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Does Public Debt Matter For Economic Growth? Evidence from southern Mediterranean countries.

Abstract:

This paper aims to examine the impact of public debt on economic growth using the dynamic panel data for a 9 southern Mediterranean countries over the period 1990-2015. Our empirical results showed that public debt is negatively and significantly related to economic growth. They also indicate that inflation, investment and total reserves are the main factors of economic growth in the southern Mediterranean countries.

Key words: public debt, economic growth, GMM.

Introduction

During the last decade, the study of the impact of public debt on economic growth has long been dealt with in literature. For this end, many researches were focused in the nexus (Pak H (2001); Edsel Beja (2007), Aïda WADE (2014), Reinhart and Rogoff (2010) ...). The public debt concept is used to lead debates on the financial sector, sustainable development, macroeconomic development and economic growth.

In recent years, the southern Mediterranean countries have encountered some growing economic and financial problems. To overcome these difficulties, many States have become generally indebted. The public debt, which is one of the major macroeconomic imbalances, is particularly linked to the dynamics of economic growth, consumption and investment. In addition, the increase in public debt can lead an increase in interest rates, which have reflected difficulties on the financial capacities of economic agents. In other words, the increase in the interest rate can generally lead to decrease in consumption and investment. The debt growth has a negative effect on economic growth, particularly in countries which was encountered various difficulties caused by the political instability and the governance problems, including corruption, government efficiency and accountability.

In the Southern Mediterranean countries, public debt represents one-third of bank balance sheet total. So, exceeding the credit in the private sector. In this region, the infrastructures of equipment, the production, the resources and investment were insufficient to start the economic difficulties. Actually, the evolution of the government debt is the major cause of the

public deficit which often exposes the developing as well as the developed countries to a bankruptcy risk and financial crises.

In the wake of a particularly restrictive political and social environment, the Arab Spring countries (Tunisia, Egypt, Libya and Syria) has been marked by a slowdown of economic growth since 2011, this is reflected in a difficult social environment, pending for local and foreign investors, a deterioration in the exchange rate, lower tourism and export revenues, a deficit in the trade balance, a rise of unemployment and inflation rates..... All these factors are likely to increase the indebtedness in this region.

We study the case of Southern Mediterranean countries firstly because these countries encountered various difficulties caused by the political instability and the direct and indirect effects of the financial crisis, can generally lead to an excessive debt growth. Actually, the analysis of the 2011-2015 period showed that public debt in this region increased rapidly from 44, 49% to 55, and 48%. And on other hand the majority of recent studies focus on developing countries and emerging countries.

The primary focus in this paper is to inquire about the effect of public indebtedness on the economies of the Southern Mediterranean countries. As a consequence, the rest of this paper is structured in the following way. Section 2 presents a literature review, then section 3 includes a debate about the methodological and econometric particularities, while section four presents the results and their interpretations, and finally, section 4 sums up the paper and examines the implications.

2. Literature review

The relationship between economic growth and public indebtedness has long been dealt with in literature. The absence of an agreement about the results in the studies about the same country or the same geographic zone is explained by the methodological disparities and databases which are most of the time divergent and even contradictory. In a more recent study focus on Tunisia, Abdelhafidh S (2013) studied the relationship between external debt and economic growth for the period 1970-2010 using the Autoregressive distributed lag model (ARDL). Their results showed that external debt is negatively and insignificantly related to economic growth. In addition, this author showed there exist several factors influencing the economic growth such as corruption and capital flight.

Other studies, about advanced economies Amilcar Serrao (2016) analyzed the incidence of public debt on the economic growth. The results showed that when the public debt ratio is above 220%, economic growth in this region is negative. The author used the cointegration test to determine the long-term relationship between the variables. Besides, Nguyen Van Bon (2015) studied the relationship between the public debt, inflation and economic growth over the period 1990 – 2014. Their result reveals that public debt and inflation have positive effects on economic growth in the sub –sample of Asia. However, in Latin America, the impact of public debt and inflation are negative. In the context of financial crisis, Reinhart and Rogoff (2009, 2010) examined the relationship between inflation, government debt and economic growth in 40 advanced and emerging countries. Their results showed there exist a causal relationship between these macroeconomic variables (government debt, economic growth and inflation) in emerging countries. Moreover, government debt can lead to inflation in the way that where reduces job opportunities, which implies that the economic agents will have lower incomes and increase their indebtedness. Therefore, the total external debt/GDP (60 %) in emerging countries deficit implies a strong dependence on market funding which may be more volatile and expensive and can reduce the economic growth. In another studies, Kumar and Woo (2010) studied the impact of debt on economic growth in emerging and advanced economies over the 1970–2007 period. These authors used panel data to ten macroeconomic variables (Initial government size, Banking crisis, Government debt, Initial trade openness, Initial inflation rate, Initial per capita real GDP, Initial financial depth ,Initial years of schooling, Initial government size , Initial financial depth) . The applications of BE, OLS, and SGMM suggest that GDP per capita can explained by debt to GDP in the analyzed period. Besides, the government debt has a significant negative effect on the debt to GDP. The coefficient is 0.02 and this indicates that government debt decreases by 0.02% when there is an increase of 5% debt to GDP.

Cecchetti and al. (2011) reported evidence of relationship between Government debt and economic growth OECD countries, their results reveal that the government debt is found to have an impact on the economic growth rate. On the other hand, little empirical literature has developed the link between government debt and economic growth Checherita and Rother (2010) showed a non-linear impact of debt on the economic growth in 12 euro area countries.

Recently, in the OECD countries, Dar Atul and al (2014) investigated the impact of public debt on economic growth over the 1996- 2007 period, The author used panel data to seven macroeconomic variables (the public debt to GDP ratio, the growth rate of employment, the rate of export growth, rate of growth of labour, the rate of growth of real GDP, total labour force, the rate of capital accumulation). Based on Swamy random generalized least squares (RGLS) technique, we found that public debt had a negative effect and insignificant for all countries. Contrary, in USA and Luxembourg, this estimation found a negative correlation and statistically significant between public debt and economic growth.

Aide WADE (2014) analyzed the relationship between public debt and economic growth. The author used GMM model to eight macroeconomic variables (The GDP per capita growth, the population growth rate, inflation rate, Public debt (% of GDP). At the level 48%, the author found a positive correlation between public debt and economic growth. When the stock of debt is at a level of 48%, the probability of indebtedness becomes strong. This can lead to higher interest rates.

In the South Africa and over the period 1980 -2014, Yosra B and al (2015) using a nonlinear Smooth transition Regression (STR) model to determine the relationship between public debt and economic growth. The results obtained suggest that the debt accumulated by South Africa decreased its growth. Other studies, about emerging countries, Finche and Greiner (2015), studied the incidence of public debt on economic growth. Their results show that public debt play an important role in economic growth, it indicates a statistically and significantly positive. In a more recent study, about Bittencourt et al. (2015) used a fixed effects and random effects for the period 1980- 2009 to test for long-run equilibrium relationship between debt and economic growth .The authors show that in the long-run public debt promote economic growth. Similar results were found in Kenya by H armon (2012) who also found that public debt has a more significant impact on economic growth. This research used a simple linear regression models to analysis the relationship between inflation, interest rate, public debt on the period 1996- 2011.

3. Public debt and economic growth: empirical analysis

3.1. Data and methodology

In this research, we examine the impact of public debt on the economic growth for 9 Southern Mediterranean countries namely Tunisia, Algeria, Egypt, Jordan, Libya, Lebanon, Morocco, Syria, Turkey over period 1990-2015. The data are obtained from the World Development Indicators produced by the World Bank and IFS. We define the variables as follows:

GDP: Gross Domestic Product growth (annual %).

PD: Public debt (%).

POP: Population.

INF: inflation per year (%).

DS: Debt service (% of exports of goods)

TR: Total reserves.

INV: Investment (% of GDP)

EXP: Exportations

Table 1: List of variables

<i>Definition of variables</i>	<i>expected sign</i>	<i>Data source</i>
Annual percentage growth rate of Gross Domestic product is an instrument of economic activity.	(-)	<i>World development indicators, World Bank</i>
The public debt as a percentage of GDP, in order to analyze the debt structure in Southern Mediterranean countries.	(+)	World Economic Outlook, IFS.
Annual percentage growth rate of population is an instrument of economic activity.	(-)	<i>World development indicators, World Bank</i>
Inflation is an indicator measured by the consumer price index, can affect the economic growth.	(-)	<i>World development indicators, World Bank</i>
Debt service is a principal indicator to cover the repayment of interest on the debt.	(-)	<i>World development indicators, World Bank</i>

Total reserves present a sum of all deposits for a particular period.	(+)	<i>World development indicators, World bank</i>
Investment is a macroeconomic determinant of economic growth can will generate income in the future.	(+)	World Economic Outlook, IFS.
Exportations of goods and services can affect the economic growth.	(+)	<i>World development indicators, World Bank</i>

The empirical methodology based on the generalized method of moments (GMM) to estimate the impact of public debt on the economic growth in the southern Mediterranean countries over the period 1990-2015. The Generalized Moments Method (GMM) of Arellano and Bond (1991) was used to estimate dynamic models on panel data. However, the choice of the method is made because this method seems to be accurate and effective.

The model of panel data is given as:

$$GDP_{i,t} = \alpha GDP_{i,t-1} + \beta \sum X_{i,t} + \mu_i + \nu_t + \varepsilon_{i,t}$$

GDP: Gross Domestic Product growth.

X: The explanatory variables.

μ_i : The specific effect of these countries.

ν_t : The temporal specific effect.

ε : Stands for the estimation error.

Eq (2) can be written:

$$GDP_{it} = \alpha GDP_{it} + \alpha POP_{it} + \alpha INF_{it} + \alpha EXP_{it} + \alpha DS_{it} + \alpha RSV_{it} + \alpha IVS_{it} + \alpha DBT_{it} + \delta_{it} + \gamma_{it} + \varepsilon_{it}$$

Therefore, our analysis starts with a description of all the variables (table 2). Then, in (table 3), it examines the correlation matrix to identify the potential multicollinearity problems that might be induced by a strong relationship between the explanatory variables.

To present the model, it is necessary to use the test of overidentification restrictions (Sargan/Hansen) to provide some evidence of the instruments' validity. Actually, the acceptance of the null hypothesis indicates the validity of the over-identification restrictions.

The second is the endogeneity/exogeneity test of Durbin–Wu–Hausman is justified by role in checking the presence of a relationship between the specific impacts of the public debt and the explanatory variables. Actually, this test consists in selecting the appropriate model among the fixed and the random effect ones, Kpodar (2007). As a consequence, the null hypothesis rejection implies that the effects of the endogenous regressors in the estimations are important.

4. Interpretation of results

Descriptive Statistics

Descriptive statistics is used to present quantitative description of different variables (dependent and independent), such as the mean and standard deviation presented in the following table;

Table 2: Descriptive Statistics

Variables	Mean	Std-Dev	Min	Max
PD	23.4829	14.516522	1.37499	10.03407
GDP	71.59431	49.42371	3.0745612	1196.678
INF	22.09978	15.32877	3.285216	77.41366
POP	3.86644	1.823109	.243731	10.7355
EXP	5.596116	3.043646	.54841	9.42038
DS	9.031245	.6131475	7.363409	10.78616
TR	.519646	.5499285	5.227686	7.639399
INV	61.01462	25.1791	25.98	99.67

The descriptive statistics of the variables used in the empirical analysis is presented in table 2. The GDP is an indicator of economic growth present a very high disparity, since its minimum value stands at 3, 07% and maximum at 1196, 67%. As far as PD is concerned, has a mean 23.48% and a standard-type 14.51%. It has a minimum value of 1, 3749% and a maximum of 10,034%. Our regression showed that population growth has a mean 3,86% and a standard-

type 1,82%, this indicator is generally low because the minimum value stands at 10,73% maximum of 0,2%.

In this table, it appears that public debt (mean =23, 48; SD = 14.51) are the best determinants of economic growth since they have the highest mean compared to other determinants. In addition, we can see that a total reserve has the lowest mean in all the variables of 0, 51% and a standard deviation of 0, 54%.

Correlation Matrix

To test the correlation between these variables, we will present the various correlation coefficients in the following table.

Table 3: Correlation Matrix

variables	GDP	PD	INF	EX	POP	DS	RSV	INV
GDP	1.00000							
PD	-0,82632	1.00000						
INF	0,127842*	-0,72512*	1.00000					
EX	0,173482	-0,42136*	0,74352	1.00000				
POP	-0,23671*	0,534721*	-0,7321	0,126341	1.00000			
DS	-0,43526*	0,456321	0,216732	0,41789	-0,3652	1.00000		
RSV	0,188724*	0,437412	0,167432*	0,13457	-0,4783	0,34762	1.00000	
INV	0,478321*	0,734598	-0,26347*	0,253479	-0,1237	0,612348	0,83124	1.00000

The correlation matrix coefficients for the variables is given in table 2. In fact, all the correlation coefficients between the explanation variables and the dependent variable are statistically significant at 5% at least. Accordingly, public debt, population and debt service are negatively correlated with economic growth while inflation, investment, total reserves, and exportations are positively linked to economic growth. In addition, all the correlation coefficients between the independent variables are relatively low, which helps to eliminate the possibility of co-linearity between these variables.

Stationarity

To test the stationary of the variables used in the estimates, we used the stationarity tests, which are the Panel data tests of A. Levin and CFLin (1992); K.S.Im, M.H .Pesaran and Y.Shin (1997); G.S.Maddala S.Wu (1999).

Table 4: stationarity tests

Variables	A. Levin and CF Lin (1992)	K.S.Im, M.H .Pesaran and Ishim (1997)	G.S.Maddala S.Wu (1999).
GDP	-6,4521 (0,0000)	-4,5641(0,0000)	-5,4321(0,0000)
PD	-3,1245(0,0020)	-9,8932 (0,0123)	-4,7312(0,0000)
INF	-6,5213(0,0031)	-5,5234(0,0001)	-8,7534(0,0309)
EXP	-8,9021(0,0032)	-6,7213(0,0021)	-7,92387(0,000)
POP	-8,9364(0,000)	-5,8321(0,012)	-7,8215(0,000)
DS	-8,9021(0,001)	-6,8213(0,031)	-9,8325(0,091)
RSV	-5,7321(0,000)	-7,8341(0,000)	-7,9023(0,000)
INV	-5,2134(0,0000)	-4,2134(0,000)	-6,9423(0,213)

The results of unit root tests show that all data series in this table are not stationary. The study of the series in the panel is integrated of order (1). Hence, we can consider the existence of a long term relationship between the variables. Recently, the applied of Levin & Lin (1992),

Pesaran and Y.Shin (1997) and G.S.Maddala S.Wu (1999) on panel data indispensable in the analysis of long-term process involving the use of the static series.

GMM estimation

The results of GMM presented in the following table;

Table 5: GMM estimation

<i>Variables</i>	<i>GMM(1)</i>	<i>GMM(2)</i>	<i>GMM(3)</i>	<i>GMM(4)</i>	<i>GMM(5)</i>
<i>GDP (-1)</i>	-0,0820* (0,010)	-0,0285** (0,032)	-0,0623* (0,0128)	-0,0518* (0,0162)	-0,0712** (0,0416)
<i>PD</i>	-0,0347* (0,0134)	-0,0644* (0,0100)	-0,0467* (0,0000)	-0,0983* (0,0137)	-0,0341* (0,0171)
<i>POP</i>	0,4548 (0,711)	0,4059 (0,734)	0,1397 (0,537)	0,2489 (0,632)	0,15673 (0,674)
<i>INF</i>	-0,0546** (0,041)		-0,0723* (0,000)	-0,0435** (0,0423)	-0,0678** (0,0512)
<i>EXP</i>	0,0678 (0,761)		0,0978 (0,978)	0,0698 (0,786)	0,0843 (0,876)
<i>DS</i>	0,0932 (0,832)			0,0154 (0,765)	0,8961 (0,732)
<i>RSV</i>	0,4561** (0,041)				0,3765* (0,011)
<i>INV</i>	0,2131** (0,04)				
<i>Constant</i>	-0,895 (1,01)	-0,4234 (1,765)	-1,345 (2,345)	-2,234 (2,789)	-2, 546 (3,213)
<i>AR(2)</i>	0,123	0,141	0,153	0,157	0,184
<i>Sargan Test</i>	0,254	0,275	0,645	0,234	0,163

*Notes: Values in parenthesis are the estimated p-values. Hansen test refers to the over identification test for the restrictions in GMM estimation. The AR2 test is the Arellano–Bond test for the existence of the second-order autocorrelation in first differences. *, ** and *** indicate significance at the 1%, 5%, and 10% levels, respectively.*

The results of GMM showed that public debt is negatively and significantly related to

economic growth. This indicates that the public debt increases by 0.082% when there is a decrease of 1% of GDP. This result is consistent with the literature that indicates that public debt has a positive effect on economic growth (Nautet and Meensel 2011; Aida Wade 2014; Mencinger and al 2014). The southern Mediterranean countries encountered an increase in public debt dictated mainly by the crisis of European sovereign debt and political instability. This leads a decline in savings and an increase in interest rates. Therefore, a higher public debt implies a decline in investment and slowdown economic activity. According to Nautet and Van Meensel (2011), high public debt associated with poor macroeconomic management and lack of governance causes an increase of the interest charges which will reduce the productive expenditures in public investment in infrastructure. On the other hand, the reduction of revenue for state governments could, however, result in a higher taxation. In fact, the State must reduce the public expenditure or increase taxes, which can affect consumption, private investment or the offer of employment to ameliorate the overall economic performance.

In addition, the increase in public debt can generally lead an increase of inflation and the uncertainty of macroeconomic volatility. In this situation, the southern Mediterranean countries initiated a series of reforms in the tax system to reduce the public deficits and stimulate the economic growth. This result supports the idea that the public deficit is a source of public debt can increase during the periods of low growth.

The total investment rate as a percentage of GDP has a positive impact on the economic growth. This indicates that an increase in the investment by 5% causes an increase in economic growth. In other words, an increase in the investment leads to an increase in the national income and the consumption. In fact, this increase can generally lead an increase in production that affect the economic growth by the rise in wages and profits.

Despite the fact that the direct links between the economic growth and the investment are the subject of a current debate, various authors argue that investment is a factors of economic growth (Taiwo Muritala (2011), K Kim and H Bang (2013); D r. Aurangzeb (2012)), which significantly affects the countries' developing achievements. On the one hand, the investment can improve the productivity and purchasing power in the southern Mediterranean countries. Jorge A. Alarcon and Rivera, Juan (1994) stipulates that an increase in the income and

purchasing power are likely to increase household consumption, as the two are complementary.

In addition, an increase in the public investment implies an increase in the private investment. Particularly, when the public investment in infrastructure improves the productivity and the private sector investment. According to Tom Hart and al (2015) the investment in infrastructure can affect economic growth and has been shown to improve human development indicators.

As expected, inflation is negatively and significantly related to economic growth in the southern Mediterranean countries. This result is consistent with the literature (Gillman et al. (2004); Gillman & Harris (2008); Bittencourt (2012)) that indicates that a weak inflation causes a decrease of interest rate, which encourages the real estate investment and credit. On the other hand, a significant and rapid drop of inflation led to the improvement of the banks' credit activities and can boost the economic growth (Mubarik, 2005). In addition, and in line with previous studies, a negative and significant relationship was found between the inflation and economic growth (Fischer 1993). Inspired by this study, our result interpretations revealed that decrease of inflation have an increase of the investment and the productivity growth. Besides, this author showed that reduction of inflation could, however, result in a rise nominal income and cash flow, which affects the liquidity and solvency of the financial institutions.

On the other hand, the rise of inflation can affect economic growth in the southern Mediterranean countries. This means that an increase in the total of loans and a decrease in the rate of capital investment have succeeded in supporting economic growth. In fact, the positive effects of inflation are justified by the formation of savings and the increase in the future income (Cheikh Tidiane and al (2012)).

Conclusion

The impact of public debt on the economic growth at the heart of the research debate. The Public debt represents a source of macroeconomic imbalance, which weakened the real economy. This paper analysis the impact of public debt on economic growth in the southern

Mediterranean countries, estimated by the generalized method of moments (GMM) during the period 1990–2015.

Following the democratic transition and political instability, some Mediterranean countries a difficult economic situation which was accompanied by a deterioration in the macroeconomic indicators such as an increase in the percentage of public debt, an increase in inflation and the depreciation in GDP growth, this depreciation has negatively affected the exports, the tourism sector and foreign direct investment.

Actually, the analysis of the 2011-2015 period showed that public debt increased rapidly from 44% in 2011 to 53% in 2015. The public debt growth was affected by the fragility of the Mediterranean economy, loan repayment capacity, the accumulation of debt and the decline in economic growth. The financial crisis of 2008-2009 and the political instability for some Southern Mediterranean countries led to a rapid rise in public debt.

The empirical results suggest the public debt has a negative and statistically significant effect on economic growth in the southern Mediterranean countries. According to the theory of over-indebtedness, the negative impact of the debt on economic growth is only observed when its weight is high and in the difficulties of repayment (Warner M. Corden 1988, Jeffrey D. Sachs 1989). The increase of public debt in the southern Mediterranean region is intensified by development problems, such as poor debt management, poor governance, macroeconomic shocks, limited access to capital and infrastructure and inadequate technologies. In fact, the developing countries sought to improve the performance and efficiency of their financial sectors to ameliorate their overall economic performance. The authorities of several countries of the southern Mediterranean initiated a series of reforms to modernize their debt sectors.

To conclude, we can say that the Southern Mediterranean countries should orient their economic policies to changes and improve the debt services and the debt governance to support a sustainable the economic growth. Also, the future research should focus on the relationship between the public debt, inflation and trade openness in the southern Mediterranean countries. Besides, it is possible to use other macroeconomic variables namely the interest rate, the index of industrial production, the real exchange rate and using the Autoregressive distributed lag model (ARDL). However, we believe that this research

provides empirical results which are useful for the understanding of this type of national economy in this region as well as in the choice of the economic policies in order to increase the development.

In fact, the implications dealt with in this study are the following. First, it clearly appears that the Southern Mediterranean countries suffer from a heavy debt burden. For this reason, they had better reorient their economic regulations regarding their public debt so that they will be able to boost their economic growth and therefore improve their living standard. Moreover, keeping the debt ratio stable often helps promote investment. Moreover, the inappropriate conditions, such as the political transition accompanied by social instability as well as poor governance, represent the main challenge for the Southern Mediterranean countries to sustain their economic growth. It follows that the governments in these countries should adopt efficient political measures regarding the debt services so that they will be able to revive their economy through the enhancement of both local and foreign investments.

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