad (eq \ 3)
\end{align*}
\]

\[
\begin{align*}
DEMP &= C(27)*DGDP(-1) + C(28)*DGDP(-2) + C(29)*DCAPT(-1) + C(30)*DCAPT(-2) + C(31)*DEMP(-1) + \\
&\quad + C(32)*DEMP(-2) + C(33)*DEXPND(-1) + C(34)*DEXPND(-2) + C(35)*DREVN(-1) + C(36)*DREVN(-2) + \\
&\quad + C(37)*DSAVE(-1) + C(38)*DSAVE(-2) + C(39) \quad \text{-----------------------------} \quad (eq \ 4)
\end{align*}
\]
DEXPND = C(40)*DGDP(-1) + C(41)*DGDP(-2) + C(42)*DCAPT(-1) + C(43)*DCAPT(-2) + C(44)*DEMP(-1) + C(45)*DEMP(-2) + C(46)*DEXPND(-1) + C(47)*DEXPND(-2) + C(48)*DREVN(-1) + C(49)*DREVN(-2) + C(50)*DSAVE(-1) + C(51)*DSAVE(-2) + C(52) 

DREVN = C(53)*DGDP(-1) + C(54)*DGDP(-2) + C(55)*DCAPT(-1) + C(56)*DCAPT(-2) + C(57)*DEMP(-1) + C(58)*DEMP(-2) + C(59)*DEXPND(-1) + C(60)*DEXPND(-2) + C(61)*DREVN(-1) + C(62)*DREVN(-2) + C(63)*DSAVE(-1) + C(64)*DSAVE(-2) + C(65) 

DSAVE = C(66)*DGDP(-1) + C(67)*DGDP(-2) + C(68)*DCAPT(-1) + C(69)*DCAPT(-2) + C(70)*DEMP(-1) + C(71)*DEMP(-2) + C(72)*DEXPND(-1) + C(73)*DEXPND(-2) + C(74)*DREVN(-1) + C(75)*DREVN(-2) + C(76)*DSAVE(-1) + C(77)*DSAVE(-2) + C(78) 

Table 5 (appendix I) shows the results obtained from the above equations. The bold written probability values which are supposed to be less than 0.05 probability values, become significant and influences the dependent variable. From table 5 in appendix1 following findings have been estimated. Results show that employment as dependent variable influences saving amount, governmental expenditures, and total capital whilst total revenue and saving influence employment as the dependent variable. And it is also observed that total capital and employment influence total revenue.

Wald Test Results Interpretation

Table 6 shows the results of equation 2. Wald test results are shown for the dependent variable GDP. This test is done to understand whether these lags together affect the GDP growth rate as the dependent variable. If the probability value is greater than 0.05 and greater than zero (probability values greater than 0.05 for all coefficients), we reject the null hypothesis, which is assumed to be zero. Being greater than zero means that these coefficients cannot affect the dependent variable that is considered common. As shown in Table 6, it was observed that the independent variables considered had no effect on the GDP growth rate of the dependent variable in equation 2.

Table 6: Wald test results
Table 7 shows the wald test results illustrated for equation 3. The probability value for employment is less than 0.05 and is zero (probability value is 0.000), this has meant the coefficient of independent variable employment has some value to influence total capital.

Table 7: Wald test results

| Dependent variable | Independent variable | Chi square | Probability |
|--------------------|----------------------|------------|-------------|
| Tot capital        | RGDP                 | 0.154204   | 0.9258      |
|                    | Employment           | 31.87098   | 0.0000      |
|                    | Gov Expenditure      | 0.017587   | 0.9912      |
|                    | Total Revenue        | 0.467967   | 0.7914      |
|                    | Total saving         | 1.470254   | 0.4794      |

Source: Estimated by Author

Table 8 shows the wald test results for dependent variable employment in equation 4 are illustrated. As on the table below is illustrated, coefficients of total revenue and total saving influence the employment. It is more than zero but less than 0.05 probability value. This has meant these two coefficients of total revenue and total saving have some value to jointly influence employment.

Table 8: Wald test results

| Dependent variable | Independent variable | Chi square | Probability |
|--------------------|----------------------|------------|-------------|
| Employment         | RGDP                 | 0.193887   | 0.9076      |
|                    | Total Capital        | 0.380489   | 0.8268      |
|                    | Gov Expenditure      | 0.566081   | 0.7535      |
|                    | Total Revenue        | 8.993080   | 0.0111      |
|                    | Total saving         | 15.39111   | 0.0005      |

Source: Estimated by Author

Table 9 shows the Wald test results for the dependent variable governmental expenditure illustrated regarding equation 5. Below in table 9, Wald test results are given. The probability value is less than 0.05
and is near to zero (probability value for employment is 0.000), we reject again the null hypothesis. It is zero less than 0.05 probability value. This has meant the coefficient of employment has some value to influence governmental expenditure.

**Table 9: Wald test results**

| Dependent variable | Independent variable | Chi square | Probability |
|--------------------|----------------------|------------|-------------|
| Gov Expend         | RGDP                 | 0.128944   | 0.9376      |
|                    | Total Capital        | 2.198481   | 0.3331      |
|                    | Employment           | 22.12394   | 0.0000      |
|                    | Total Revenue        | 1.471777   | 0.4791      |
|                    | Total saving         | 1.991626   | 0.3694      |

Source: Estimated by Author

Table 10 shows the wald test results for total revenue in equation 6 are given. The probability value which is zero means, the coefficient of governmental expenditure has some value to influence total revenue.

**Table 10: Wald test results**

| Dependent variable | Independent variable | Chi square | Probability |
|--------------------|----------------------|------------|-------------|
| Tot. Revenue       | RGDP                 | 2.530461   | 0.2822      |
|                    | Total Capital        | 0.391767   | 0.8221      |
|                    | Gov Expenditure      | 28.59134   | 0.0000      |
|                    | Employment           | 0.266791   | 0.8751      |
|                    | Total saving         | 0.157053   | 0.9245      |

Source: Estimated by Author

In the table 11 Wald test results for total saving is illustrated for equation 7. The probability value is less than 0.05 and is near to zero (probability value is 0.048 and 0.0001), we reject again the null hypothesis. It is more than zero but less than 0.05 probability value. This has meant total capital and employment have some value to jointly influence total saving.

**Table 11: Wald test results**

| Dependent variable | Independent variable | Chi square | Probability |
|--------------------|----------------------|------------|-------------|
| Tot saving         | RGDP                 | 2.991047   | 0.2241      |
|                    | Total Capital        | 5.373222   | 0.0481      |
|                    | Employment           | 18.12804   | 0.0001      |
|                    | Gov Expend           | 1.275038   | 0.5286      |
|                    | Total Revenue        | 0.294425   | 0.8631      |
Conclusion And Findings

In this study, the Cyprus economy is analysed in light of the debt problem. The model tested the causal relationship of the variables considered. Wald test results for 78 lags, respectively, revealed that some of the variables considered jointly affect the GDP growth rate. As can be seen from Table 5 in Appendix 1, the findings obtained from the equations after applying the OLS method; Employment as an independent variable affects all other dependent variables. Total savings and total income affect employment as dependent variables. Government expenditures also affect total savings along with employment that affects current account deficit. This is happened because amount of the collected capital and revenue either not correct registered or transferred money is not sufficient to cover the public debt and reduce the current account deficit. According to the ministry of finance data in Cyprus in 2020, capital account decreased during 2020 was limited to 96 million. In addition, amount of import which is more than export contributes also to the public debt and increases current account deficit.

When we consider the Wald test results in Table 6, the employment probability value is less than 0.05 and the employment coefficient of the independent variable has shown that it has a value that will affect the total capital as a dependent variable. Table 7 shows that the probability values of total capital, employment, government expenditures, total income and total savings are less than 0.05 and these variables have some value to affect the GDP growth rate as the dependent variable, but not enough to increase the GDP growth. Due to the insufficient savings rate in Cyprus, the total capital is affected and as a result, the problems of public debt and current account deficit negatively affect the GDP growth rate. It was observed in another study done by Saungwemean Odhiambo (2019), that public debt negatively affected growth in some countries. However, many studies supporting that there is no relationship between public debt and economic growth have predicted the same results as the Ricardian Equivalence Hypothesis.

Casares Enrique R. (2015) has also observed relationship between public debt and economic growth. However, he stated that the effect of public debt can have positive effects on economic growth up to a certain level, and then these effects turn into negative ones and harm economic growth. It affects positively because the relative price of non-tradable goods in local markets is lower than foreign goods due to public debt, and production and development can be observed in these sectors. It turns into a loss because when the public debt increases, the risk premium increases and therefore the interest to be paid increases, as a result of which the incomes of the households and savings also decrease the resources and the growth is also affected. This is also stated in Table 1. Cyprus’s economy has been declined steadily and RGDP was -4.9 between 2003 and 2007. And between 2013 and 14 its average was reduced to -1.8. The impact of weak savings, total income and public debt problem contributed these results. However, after the adjustment program of Troika in 2013, some financial improvements observed and RGDP was improved to 4.8 in 2016 and 2.7 in 2020 (see Table 1). Similar to Troika measures which brought financial stability regarding to the European Stability Mechanism has also supported by
Checherita-Westphal, et al (2014) study, where fiscal deficits, and therefore debt, are partially affected by internal and external shocks, policy uncertainty and errors. It proposes the establishment of a financial control mechanism to protect and get rid of situations such as indiscipline, and thus to support the creation of a safer financial structure.

In Table 8, it is observed that the total income and total savings coefficients have some value to affect employment together as dependent variables. In Table 9, only employment has a value for influencing government spending. Results of the applied Troika program government surplus has increased 0.8% of GDP for the 2020 but governmental expenditure decreased by 10.8 mn (-0.6% percent) compared to the year 2019 (Ministry of finance 2020). In Table 10, it is seen that only the government expenditure coefficient has a value to affect the total income. Finally, in Table 11, where total savings become the dependent variable, only employment and total capital probability values in the Cyprus economy are less than 0.05 and have a value that will affect total savings.

When employment is the independent variable, it has been observed that its coefficient has a value that will affect all other dependent variables except total income.

As with the Wald test results (see Tables 6 to 11), it shows that all variables together affect the GDP growth rate of Cyprus.

The EU commission continues to support Cyprus for the improvement of the Cypriot economy and financial problems. Technical support was provided from the EU Commission to improve public finances. The Commission has also supported the implementation of international public-sector accounting standards and the creation of a new integrated tax administration system (EU Commission 2019). Despite this, public debt and current account deficit continue to be problems as a result of unsustainable public fiscal policies, and as a result, growth is negatively affected.

References

References are in the supplementary files section.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- References.docx