# Public Debt and GDP Growth in Western Balkan Countries - Empirical Evidence

Violeta Madzova, Sladjana Stojanovska, Krste Sajnoski,

**Abstract**— The debate about the impact of high debt levels on economic growth has intensified over the last decade as the levels of public debt have risen sharply in many countries. The Western Balkan countries have not been immune to the increase in public debt and slowdown in economic growth, as has been the case in the countries' primary economic partner, the Euro zone. This paper presents an empirical analysis of the relationship between debt and GDP growth in the Western Balkan countries, controlling for multiple economic variables. Relying on panel vector auto regression methodology, it is concluded that while the increase in debt in these countries over the 2002-2016 period could have had a negative impact on growth, the conclusion is not definitive. Moreover, even if a negative impact existed, it was likely very limited. The findings have shown that beside the public debt growth, the economic performance of the main economic partners in the Euro zone was the predominant factor impacting the levels of growth in the Western Balkan countries over the sample period

**Index Terms**— *public debt, economic growth, economic performance, Vector Autoregressive Model, Granger tests of causality.*

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## 1 INTRODUCTION

THE correlation and the causal relationships between public debt and economic growth have been analyzed theoretically and empirically for a long period of time. Before the global financial crisis, the published academic papers presented divergent conclusions about the impact of indebtedness on economic prosperity. The body of knowledge can be summarized into three lines of thought. The first group of economists sees public debt as determinant to domestic saving, investment and thus to growth (Eisner, 1992). The second group considers that higher public debt may discourage domestic saving and investment through the crowding-out effect and as a result reduce economic growth (Krugman, 1988; Alesina and Tabellini, 1989; Tornell and Velasco, 1992). This line of thought is related to the so-called the debt overhang theories, which show that the future debt ends up being greater than a country's expected repayment ability. The last line of thought centers on the Ricardian equivalence theory (Barro, 1989), which states that the level of the debt does not have any impact on economic growth because the higher borrowing, accompanied with tax cuts, can increase private saving and therefore will offset the fall in public saving. This is because taxpayers would save the full tax cut in order to repay the future tax liability, as a result annulling any effects on the changes in aggregate demand, leading to conclusion that public debt has no short-run effect on growth. Based on these theoretical positions, more recent studies tend to empirically investigate the

existence and nature of the impact and relationship between public debt and economic growth.

Different studies produce different conclusions, depending on the level of economic development of the observed countries, the tempo of growth of public debt, as well as the level of the countries' level of indebtedness. In general, however, research tends to find a negative linear relationship between debt and growth or in the cases where threshold models are used following the methodology developed by Hansen (1999), a non-linear impact of debt on growth, meaning a positive effect on growth up to a certain threshold and a negative effect beyond. Although the over indebtedness is a burning issue for the Western Balkan countries too , there is limited number of research papers which empirically test the significance of public debt on the economic growth in each of the Western Balkan countries  and no analysis so far on the reginal level. Thus, the aim of this paper is to fill this gap in economic analysis and add contribution to the existing empirical research, related to the public debt effects on economic growth of the Western Balkans economies. The paper presents an investigation of the relationship between debt and growth in five West Balkan Countries (WBC)[1]: Albania, Bosnia and Herzegovina, Macedonia, Montenegro and Serbia over the 2002-2016 period.

## 2 REVIEW OF EMPIRICAL LITERATURE

The empirical research in the 21st century regarding the public debt effect on economic growth can be divided into two, significantly different groups. While the first group is focusing on identifying linear relationship between the two observed variables (debt and economic growth) , the other group of scientist explore, non-linear mechanisms applying the threshold regression framework methodology .
The study of Schclarek (2004), which falls in the first category ,

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[1] Kosovo is not included due to the lack of data

examined a panel of 59 developing countries and 24 industrialized countries with data averaged over five-year periods between 1970 and 2002. His findings revealed that a rise in external debt, and in particular the rise in external public debt, plays a major role in setting back economic growth. These findings, however, are only valid for the group of developing countries, as calculations applicable to developed economies do not support any relationship between public debt and economic growth. In a more recent study, Kumar and Jaejoon (2010) explored the influence of high public debt on long-run growth using a panel of data from advanced and developing countries over 38 years, and reached two conclusions: an inverse relationship between initial debt and growth; and the possibility of some non-linearity effects of debt on growth.

One of the most influential studies on the topic is the one of Reinhart and Rogoff (2010). They explored the possibility of a persistent relationship between high gross central government debt levels, economic growth and inflation, based on a newly developed database. The authors affirm the existence of a weak link between growth and low levels of debt, but when debt-to-GDP ratio reaches over 90%, the economies' growth rates is on average one percent lower than otherwise. In 2011 the same authors compiled a database of domestic debt which allows for a better comprehension about the question as to why economies default on external debts at low thresholds of public debt. Later, Reinhart and Rogoff (2012) complemented their analysis by considering prolonged periods of high debt. Their results suggest that during periods of debt overhangs growth tends to be considerably lower.

Herdon, Ash, and Pollin (2013), have challenged the Reinhart and Rogoff findings, finding that the threshold effect seems to vanish after correcting for a coding error and using a different weighting of the data.

Kumar and Woo (2010), claim to have found "some evidence of nonlinearity with higher levels of initial debt having a proportionately larger negative effect on subsequent growth. They have run a growth regression at 5 year frequency from 1970 to 2007 and find that a 10 percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of 0.15 percentage points per year. They test for nonlinearities by introducing interaction terms between initial debt and dummy variables for three ranges of initial debt, 30, 60, and 90, respectively. Several years after, Woo and Kumar (2015) find that higher debt starts affecting growth at a lower threshold (40% of GDP), but the effects become statistically significant only at about 90% of GDP. Another empirical study that contributes to understanding the role of public debt in economic growth is provided by Cecchetti et al (2011). They find the threshold for government debt, beyond which debt is a drag on growth, to at around 85% debt-to-GDP ratio. Using data on 18 OECD countries from 1980 to 2010 they also find that a 10 percent increase in government debt reduces real per capita GDP growth by 0.17 percent per year.

Focusing on the twelve Euro area countries for the period between 1990 and 2010, Baum, Checherita and Rother (2013) also find that debt has a non-linear effect on growth, leading to lower growth when it exceeds 95 percent. In addition to the threshold effect, there is the issue of causality: high debt may be the result of sluggish growth or it could reflect a third factor, an omitted variable that simultaneously increases debt and reduces growth. Obvious examples are wars or financial crises. This concern is particularly relevant when considering the short-term correlation between growth and debt, which has been the focus of segments of the literature, since temporary recessions naturally lead to an immediate increase in the debt ratio

Using a larger time span (from 1970 till 2010) for the same twelve Eurozone countries Checherit-Westphal and Rother (2012) concluded that the negative effect of government debt on growth starts between 70% and 80%, and private saving, public investment and TFP are the channels where public debt is found to have a non-linear impact on growth. Annual changes in the debt level (first difference of the debt ratio) are also found to be negatively associated with annual economic growth rate.

Greiner (2012) relates a higher public debt ratio with a lower long-run growth rate. However, in the next year when the author assumes wage rigidity, the conclusion is different: public debt does not affect long-run economic growth or employment, but only the stability of the economy.

Afonso and Jalles (2013) analyzed the linkages between growth, public debt and productivity, through an analysis of 155 countries between 1970 and 2008. The authors conclude that there is a negative effect of debt ratio and financial crisis on economic growth.

Other papers have tackled the issue of causality by using instrumental techniques. Among these, Panizza and Presbitero (2012) reject the hypothesis that high debt causes lower growth. They propose a novel instrumental variable that allows them to reject the notion that debt causes slower growth in OECD countries. They claimed that there is a negative correlation between debt and growth, but show that debt does not have a causal effect on growth. To answer the question "Do high levels of public debt reduce economic growth?" they follow the econometric procedure of trying to reject the proposition that "debt has no effect on growth". Their research shows that this proposition cannot be rejected, so it may well be that it is true.

Afonso and Alves (2014) have analyzed the effect that government debt has on real *per capita* GDP growth, both annually and with 5-year average rates, for 14 European countries over the 43 years period between 1970 and 2012. They concluded that debt is negatively related with growth, both in the short and long-term. In addition to this, they have highlighted the process of convergence between the countries selected for their sample. Turning to interest rates; short-term interest rate has a positive effect on growth, which is contrary to the case of long-term rate. When they analyzed both debt-to-GDP ratio and debt service variables, the latter has a much more negative effect on economic performance when compared with debt. Their analysis also showed that when debt interacts with macroeconomic variables, there is evidence of unfavorable effects of taxation on capital and profit and the growth of credit to the private sector, as well as on government expenditure. On the other hand, total factor productivity, current account

balance and urbanization are examples of variables that contribute positively to growth. They have also provided results that show the existence of an inverted U-shape relationship between debt ratio and economic growth. During the computation of the two average thresholds for this non-linear relationship, they obtained annual and 5-year average growth rate thresholds of 75% and 74%, respectively.

In contrast to most of the findings on developed country data, Fincke and Greiner (2014) analyzed the effect of public debt on economic growth in emerging market economies, and using panel data estimations of selected emerging market countries, found significant positive correlation between public debt and the subsequent growth rate of per capita GDP.

Pescatori, Sandri, and Simon (2014) used an extensive dataset which covering almost all IMF members for a period of more than 135 years, and found no evidence of any particular debt threshold above which medium-term growth prospects are dramatically compromised. However they found that debt trajectory can be as important as the debt level in understanding future economic growth of the countries, as the economies of the countries with high but declining debt have grown as fast as countries with lower debt. Finally, they found evidence that higher debt is associated with a higher degree of output volatility, implying that debt can be a threat for further sustainable development and economic welfare.

It can be concluded that despite extensive theoretical and empirical analysis made on the case of developing, emerging and high level developed countries; there are still divergent understandings and conclusions about the impact of indebtedness on economic growth, which makes this topic to be still in the focus of many researchers and scholars. The divergence of the findings and conclusion among the researchers is mostly due to the different deployed methodologies, data robustness and the observed time span, as well as to the different level of the economic development and the economic cycle's stage of the observed countries.

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## 3 DATA AND METHODOLOGY

In the empirical analysis, the annual data are used covering the period 2012-2016. The main sources of data are the IMF data base , Annual reports of the Ministries of Finance of the observed Western Balkan countries , UNDP's Human Development data base , as well as World Banka data base.

The analysis of the data is conducted using panel vector autoregression (pVAR) methodology in a generalized method of moments framework using the pVAR Stata package, as developed by Abrigo and Love (2016).

It is specified the following pVAR model represented by the following system of linear equations:

$$\Delta P_{it} = A_0 + A(L)\,\Delta P_{it} + X_{it}B + u_i + \varepsilon_{it} \qquad [1]$$
$$i \in \{1, \ldots, N\},\ t \in \{1, \ldots, Ti\}$$

where:

- i represents each country, the cross-sectional dimension;
- t represents years, the time dimension;
- $\Delta P_{it}$ is the vector of dependent variables;
- $X_{it}$ is vector of exogenous covariates, i.e. control variables;
- L is the lag operator;
- A and B represent the matrices of parameters to be estimated;
- $u_i$ is a vector of dependent variable-specific panel fixed-effects;
- $\varepsilon_{it}$ is the idiosyncratic error term.

The variables used are expressed as growth rates and ratios in order to ensure stationarity. The lag selection for the model is conducted by investigating the Akaike Information Criterion (AIC) values of multiple VAR specifications for each of the

panels. The results from this analysis suggest that the optimal lag order is 3. The multiple specifications of the main model is done, with the postestimation analysis including a test for pVAR stability and Granger tests of causality.

According to Granger (1969), Y is said to "Granger-cause" X if and only if X is better predicted by using the past values of Y than by not doing so with the past values of X being used in either case. The following gives a clear picture about this:

- If a scalar Y can help to forecast another scalar X, then we say that Y Granger-causes X;
- If Y causes X and X does not cause Y, it is said that unidirectional causality exists from Y to X;
- If Y does not cause X and X does not cause Y, then X and Y are statistically independent; and
- If Y causes X and X causes Y, it is said that feedback exists between X and Y.

Essentially, Granger"s definition of causality is framed in terms of predictability. With the regression analysis it has been estimated whether public debt determines the economic size (GDP) in Western Balkan countries and whether GDP can influence the level of public debt.. The following equations are used to test the causality between aforementioned variables:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i Y_{t-i} + \sum_{i=1}^{k} \beta_i X_{t-i} + \varepsilon_{1t}$$

$$X_t = \gamma_0 + \sum_{i=1}^{k} \gamma_i Y_{t-i} + \sum_{i=1}^{k} \delta_i X_{t-i} + \varepsilon_{2t}$$

Where X and Y are the time series sequences, $\alpha$, are the respective intercepts $\varepsilon_{1t}$ and $\varepsilon_{2t}$ are white noise error terms and k is the maximum lag length used in each time series. The optimal lag length should also be found for used variables.

## 4 ECONOMIC GROWTH AND PUBLIC DEBT IN WESTERN BALKAN COUNTRIES

The Western Balkan countries, (which are still left aside of European Union, but with strong aspiration to join EU family in the near future) were not immune to the increasing trend of the public debt. In fact having the European Union as the most significant trading and investment partner, the Western Balkan countries experienced "spillover effect" from the contaminated EU countries. Additionally, their governments trying to keep "social peace" among the population recognized the "advantages" of solving their budget deficit gaps, through internal or external borrowing, rather than by increasing the tax burden of their citizens.

When analyzing the economic growth in the WBC over the 2002-2016 period it can be considered as moderate and uneven. During this period, the levels of debt increased in real, nominal and relative terms practically in all countries[2]. The

moderate growth rates reflect the fact that the sample period coincides with the global financial crisis and its aftermath. The increase in debt, in addition the crisis period, likely reflects WBC governments taking advantage of relatively favorable interest rates, an improved access to global capital markets, and possibly most importantly a preference to use debt as a temporary solution to budget deficits as opposed to tax hikes. At a first glance of the raw data, debt growth and levels look inversely correlated with GDP growth (Fig. 1 and 2). The relationship between the average growth rates and average debt levels and growth rates by country varies depending on the measuring units employed.
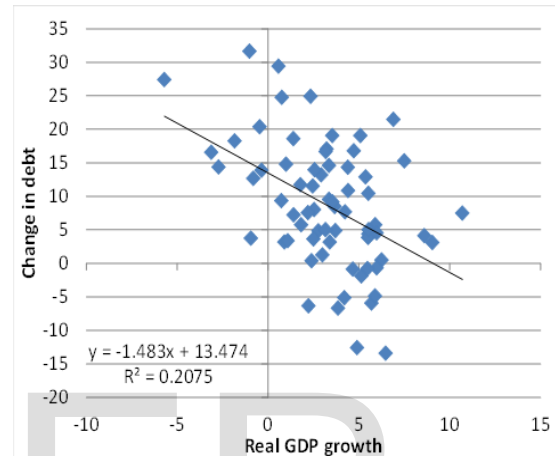


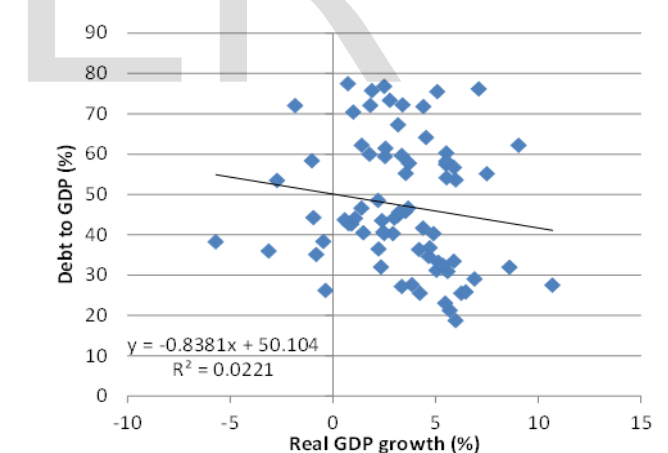Fig.1. Real GDP growth and debt growth in each year in WBC, 2002-2016



Fig. 2 Real GDP growth and debt levels in WBC, 2002-2016

While the average real GDP growth rate is inversely related with the average increase in debt, when measures that exclude the effects of different inflation rates across WBC are used, the relationship reverses. Moreover, the countries that posted higher average growth rates over the sample period tend to have a higher average level of relative indebtedness, as well as a higher rate of increase in the level of relative indebtedness.

To account for the likely effects of important endogenous and exogenous factors, in the analysis, the lagged values of the main variables (real GDP growth and debt growth) as well as

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[2] The decline in debt-to-GDP in Montenegro reflects a large and atypical decrease in debt in 2003. Any dissonance in the summary statistics for this country is due to this change occurring in the beginning of the sample period

multiple control variables are introduced. The control variables account for the differences in economic openness and competitiveness, the growth of the main trading partners, as well as the different level of development. In order to control for the exposure of each country to the global economy and its competitiveness, the ratios of the countries' exports to GDP are used. To control for the variability of growth over time due to exogenous factors, the GDP growth rates for the Euro zone countries are used, as they the primary trading partners of the Western Balkan countries. As the e level of development has been pointed in the above literature review as a factor that impact the effect of debt on growth to differ, the UNDP's Human Development Index is used in order to control this conclusion in the case of Western Balkan countries. Last but not least, the control for the level of relative indebtedness measured by the debt to GDP ratio was made. The summary statistics of the debt, growth and other variables covering WBC that are used in this paper are presented in Table 1 and Table 2.

The data show a group of countries that are somewhat homogeneous in regards to their level of development and economic performance. Albania has the highest average GDP growth, but also the highest level of government debt to GDP and the lowest ratio of exports to GDP. Serbia has the lowest average growth, but the also the second lowest average increase in debt-to-GDP.

## TABLE 1

### SUMMARY STATISTICS OF USED VARIABLES, 2002-2016

| | Real GDP growth (%) | | Nominal GDP growth (%) | | Change in debt (nominal) (%) | | Government debt to GDP (%) | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| ALB | 4.0 | 1.9 | 6.7 | 3.5 | 7.6 | 4.3 | 62.2 | 6.7 |
| BIH | 3.1 | 2.4 | 5.5 | 4.9 | 9.8 | 23.9 | 34.8 | 9.5 |
| MKD | 3.2 | 2.0 | 5.9 | 3.5 | 6.5 | 11.8 | 35.7 | 7.9 |
| MNE | 3.4 | 4.0 | 7.9 | 7.7 | 9.1 | 16.4 | 47.9 | 15.9 |
| SRB | 2.9 | 3.5 | 10.6 | 6.9 | 11.1 | 12.0 | 56.2 | 16.5 |

Anyhow , the mean values of the Real GDP growth in all Western Balkan Countries are significantly higher than the Real GDP growth in Eurozeone for the period 2002-2016.

## TABLE 2

### SUMMARY STATISTICS OF USED VARIABLES, 2002-2016

| | Change in debt-to-GDP ratio p.p. | | Human Development Index | | Exports to GDP (%) | | Euro zone real GDP growth (%) | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| ALB | 0.58 | 3.30 | 0.73 | 0.03 | 25.9 | 3.3 | 1.1 | 1.9 |
| BIH | 0.92 | 4.47 | 0.72 | 0.02 | 31.0 | 3.6 | | |
| MKD | 0.57 | 3.99 | 0.73 | 0.02 | 40.0 | 7.8 | | |
| MNE | -0.02 | 11.3 | 0.78 | 0.03 | 40.4 | 4.6 | | |
| SRB | 0.05 | 7.77 | 0.75 | 0.02 | 33.0 | 9.0 | | |

## 5 EMPIRICAL RESULTS AND COMMENTS ON FINDINGS

The panel VAR results from five specifications of the main model are presented in Table 3 . Although VAR coefficients are not usually analyzed like simple regression coefficients, they can be still compared as the coefficients of the change in debt variable and the Euro zone real GDP growth exogenous variable, due to the fact that all variables are expressed as growth rates in percentages. What stands out at first glance is the relatively small size of the coefficients of the change in debt variable.

### TABLE 2

### REGRESSION RESULTS . ESTIMATED COEFFICIENTS RESPONSE VARIABLE

| | Dependent variables | | Exogenous variables | | | |
|---|---|---|---|---|---|---|
| | Real GDP growth | Change in debt | Euro zone real GDP growth | Exports to GDP | Debt to GDP | HDI |
| Spec. 1 | L1. 0.197 L2. -0.009 L3. 0.209** | L1. -0.086*** L2. -0.022 L3. -0.013 | | | | |
| Spec. 2 | L1. 0.338** L2. 0.076 L3. 0.125 | L1. -0.011 L2. -0.031 L3. -0.005 | 0.99*** | | | |
| Spec. 3 | L1. 0.292** L2. 0.005 L3. 0.050 | L1. -0.021 L2. -0.035** L3. -0.010 | 1.01*** | -0.12 | | |
| Spec. 4 | L1. 0.249* L2. 0.102 L3. 0.171 | L1. -0.010 L2. -0.037** L3. -0.002 | 0.79 | 0.23 | -0.06 | |
| Spec. 5 | L1. 0.312 L2. 0.087 L3. 0.108 | L1. -0.011 L2. -0.030 L3. -0.001 | 0.95** | 0.06 | -0.05 | 23.65 |

* denotes significance at 10%, ** at 5%, and *** at 1%, respectively

These coefficients also decline further once the exogenous variables are added. Contrary to that, the size of the coefficient of the Euro zone real GDP growth variable is very large in all specifications, indicating that the relationship between this variable and real GDP growth rates in the WBC is almost one-to-one.

The results from the Granger causality tests and the VAR stability tests are presented in Table 4.

### TABLE 4

### GRANGER CAUSALITY TEST RESULTS AND

### pVAR STABILITY TEST RESULTS

| Spec. | Granger test results | Stability |
|---|---|---|
| 1 | Change in debt Granger-causes change in real GDP | pVAR satisfies stability condition |
| 2 | Change in debt does not Granger-cause change in real GDP | pVAR satisfies stability condition |
| 3 | Change in debt Granger-causes change in real GDP | pVAR satisfies stability condition |
| 4 | Change in debt does not Granger-cause change in real GDP | pVAR satisfies stability condition |
| 5 | Change in debt does not Granger-cause change in real GDP | pVAR satisfies stability condition |

The results from the causality tests show that the causal relationship cannot be established robustly, while the results

from the stability tests indicate that the VAR system in all forms is stationary and we can use it to produce impulse response functions.

As can be observed from the presented statistics so far, as well as from the resulting impulse response function of debt changes on real GDP growth (Fig.3), the nature of the relationship between debt growth and GDP growth in the WBC over the 2002-2016 period cannot be clearly established once the control variables are taken into account.
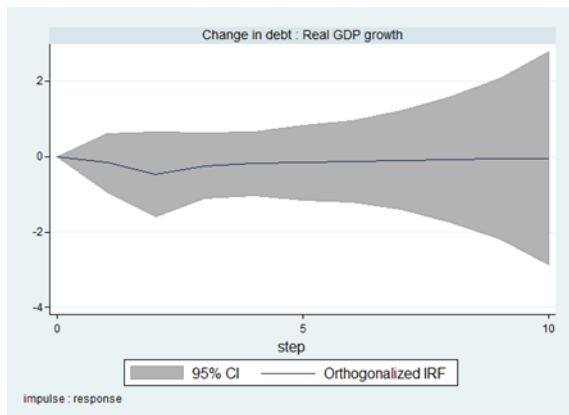Even if negative relationship existed, it would be rather weak.



Fig. 3  Impulse response function, specification

Over the sample period, the most significant factor determining growth in the WBC is the growth rate of the Euro zone, which could be expected since it is the largest export market for the five countries, and also an area where many expatriates from WBC live and work and send remittances from. The size of the WBC economies relative to the one of the Euro zone is instructive – the combined GDP of the five countries of $81billion in 2016 represent only 0.6% of the Euro zone's $13,936 billion. This makes the five countries a periphery on the outskirts of the Euro zone, highly dependent on the economic developments in the core. That said, the regression results do suggest that there is at least a possibility that the increase in debt has weighed down on growth to a limited extent

## 6  CONCLUSION

There are divergent understandings and conclusions about the impact of the public debt on economic growth, which makes this topic to be still in the focus of many researchers and scholars.
Most policymakers seem to think that debt reduces growth. This view is in line with the results of a growing empirical literature which shows that there is a negative correlation between public debt and economic growth, and finds that this correlation becomes particularly strong when public debt approaches 100% of GDP. Using panel econometric methodology, this paper's findings show that the debt could have had a negative effect on growth in WBC, but the conclusion is not definitive once control variables are included in the analysis.
In fact, at a first glance of the raw data, debt growth and levels look inversely correlated with GDP growth. While the average real GDP growth rate is inversely related with the average increase in debt, when measures that exclude the effects of different inflation rates across WBC are used, the relationship reverses. Moreover, the countries that posted higher average growth rates over the sample period tend to have a higher average level of relative indebtedness, as well as a higher rate of increase in the level of relative indebtedness.
Thus, even if the negative effect of debt growth on GDP growth had been present, it had a very limited impact. Growth in these countries over the sample period was primarily a reflection of the growth in countries in the Euro zone, which could be expected as the WBC countries can be thought of as a periphery on the outskirts of the Euro zone.

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