

# ASSESSMENT OF PUBLIC DEBT SUSTAINABILITY IN THE BALKAN MARKET

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## Abstract

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This research paper focuses on the relationship between public debt and the economy in the Republic of North Macedonia. Debt size has become a crucial indicator for monitoring the health of economies, and North Macedonia's economy is often reliant on borrowing. The COVID-19 crisis exacerbated the country's already high level of debt, limiting budget response options. The effectiveness of implemented measures to mitigate the crisis depends on their adaptation to specific conditions. To assess the sustainability of public debt, the study uses ordinary least squares (OLS) and multivariate regression analysis, providing an empirical evaluation of North Macedonia's public debt sustainability by using data from the Ministry of Finance. The main findings of the paper reveal insights into the sustainability of public debt and the impact of fiscal policies on economic stability. The study highlights the importance of careful debt management and the need for fiscal policies that strike a balance between supporting economic growth and maintaining budget sustainability. The empirical analysis and methodology employed in the study offer valuable insights for policymakers and researchers, aiding in the formulation of effective fiscal policies. Research has its limitations on the usage of the quartile data for earlier periods — transition periods that were not available.

**Keywords:** Public Debt, Sustainability, Budget Deficit

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## 1. INTRODUCTION

Fiscal policy stability is called into question when an increase in the debt-to-GDP ratio exceeds a certain level when revenues are not sufficient to offset the financial costs associated with new levels of debt issued or when it is clear that the needs of the government are higher than can be supported by taxpayers. Public debt is the main instrument that guarantees the efficient use of economic resources, where it ensures optimal delivery of policies undertaken by the government by allowing the provision of public goods and services at any time regardless of the existence or not of

the necessary funds. High rates of interest and fiscal indiscipline are found to be among the main driving forces for increasing debt burden (Sundus et al., 2022).

On the other hand, public borrowing is an inevitable process of indisputable importance, which promotes the economic development of the country, produces equality between generations, and contributes to increasing the well-being of each as a result of the allocation of capital in financing public projects as productive and necessary for all in priority sectors such as security, justice, infrastructure, health, education, etc.

Public debt has positive effects on the economy if used effectively, especially for profitable investments or high returns. If misused or taken in inappropriate conditions and in moments of economic strain, it negatively affects a number of other economic parameters. Debt size has become the main indicator for tracking the health of economies.

Public debt issues become among the major topics for the Eurozone. Briceño and Perote (2020) suggest that it is important to re-think of revision of qualitative and quantitative parameters in the context of the Maastricht Treaty, for future economic development. Furthermore, sovereign debt crises in the euro area were a good reminder that even in the advanced economies debt sustainability should be monitored closely (Pamies & Reut, 2020).

In the case of the Republic of North Macedonia, this indicator becomes even more sensitive due to the de facto installation of an all-consuming spirit at every level of the economy. External debt management is an integral part of macroeconomic management, including planned purchases, loan stabilization, debt service payments, and their final repayment to drive economic growth, poverty reduction, and sustainable development without creating payment difficulties.

The case of the North Macedonia economy is almost related to borrowing and always in difficult conditions. Moreover, the borrowings were mainly for investment projects, which still today have not brought additional income to the country.

Sustainability is one of the most widely used concepts in assessing fiscal policy behavior. Moreover, the use of debt to finance investments is justifiable when great benefits are expected in the future. High budget deficits for a long time represent or are not a real threat to the stability of public finances. The tendency of their accumulation is noticed in many countries, which makes the sustainability of public debt turn into an argument and challenge as economic and political on a global scale. Therefore, the research question of the study is:

*RQ: Are the fiscal policies in North Macedonia stable enough to have high levels of public debt that will remain stable?*

To answer this question, the study will treat two dimensions where relevant hypotheses will be tested for each, according to the selected econometric model: 1) Progress of public debt in the Republic of North Macedonia and 2) Assessment of public debt sustainability in the Republic of North Macedonia.

As public debt increases economic efficiency by lowering tax rates over the long term, stimulating macro-level income savings, and enabling equality between certain generations, its use must be made very carefully and the additional funds provided must be channeled into the most efficient projects that generate sufficient income in service of the received debt. In order for the public borrowing target to be met it is necessary for fiscal policies to be sustainable, a concept that is extremely difficult to materialize in reality, but at the same time quite important to be assessed in terms of the adoption of fiscal measures necessary for the performance of the economy that guarantee development and maintain dynamic balances.

During the COVID-19 pandemic and after, the debt transparency agenda is made more relevant than ever (Rivetti, 2022). On the other hand, the COVID-19 crisis left the country with a high level of debt, which limited budget response options and made them more vulnerable. Budget policy has been put at the forefront of the response to COVID-19. The country has implemented the necessary measures to mitigate the immediate impact of the crisis, but how effective these measures are depends on how well they are adapted to the specific conditions. Borrowing needs have risen sharply as fiscal deficit and public debt rise and financial markets shrink, where after a period of immediate crisis restraint, fiscal policy will have to strike a delicate balance between supporting economic recovery and securing budget sustainability. The study by Debuque-Gonzales et al. (2022) concludes that COVID-19 had an immediate impact on the fiscal responses to public finances.

The Public Debt Management Strategy 2021–2025 sets limits for the three levels of debt, state, guaranteed, and total public debt in the next five years, as well as for the debt structure, in terms of prudent management. According to the Public Debt Strategy, prepared by the Ministry of Finance of North Macedonia, as well as in terms of fiscal consolidation policies to be implemented by 2025 public debt should be reduced below the Maastricht criterion, i.e., reduced to 58.8%. The state debt, according to this strategy, will be up to 53.7%, after which it is planned to stabilize and decrease up to 51% by 2025 (Ministry of Finance, n.d.).

All over the world, government budgets need to be supported by tax systems that promote the increase of GDP per capita by stimulating economic competition. Fiscal policy should stimulate the reaction of the economic environment, where the increase of budget revenues stimulates the development of business activity, as a result of which stimulates economic growth, or the opposite may happen.

The issue of fiscal policy stability and its relationship to public debt levels is of paramount importance in the context of economic management. In the case of the Republic of North Macedonia, the question arises as to whether the country's fiscal policies are stable enough to support and sustain high levels of public debt. The stability of fiscal policies becomes a critical concern when the debt-to-GDP ratio exceeds a certain threshold, and when revenues are insufficient to cover the financial costs associated with new debt issuance. Moreover, the country's heavy reliance on borrowing, particularly for investment projects that have not yet generated income, further underscores the need to assess the sustainability of public debt in North Macedonia. This research aims to address the research question and shed light on the stability of fiscal policies in relation to high levels of public debt, providing valuable insights for policymakers and economists in their decision-making processes.

This study adopts a theoretical/conceptual framework that integrates concepts related to fiscal policy stability, public debt sustainability, and economic development. It draws on established theories and empirical research in the fields of macroeconomics, fiscal policy, and debt management. The framework provides a lens through which

the research question of the study can be analyzed and evaluated, enabling a comprehensive understanding of the factors that contribute to the stability of fiscal policies and the sustainability of public debt in North Macedonia.

The relevance and significance of this study lie in its examination of the relationship between fiscal policy stability, public debt, and economic development in the specific context of North Macedonia. By assessing the stability of fiscal policies and the sustainability of public debt, the study offers insights into the country's economic health and the effectiveness of its policy measures. The findings of this research have implications for policymakers, as they can inform the formulation of strategies and measures to ensure a balance between economic growth and budget sustainability. Furthermore, the study contributes to the existing literature on fiscal policy behavior and debt management, providing valuable knowledge for researchers and policymakers worldwide. The research methodology employed in this study involves a quantitative approach, utilizing econometric analysis techniques. The study utilizes data obtained from the database of the Ministry of Finance of the Republic of North Macedonia. The data are analyzed using ordinary least squares (OLS) and multivariate regression analysis, allowing for the empirical assessment of public debt sustainability. The rigorous methodology ensures the reliability and validity of the findings, enhancing the credibility of the study's conclusions.

Consequently, the main findings of this study shed light on the stability of fiscal policies and the sustainability of public debt in North Macedonia. The analysis reveals the challenges and vulnerabilities associated with high levels of public debt, particularly in the context of difficult economic conditions and investment projects that have yet to generate income. The study highlights the need for careful debt management and a balanced approach to fiscal policies to ensure both economic growth and budget sustainability. The research makes significant contributions to the understanding of public debt dynamics and its implications for economic stability. The findings provide valuable insights for policymakers and researchers, offering guidance for effective fiscal policy decisions and contributing to the broader academic discourse on debt sustainability and macroeconomic stability.

The structure of this paper is as follows. Section 1 provides an overview of the research problem. Section 2 reviews the relevant literature. Section 3 analyses the methodology that has been used to conduct empirical research on public debt sustainability. Section 4 provides details of the analysis and discusses empirical findings obtained from the analysis. Section 5 summarizes the main findings and provides recommendations.

## 2. LITERATURE REVIEW

Despite the advantages that public debt brings to the economy and the reasons for which it is used, theoretical and empirical analysis statistically proves that its high levels beyond a certain limit lead to misleading pro-cyclical fiscal policies, reduce the pace of economic growth, or the deterioration of other indicators such as inflation, interest rates, and

the possibility of economic crisis (Modigliani, 2005; Patillo et al., 2002; Patillo et al., 2004; Afonso, 2002; Gale & Orszag, 2003; Baldacci & Kumar, 2010; Calderón & Fuentes, 2013). In the very fast-changing economic environment, the constant parameter model for debt sustainability exerts poor performance (Can, 2021).

Numerous studies have been conducted to find the optimal level of public debt in the country that guarantees and stimulates only economic development, but numerous assumptions on the behavior of individuals, market perfection, investment time horizon, and econometric models make it impossible to find the desired critical point. Bandiera and Tsiropoulos (2020) have worked on assessing debt sustainability under the Belt and Road Initiative (BRI) and found that debt vulnerability is likely to increase because of BRI in more than 50% of the countries in the study.

According to Sinha et al. (2011), the main variables that affect the size of GDP are economic growth and the size of public spending. In their analysis of a panel of 30 countries, it was concluded that the trade account balance, regardless of the stage of development of the economy, together with the levels of foreign direct investment (FDI) significantly affect the size of GDP. An important finding was reached as FDI tends to increase in GDP mainly in developing countries and it is precisely in these economies where their measure affects the reduction of GDP levels.

Another element that affects the size of GDP is public spending when undertaken in the function of education and upbringing, but this connection is found mainly for high-income countries, as these are also countries that spend significantly for such purposes.

Additionally, according to Briceño and Perote (2020), institutional factors are relevant for the explanation of the evaluation of the public debt ratio.

Incomes per capita are commonly used to measure the country's ability and ability to borrow, as an increase in this indicator implies an increase in demand and the ability to afford higher social services despite ever-increasing costs. Many analyses show a positive correlation between revenue impact and changing GDP levels. Also, the unemployment rate is claimed to cause the reduction in the level of GDP that the government can afford by limiting the government's ability to generate high levels of employment income. Various authors reflect positive correlations between the variables under the judgment that as a result of reduced revenues, the government to serve the same as before will have to receive even more GDP, while other authors note negative correlations, i.e., the higher the unemployment rate, the lower the GDP level.

In order to assess public debt sustainability, de-Córdoba et al. (2021) suggested to use reduced-form models or GDP, interest rate, and inflation.

Public expenditures are considered as factors that also affect GDP. Some studies highlight the positive relationship of these expenditures which are mainly financed with GDP with the borrowing rate of a country. The higher this indicator, the greater the chances that the level of GDP will be high. Many analyzes prove that inflation, but also interest rates and exchange rates affect

the level of GDP mainly in low-income and underdeveloped countries, because any change in them directly affects the cost of public borrowing of the government, while in countries with high incomes and economically developed, this connection is weak. High levels of economic growth significantly improve other economic indicators and especially affect the reduction of the unemployment rate, which in itself affects the size of GDP. In the context of public investments, the major role of the optimal share of the aggregate government plays the elasticity of substitution of current expenditures and public investment (Divino et al., 2020).

Shadady (2022, as cited in Agoraki et al., 2020) found out that growth and government spending in Eastern Europe and Central Asia countries are credit-driven, a cycle of boom and bust.

Although governments have imposed restrictions on legislation not to exceed a certain level of public debt in the economy, nevertheless its level has increased significantly and continues to grow even faster worldwide. Evidence shows that different countries have experienced large increases in public debt.

Eğrican et al. (2022) argue that fulfilling the solvency and liquidity conditions of the countries is a contribution to the achievement of sustainability of public debt.

Assessing its sustainability in decision-making processes is a necessity for governments as all policies should function on the already accumulated level of public debt and the level of borrowing that can be afforded in the future by guaranteeing at all times the capacity of government to serve its obligations in order to prevent economic crises. This research paper will assess the current path of financial stability of policies pursued by governments against the crowning of several years of aspirations.

Public debt levels, especially in developing countries due to large demographic changes, have reached such levels that their economic performance is at risk at any time. The Maastricht Treaty and the Stability and Growth Pact require countries to avoid excessive deficits and keep public debt levels at around 60% of GDP, to avoid the effects and negative correlation between financial markets. and volatile fiscal policies.

Public debt is also showing a worrying trend in the Republic of North Macedonia. The analysis of debt sustainability serves many purposes and remains among the main components of fiscal risk management (Pamies & Reut, 2020).

The COVID-19 pandemic, which became a source of economic crisis in all countries, changed the structure of the annual budget in 2020, where the level of public debt according to the data of the Ministry of Finance has reached 59.5% of GDP, thus marking an increase of 10.6% compared to 2019.

The Minister of Finance, Mr. Fatmir Besimi, warned that in the medium term, a gradual consolidation of the budget will be realized, which, on the one hand, will affect debt stabilization, while, on the other hand, will not have a restrictive effect on economic growth. In that regard, the budget deficit is planned, i.e., the negative difference between revenues and expenditures in the budget should be gradually reduced. Thus, this year is

forecasted almost twice lower deficit compared to last year of -4.9% of GDP; next year the forecast is -3.8%; in 2023, -3.2%; in 2024 -2.9%; and in 2025 -2%, i.e., below the Maastricht criterion of -3% of GDP.

Empty state budget on the one hand, and new borrowings to finance the functions of the state, on the other hand, where it is clear that the country is entering a process of new borrowings, with which it must cover and mitigate the consequences of the health crisis that has already turned into an economic crisis.

In March 2021, the Republic of North Macedonia entered the international capital market and issued its eighth Eurobond. According to the Minister of Finance, this auction was a real success for the country, because it showed that international investors have great confidence in our economy, as well as in its perspective, as investors showed interest in the Eurobond and the interest rate reached 1.625% — which is lower, compared to the average interest rates of all previously issued Eurobonds, 5.05%.

The eighth Eurobond is specific because it was issued during the global economic crisis caused by COVID-19 and the Ministry of Finance has an economic justification as it will refinance the Eurobond issued in 2014 in the amount of 500 million euros, which was issued at an interest rate of 3.975%, which means that for seven years interest savings of 82.25 million euros are foreseen. This strategy has resulted in a significant improvement in terms of refinancing risk and interest rate risk in the domestic portfolio since 2012. In terms of other risks, medium-term debt management should focus on achieving lower costs to a sustainable level of risk.

It is important to work for fiscal consolidation and accelerated growth to stabilize debt. Fiscal consolidation in the medium term is an important factor in ensuring sustainable growth. If growth is to be financed, if there are not enough savings, this can be done through borrowing, but it must be economically reasonable to be able to ensure sustainable growth. Looking at it intertemporally, between generations, if borrowing is taken today, it means that tomorrow must be returned, and this means that if invested today, the benefits must be seen tomorrow or if one generation borrows and another must repay it. that, of course, they should benefit from such a decision.

It can be said that an equally important element in determining the increased level of budget deficit and public debt in the country is the size of the ruling government and the number of political forces in the coalition. For this reason, to overcome and avoid all the shortcomings in terms of fiscal illusion and the way of perceiving the ever-increasing level of budget deficit and public debt in the country, international institutional bodies such as the International Monetary Fund (IMF), the World Bank (WB), and the European Union (EU) have dictated a set of rules that do not allow misuse of public spending and unjustified and uncontrollable growth.

The level of debt, the price of debt, and the purpose for which this debt will be used are three issues that concern the governments of countries and cause public debate.

Based on the data on public debt from the Ministry of Finance, it can be said that the public debt in the Republic of North Macedonia has expanded from year to year, also covering the unsecured debt of public enterprises created by the state or municipalities.

As a result of inappropriate macroeconomic policies, the government of the country should strive to ensure that the current level and rate of growth of brut product (PB) is completely stable, to meet the main objective on costs and risk and the main effects of PB on economic activity. It can be said that high levels of PB will be accompanied by increasing levels of taxes that serve to finance it, which negatively affect the increase of real interest rates and the shift of private investment to government budget expenditures by stimulating further reduction of the rate of economic growth. Due to the high levels of PB, fiscal policies are transformed from counter-cyclical policies to cyclical policies that derive from further increasing public spending and reducing revenue levels where governments lose the ability to meet their obligations.

### 3. METHODOLOGY

The research in this study utilizes quantitative data and information obtained from the database of the Ministry of Finance of the Republic of North Macedonia. The analysis focuses on assessing the sustainability of public debt, particularly in relation to the fiscal policies implemented by the government to maintain economic stability. By relying on numerical data, the study aims to draw conclusions and findings based on empirical evidence and statistical analysis. This quantitative approach allows for a systematic examination of the evolution and structure of the debt, providing a quantitative basis for evaluating the effectiveness of fiscal policies in ensuring debt sustainability. By using data from an authoritative source such as the Ministry of Finance (<https://finance.gov.mk/>; <https://finance.gov.mk/public-debt-reports/?lang=en>), the study enhances the reliability and accuracy of the findings, contributing to a more robust understanding of the public debt situation in North Macedonia.

Through the analysis of this data, the study aims to draw conclusions and findings in numerical terms, providing empirical evidence to address the research question. The quantitative analysis involves applying econometric techniques such as OLS and multivariate regression analysis. This approach allows for a systematic evaluation of the relationship between fiscal policy stability and the sustainability of public debt.

Additionally, the methodology used in this research is multifactorial regression analysis. More precisely, the vector autoregression (VAR) model is used to see what is the long-run connection between our variables of interest. The vector error correction model (VECM) could be used in cases when we have cointegration between series but in our case, as unit root tests show, there are some series that do not cointegrate, hence, they do not show a common unit root. The lack of cointegration shows us that these series are not in balance as they should be which many of the literature review suggests.

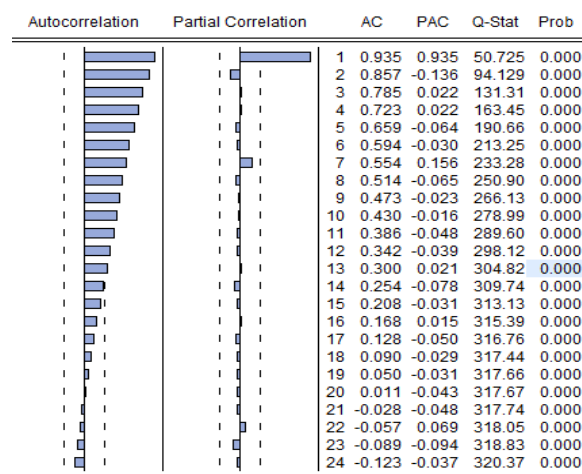
The VAR model is a statistical model used for analyzing the relationships between multiple time series variables. The VAR model is an extension of the autoregressive (AR) model, which models the relationship between a single variable and its own lagged values.

In a VAR model, each variable is regressed on its own lagged values and the lagged values of all the other variables in the system. This allows for capturing the dynamic interdependencies and feedback effects among the variables. The VAR model assumes that the variables in the system are jointly determined and influence each other over time.

### 4. RESULTS AND DISCUSSION

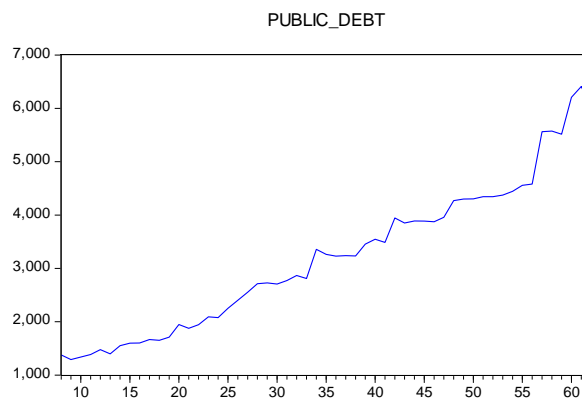
Before continuing to model the public debt as a part of GDP we will analyze the time series of the public debt. The series is quarterly from the first quarter of 2008 to the third quarter of 2021. All the data are from the Ministry of Finance of North Macedonia. The data used are retrieved from the database of the Ministry of Finance of the Republic of North Macedonia.

Figure 1. Autocorrelation and partial autocorrelation function of the series of public debt, period Q1 2008-Q3 2021



Source: Authors' own calculations with EViews 10.

Figure 2. Public debt



The graph shows that the series of public debt is an AR series of order one, this means that each year the public debt of North Macedonia is dependent on the previous year's value of the public debt. The correlogram shows decreasing values of autocorrelation and just one significant partial correlation coefficient, meaning that this series is autoregressive of order one AR(1).

The series also shows a positive trend which means that it is constantly growing. The fact that the series has a trend shows us that the public debt of North Macedonia is not consistent and it is changing. We will try to model based on some research that is mentioned in the literature review. The fact that this series is growing each period is very concerning.

There is one research done about the sustainability of the public debt of North Macedonia for the period from 2000 to 2016 (Finance Think, 2016). The data are annual and are done by Finance Think which is an institute for economic research and politics. Their basic model is that public debt is dependent on the vector of determinants such as real gross domestic product, interest repayment, primary fiscal balance sheet (budget balance minus interest payments) expressed as part of GDP, capital expenditures as part of total public expenditures, and real effective foreign exchange course. Through the literature, these are

also identified as key determinants with potential significance for debt dynamics as well.

The model has this form (Finance Think, 2016):

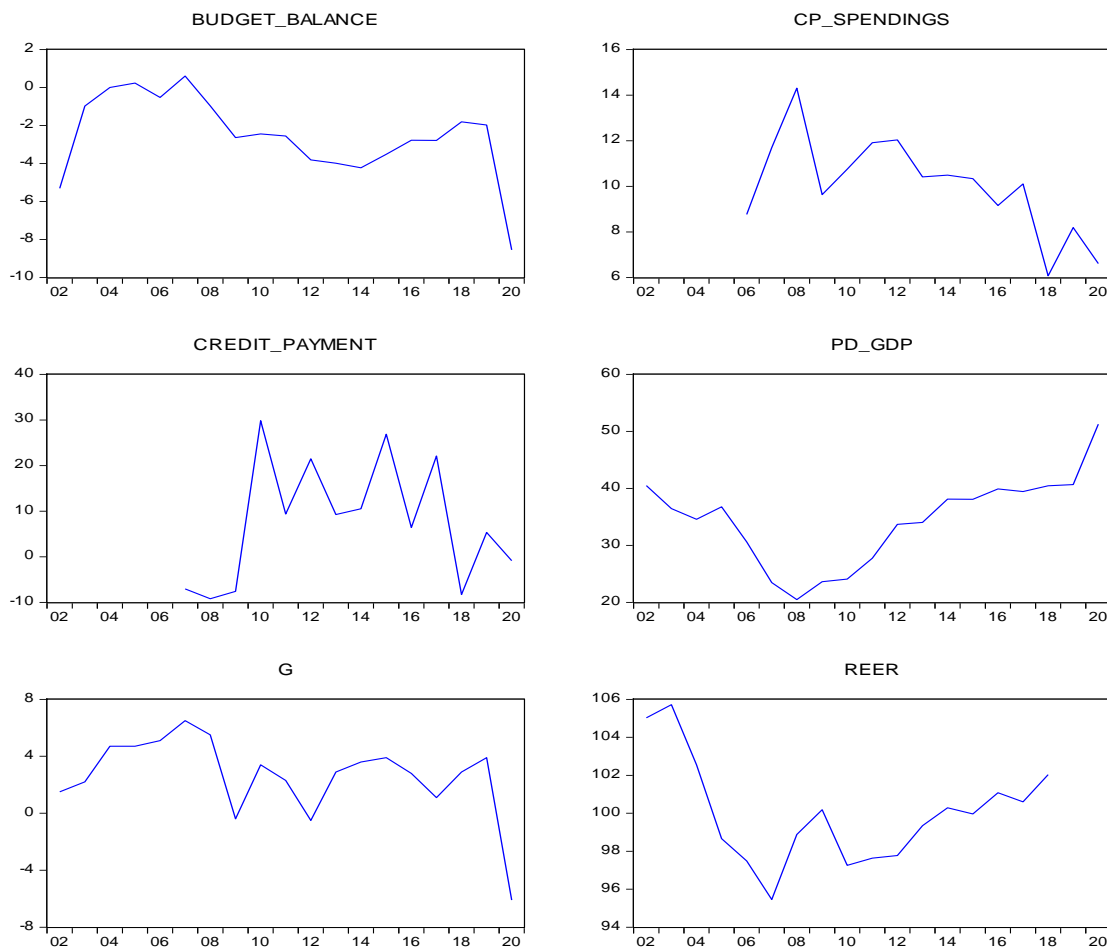
$$GD_t = \alpha + \beta X_t + \varepsilon_t \quad (1)$$

According to Finance Think (2016), there are some changes made aiming to stabilize the series.

The model is further developed according to the Finance Think (2016), to VEC model because of the cointegration the series did show. As we know from the econometric literature, series cointegrate when they show that they have the same order of integration and first we will start by testing the stationarity of the series.

From Figures 1 and 2 above we can see the trend and the variability of each of the series taken for analysis. We have annual data and, as we can observe, some of the series are short and for some years observations are missing. The series of our interest that we analyzed are public debt as a percent of GDP, economic growth in percent, budget balance as a part of GDP, credit payment as a part of total spending, a real effective exchange rate (REER), and the capital spendings as a rate of change in percent provided by the Ministry of Finance of the Republic of North Macedonia for the period 2002-2020. We will do a unit root test — augmented Dickey-Fuller test on each of the series to rule out the un-stationarity.

**Figure 3.** Budget balance, credit payment rate of spendings, credit payment total, public debt rate of GDP, economic growth and REER linear graphs, period 2002-2020



Note: CP is for credit payment; PD\_GDP is for public debt rate of GDP; G is for economic growth; REER is for real effective exchange rate.

The graphs seem to show a trend for every time series except for the series of credit payments as a part of spending which seem to have only variability and not trend. The most interesting is the positive trend of the series of public debt as a part of GDP. In 2008, this series had its lowest level ever.

As the data from the table confirms with  $p < 0.05$  all of the series, except credit payment as a part of total spending, are un-stationary. For  $p < 0.01$ , all of the series are un-stationary.

Now to see if the first differences of the series are stationary so we can move on with the VECM model.

**Table 1.** Unit root test of the series

Null hypothesis	Level	t-statistic	p-values	Comment
BUDGET_BALANCE has a unit root	0	-1.5812	0.4712	Unstationary at $\alpha = 0.01$
CP_SPENDINGS has a unit root	0	1.5511	0.9978	Unstationary at $\alpha = 0.01$
G has a unit root	0	-2.2969	0.1832	Unstationary at $\alpha = 0.01$
PD_GDP has a unit root	0	-0.1931	0.9233	Unstationary at $\alpha = 0.01$
REER has a unit root	0	-2.1442	0.2317	Unstationary at $\alpha = 0.01$
CREDIT_PAYMENT has a unit root	0	-3.3121	0.0361	Unstationary at $\alpha = 0.01$ , stationary at $\alpha = 0.05$

**Table 2.** Unit root test of the first difference of the series in Table 1

Null hypothesis	Level	t-statistic	p-values	Comment
D(BUDGET_BALANCE) has a unit root	1	-2.2917	0.1852	Unstationary at $\alpha = 0.05$
D(CP_SPENDINGS) has a unit root	1	-5.4098	0.0011	Stationary at $\alpha = 0.01, 0.05$
D(G) has a unit root	1	-3.9356	0.0097	Stationary at $\alpha = 0.01, 0.05$
D(PD_GDP) has a unit root	1	-2.1572	0.2271	Unstationary at $\alpha = 0.05$
D(REER) has a unit root	1	-3.0542	0.0524	Unstationary at $\alpha = 0.05$
D(CREDIT_PAYMENT) has a unit root	1	-6.9215	0.0002	Stationary at $\alpha = 0.01, 0.05$

Note: The "D" before the series means that the series are differentiated.

Some of the series are integrated into order one and some are not so we cannot move and estimate a VEC model. Instead, we will do a multivariate regression and a VAR.

Before we move to making a model for prediction, we would like to show the correlation matrix for the series.

**Table 3.** Correlation matrix

	BUDGET_BALANCE	CP_SPENDINGS	CREDIT_PAYMENT	PD_GDP	G	REER
BUDGET_BALANCE	1.000000	0.183028	-0.592147	-0.562110	0.589467	-0.433400
CP_SPENDINGS	0.183028	1.000000	0.073477	-0.637987	0.263532	-0.670538
CREDIT_PAYMENT	-0.592147	0.073477	1.000000	0.327676	-0.267008	-0.099643
PD_GDP	-0.562110	-0.637987	0.327676	1.000000	-0.255108	0.692174
G	0.589467	0.263532	-0.267008	-0.255108	1.000000	-0.324832
REER	-0.433400	-0.670538	-0.099643	0.692174	-0.324832	1.000000

As we can see from the table, public debt, as a part of GDP, is negatively correlated to a budget balance correlation is -0.592, and credit payment as a part of spending with a correlation coefficient of -0.638 and positively correlated to REER with a correlation coefficient close to 0.70. Budget

balance is correlated to credit payment, growth, and REER. Econometric literature suggests that the regressor should not have a significant correlation since the estimation would be biased because of the multicollinearity. However, we will continue to follow the given model.

**Table 4.** Estimated coefficients and indicators of the Model 1

Variable	Coefficient	Std. Error	t-statistic	Prob.
Constant	-1.022053	1.118325	-0.913914	0.3960
D(CP_SPENDINGS)	-0.715594	0.396598	-1.804333	0.1212
D(G)	-0.232705	0.416093	-0.559263	0.5962
D(REER, 1)	0.511242	0.715750	0.714274	0.5019
CREDIT_PAYMENT	0.158763	0.072803	2.180732	0.0720
D(BUDGET_BALANCE, 1)	-0.710430	1.271670	-0.558659	0.5966
R-squared	0.646792	Mean dependent variable		0.820899
Adjusted R-squared	0.352452	S.D. dependent variable		3.459296
S.E. of regression	2.783707	Akaike info criterion		5.192297
Sum of squared residuals	46.49416	Schwarz criterion		5.434750
Log-likelihood	-25.15378	Hannan-Quinn criterion		5.102532
F-statistic	2.197433	Durbin-Watson statistic		2.401056
Prob. (F-statistic)	0.182838			

Note: Dependent variable — D(PD\_GDP, 1).

As we can see from the table, most of the coefficients are statistically insignificant with p-values bigger than 0.05. The sample is too small to make inferences. The F-statistic also is very small so the overall impact of the coefficients is insignificant.

If there were more observations, the model would have a better fit and significance. The model is not the most suitable to use to predict the level of public debt as a rate of GDP. The only significant variable for  $p < 0.1$  is CREDIT\_PAYMENT with  $p = 0.072$ ,

which shows that it has a positive impact on the public debt rate over GDP, and for each growth of credit payment for 1% the difference of public debt rate on GDP would grow for 0.1588% approximately, *ceteris paribus*.

If we continue to remove the series that shows the most correlation to the budget balance then we have this result.

**Table 5.** Estimated coefficients and indicators of the Model 2

Method: Least squares				
Date: 12/11/21; Time: 22:51				
Sample (adjusted): 2007–2018				
Included observations: 12 after adjustments				
Variable	Coefficient	Std. Error	t-statistic	Prob.
Constant	-1.119928	1.048842	-1.067775	0.3211
CREDIT_PAYMENT	0.168892	0.066955	2.522473	0.0397
D(REER)	0.701291	0.597996	1.172735	0.2793
D(G)	-0.370934	0.317670	-1.167670	0.2812
D(CP_SPENDING)	-0.665977	0.367042	-1.814444	0.1125
R-squared	0.628419	Mean dependent variable		0.820899
Adjusted R-squared	0.416088	S.D. dependent variable		3.459296
S.E. of regression	2.643392	Akaike info criterion		5.076339
Sum of squared residuals	48.91263	Schwarz criterion		5.278384
Log-likelihood	-25.45804	Hannan–Quinn criterion		5.001535
F-statistic	2.959611	Durbin–Watson statistic		2.148044
Prob. (F-statistic)	0.100061			

Note: Dependent variable —  $D(PD\_GDP)$ .

The credit payment is still statistically significant with  $p < 0.05$  and there is no autocorrelation among the errors.

Our conclusion is that public debt is not cointegrated with real gross domestic product, interest repayment, primary fiscal balance sheet (budget balance minus interest payments) expressed as part of GDP, capital expenditures as part of total public expenditures, and real effective foreign exchange course. The sample is for annual data from 2006–2020. Anyhow the autocorrelation function and the trend of the series of quarterly public debt shows that it is not sustainable. This model shows that the capital payment rate on total spending has a negative impact on public debt. The rate of economic growth has also a negative sign meaning that economic growth makes public debt decrease by 0.666%, *ceteris paribus*. Credit payment and REER have a positive sign.

The model looks like this:

$$D(PD\_GDP) = -1.112 + 0.169CREDIT\_PAYMENT + 0.701D(G) - 0.371D(G) - 0.666D(CP\_SPENDING) \quad (2)$$

## 5. CONCLUSION

From the analysis, we can conclude that, in the future, debts should not be taken to cover old debts, consumption, or for the construction of unproductive facilities, but should be used for the economic development of the state that will bring new revenue to the budget as well as improve the capacity of the local economy for payment of debts.

Additionally, it also does not improve the welfare of citizens, opening new jobs from the private sector and so on. Another problem regarding debt entry is also full accountability, not only at the central but also local level.

Another issue to be noted is the sustainability of public debt because fiscal consolidation or the tightening of public money must not hurt or reduce economic growth.

It can be said that high levels of public debt will be accompanied by increased levels of taxes that serve as its funding, which negatively affect the growth of real interest rates and relocate private investment to government budget expenditures stimulating.

Reduction of the economic growth rate. Because of the high levels of public debt fiscal policies are transformed from countercyclical policies into cyclical policies deriving in the further growth of public spending and reducing the level of income where governments lose their ability to perform their obligations.

In the future, we need to be careful to achieve economic growth that would be at least twice as large as the budget deficit and to shorten the unproductive expenses, to enter into debt only for the construction of capital projects such as the construction of energy capacities, complete corridors eight and ten, and improve the budget component of the budget that will not be dominated by spending on wages, pensions, and other social transfers.

As a result of inadequate macroeconomic policies, the country's government should strive to ensure that the current level and the rate of public debt growth are completely sustainable, to meet the main objective of costs and risk and the main effects that follow public debt in economic activity.

The country's government should work to reduce current expenditures through the rationalization of public administration expenditures, optimizing and increasing the efficiency of public administration, optimization and reorganization of the public sector, and digitizing a good part of public services.

Fiscal consolidation should continue in terms of eliminating all unproductive expenses. Any borrowing should finance capital investments, where thus avoiding all situations when the budget deficit increases to finance current expenditures such as salary, excluding cases of its use as a countercyclical means that can be applied for short-term periods.

It would be recommended to apply the establishment of fiscal rules in terms of budget expenditures, especially when fiscal authorities judge as necessary to pursue fiscal policies.



However, the study has its limitation on the usage of the quartile data for earlier periods – transition periods, which were not available, for a thorough analysis of debt sustainability in the Republic of North Macedonia.

Future research can be focused on analyzing whether the public debt management system

enables efficient management of countries' public debt by providing means for financing the state budget at the lowest possible cost in the medium and long term. Furthermore, analysis that follows the impact of fiscal policies on the public debt.

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## APPENDIX

The VAR model shows some interesting insights and, as a result of the limited number of observations, the model is done only for one lagged value since there are limited observations and we could not go further with the time lag.

Table A.1. VAR model estimation and indicators

	<b>BUDGET_BALANCE</b>	<b>CP_SPENDINGS</b>	<b>CREDIT_PAYMENT</b>	<b>PD_GDP</b>	<b>G</b>	<b>REER</b>
<i>BUDGET_BALANCE(-1)</i>	0.982966 (0.22825) [4.30653]	-0.885102 (0.42728) [-2.07147]	-10.65534 (5.06570) [-2.10343]	-1.181896 (1.18145) [-1.00038]	-0.260324 (0.91507) [-0.28448]	0.600725 (0.37597) [1.59779]
<i>CP_SPENDINGS(-1)</i>	-0.220565 (0.15710) [-1.40400]	-0.763936 (0.29409) [-2.59766]	-5.552750 (3.48658) [-1.59261]	0.528383 (0.81316) [0.64979]	-0.876289 (0.62982) [-1.39133]	0.540917 (0.25877) [2.09033]
<i>CREDIT_PAYMENT(-1)</i>	0.027649 (0.01793) [1.54162]	-0.080277 (0.03357) [-2.39106]	-0.543652 (0.39804) [-1.36582]	0.080320 (0.09283) [0.86521]	-0.048386 (0.07190) [-0.67294]	0.021145 (0.02954) [0.71574]
<i>PD_GDP(-1)</i>	0.001282 (0.04089) [0.03135]	-0.065559 (0.07655) [-0.85641]	-0.837583 (0.90757) [-0.92289]	0.715835 (0.21167) [3.38189]	0.081845 (0.16394) [0.49923]	0.200330 (0.06736) [2.97408]
<i>G(-1)</i>	-0.030115 (0.10329) [-0.29157]	0.311767 (0.19335) [1.61246]	0.203518 (2.29228) [0.08878]	0.226069 (0.53462) [0.42286]	0.096547 (0.41408) [0.23316]	0.103861 (0.17013) [0.61048]
<i>REER(-1)</i>	0.224306 (0.16043) [1.39818]	-1.285386 (0.30032) [-4.28007]	-1.714130 (3.56047) [-0.48143]	0.493350 (0.83039) [0.59412]	-0.827404 (0.64317) [-1.28645]	0.488713 (0.26426) [1.84940]
Constant	-20.27299 (15.7861) [-1.28423]	145.6908 (29.5515) [4.93007]	243.5047 (350.351) [0.69503]	-48.81436 (81.7108) [-0.59740]	90.98109 (63.2879) [1.43757]	40.09279 (26.0028) [1.54186]
R-squared	0.881206	0.904161	0.719667	0.944879	0.446908	0.868557
Adj. R-squared	0.703016	0.760404	0.299168	0.862198	-0.382731	0.671392
Sum of sq. residuals	1.128705	3.955376	555.9522	30.24050	18.14143	3.062453
S.E. equation	0.531203	0.994406	11.78932	2.749568	2.129638	0.874993
F-statistic	4.945302	6.289475	1.711458	11.42799	0.538678	4.405237
Log-likelihood	-3.085788	-9.982816	-37.18365	-21.17040	-18.35999	-8.575590
Akaike AIC	1.833780	3.087785	8.033391	5.121891	4.610907	2.831925
Schwarz SC	2.086986	3.340991	8.286597	5.375097	4.864113	3.085132
Mean dependent	-2.865521	10.47300	10.05665	32.68196	2.500000	99.55099
S.D. dependent	0.974750	2.031532	14.08256	7.406908	1.811077	1.526391
Determinant resid covariance		0.000000				

Note: Standard errors are in ( ) and t-statistics in [ ].