

Fiscal Reform as a Structural Driver: Assessing Tax Structures and Economic Growth in North Macedonia¹

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Abstract

Fiscal sustainability remains a cornerstone of structural reform for transitional economies in the Western Balkans. This study evaluates the impact of direct and indirect taxation on the economic growth of North Macedonia using quarterly data from 2010Q1 to 2023Q4. Employing a Vector Autoregression (VAR) framework and Ordinary Least Squares (OLS) regression, the research identifies the distinct economic outcomes associated with varying tax structures. The findings reveal that while both direct and indirect taxes influence growth, North Macedonia's path to sustainable social and economic development is increasingly dependent on the transition toward progressive direct taxation. The comparative analysis with neighbouring Western Balkan states highlights North Macedonia's unique fiscal position and provides a roadmap for policy reforms aimed at reducing income inequality while maintaining financial resilience. This study offers critical evidence for policymakers tasked with modernizing fiscal architectures in emerging markets.

Keywords: fiscal reforms, North Macedonia, tax structure, economic growth, VAR model, structural reforms, fiscal sustainability.

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Introduction

The liberalization and globalization of trade, capital flows, and financial systems have significantly transformed the economic environment of many countries, particularly in emerging and transition economies. In this context, fiscal policy and taxation structures play a critical role in maintaining macroeconomic stability and supporting long-term economic growth. A well-designed tax system can influence investment incentives, labour supply, and income distribution while simultaneously ensuring adequate public revenue for sustainable economic development (Zellner et al., 2004).

Recent global shocks have further emphasized the importance of resilient fiscal systems. The COVID-19 pandemic, the energy crisis, and geopolitical tensions associated with the war in Ukraine have significantly affected macroeconomic stability across Europe, including the countries of the Western Balkans. These shocks have contributed to rising public debt, increased fiscal deficits, and inflationary pressures, creating additional challenges for fiscal sustainability and economic recovery. As a result, governments have been required to implement fiscal measures aimed at protecting economic stability, supporting vulnerable households and businesses, and strengthening the resilience of their economic systems. (Južnik Rotar, 2025; Fitriyah, & Nuraini, 2025).

The relationship between taxation and economic growth has long been debated in economic literature. Several empirical studies suggest that the composition of taxation, rather than the overall tax burden, plays a crucial role in determining economic performance. In particular, consumption-based taxes are generally considered less harmful to economic growth than direct taxes on income and corporate profits, which may distort investment and labour decisions (OECD, 2024; Stoilova, 2024).

Recent empirical studies continue to explore the relationship between taxation and economic performance across different institutional contexts. For example, Alinaghi & Reed (2021) provide a comprehensive meta-analysis showing that the growth effects of taxation depend significantly on fiscal policy design and the interaction between taxation, public spending, and macroeconomic conditions. Similarly, Merza & Khatatbeh (2025) highlight that institutional quality and fiscal governance play a key role in determining whether tax reforms successfully promote economic growth in emerging and transition economies. These findings suggest that the effectiveness of fiscal reforms depends not only on tax rates but also on broader economic and institutional conditions.

Despite the extensive literature on taxation and economic growth, empirical evidence for small transition economies, particularly those in the Western Balkans, remains relatively limited. Countries in this region often face structural challenges such as fiscal imbalances, institutional constraints, and vulnerability to external shocks. Consequently, the interaction between tax structures and economic growth in these economies may differ from patterns observed in developed countries.

In the case of North Macedonia, fiscal policy reforms have focused on simplifying the tax system, improving revenue collection, and maintaining macroeconomic stability. However, recent crises, including the COVID-19 pandemic, the energy crisis, and inflationary pressures, have affected fiscal balances and public debt dynamics. These developments highlight the need for a comprehensive empirical analysis of how tax structures influence economic growth within the country's evolving fiscal framework.

The objective of this study is therefore to examine the impact of direct and indirect taxation on economic growth in North Macedonia using quarterly data covering the period 2010Q1–2023Q4. The empirical analysis employs Ordinary Least Squares (OLS) regression and Vector Autoregression (VAR) models to capture both the direct and dynamic relationships between taxation and macroeconomic performance. By analysing the interaction between fiscal variables and economic growth, the study aims to provide new empirical evidence on the role of tax structure as a driver of fiscal sustainability and economic development in a transition economy.

From a policy perspective, understanding the relationship between taxation and economic growth is particularly relevant for countries of the Western Balkans, which are undergoing institutional and fiscal reforms in the context of European Union integration. International institutions emphasize the importance of strengthening fiscal governance, improving tax administration, and enhancing revenue mobilization in order to achieve macroeconomic stability and sustainable economic convergence with the European Union (OECD, 2022; World Bank, 2023). In this context, empirical evidence on the economic effects of tax structures can provide valuable insights for policymakers seeking to modernize fiscal systems while maintaining fiscal sustainability and economic resilience.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on fiscal sustainability and taxation. Section 3 presents the fiscal context and macroeconomic background of North Macedonia. Section 4 describes the data and empirical methodology. Section 5 reports the econometric results, followed by a discussion of the findings and policy implications. The final section concludes the paper.

1. Literature Review

The concept of fiscal sustainability has been widely discussed in economic literature, yet it does not have a universally accepted definition. In general terms, fiscal sustainability refers to the ability of a government to maintain its current fiscal policy, particularly spending, taxation, and borrowing, over the long term without jeopardizing public solvency or defaulting on its financial obligations (Krejdl, 2006). Similarly, the European Commission (2009) defines fiscal sustainability as the capacity of a government to sustain its current fiscal policies without threatening its solvency or requiring abrupt adjustments in public spending or taxation.

A substantial body of literature has examined the relationship between tax structures and economic growth, particularly in the context of fiscal reforms in transitional and emerging economies. Economic theory suggests that the composition of taxation, rather than simply the overall tax burden, plays an important role in determining long-term growth outcomes (Heady et al., 2009). Taxes that distort investment incentives, labour supply, or capital accumulation may slow economic growth, whereas well-designed fiscal systems can enhance efficiency, support macroeconomic stability, and improve income distribution.

Empirical studies provide mixed evidence regarding the growth effects of different types of taxes. Some research suggests that direct taxes, particularly corporate and personal income taxes, may have stronger distortionary effects on investment and entrepreneurship (Gemmell et al., 2014). In contrast, consumption-based taxation, such as value-added tax, is often considered less harmful to economic growth, although it may have distributional implications for lower-income households (Fetai et al., 2021). For this reason, many transition economies have implemented tax reforms aimed at shifting the tax burden from direct to indirect taxes while simultaneously improving tax administration and reducing evasion.

Fiscal sustainability also depends on the broader institutional and macroeconomic environment (Balassone & Franco, 2000). Countries undergoing economic transition frequently face challenges related to public debt management, fiscal discipline, and institutional capacity, which can significantly influence the effectiveness of fiscal reforms (Burnside, 2005). In such contexts, the interaction between fiscal policy, macroeconomic stability, and structural reforms becomes particularly important for ensuring sustainable economic development.

In the case of North Macedonia, fiscal policy has undergone several phases of reform aimed at simplifying the tax system, encouraging investment, and maintaining macroeconomic stability. The introduction of a flat tax system in the mid-2000s, combined with the modernization of indirect taxation through VAT, was intended to improve the investment climate and enhance fiscal efficiency (Bexheti et al., 2020; Fetaj et al., 2020). However, recent economic shocks, including the COVID-19 pandemic, energy crisis, and inflationary pressures, have increased fiscal deficits and public debt levels, highlighting the need for further structural adjustments in fiscal policy. More recent cross-country analyses indicate that changes in tax rates may influence economic growth over time, although the magnitude and direction of these effects vary depending on institutional context and economic structure (Kawano et al., 2025).

Given these challenges, analysing the relationship between taxation and economic growth requires a comprehensive empirical framework capable of capturing both short-term dynamics and long-term interactions among macroeconomic variables. Time-series econometric techniques, particularly Vector Autoregression (VAR) models, have been widely used in the literature to examine such relationships, as they allow researchers to analyse the dynamic interactions among multiple macroeconomic indicators simultaneously (Hamilton, 1994; Hatemi-J, 2004, Hacker & Hatemi-J, 2008; Hatemi-J & Hacker, 2009). In addition, Ordinary Least Squares (OLS) regression models remain a commonly applied method for estimating the direct effects of fiscal variables on economic growth.

Building on these methodological approaches, this study investigates the impact of direct and indirect taxation on economic growth in North Macedonia, while also controlling for other macroeconomic determinants such as government expenditures, trade openness, employment, inflation, and institutional factors such as corruption levels. By combining VAR and OLS frameworks, the analysis aims to capture both the structural relationships between fiscal variables and economic growth and the dynamic adjustments that occur over time in response to fiscal policy changes.

Despite the extensive literature on fiscal sustainability and tax policy, empirical evidence on the relationship between tax structures and economic growth in small transition economies remains relatively limited, particularly in the context of the Western Balkans. Existing studies often focus either on theoretical discussions of optimal taxation or on cross-country analyses of developed economies, leaving a gap in country-specific empirical research for economies undergoing fiscal and institutional transformation. In the case of North Macedonia, the interaction between direct and indirect taxation, fiscal reforms, and macroeconomic performance has received comparatively little econometric attention. Moreover, recent economic shocks, including the COVID-19 pandemic, the energy crisis, and inflationary pressures, have significantly altered fiscal conditions, creating the need for updated empirical analysis.

In this context, the present study contributes to the literature by examining the impact of tax structure on economic growth in North Macedonia using quarterly data for the period 2010–2023. By applying both OLS regression and Vector Autoregression (VAR) models, the analysis explores the dynamic relationships between economic growth and key fiscal variables, including direct and indirect taxes, government expenditures, trade openness, employment, inflation, and institutional indicators. This approach allows the study to provide new empirical evidence on the role of fiscal reforms as a structural driver of economic growth in transitional economies.

2. Fiscal Context and Macroeconomic Background

The fiscal context of North Macedonia can be illustrated through descriptive indicators of government revenues, expenditures, and public debt dynamics. Detailed information on the structure of government revenues and expenditures for the period 2015–2023 is presented in Appendix A (Tables A1–A3), based on data from the Ministry of Finance of the Republic of North Macedonia.

The data indicate that the share of total expenditures consistently exceeds total revenues, resulting in a persistent budget deficit. This structural imbalance suggests that fiscal policy has relied increasingly on borrowing to finance public spending. Consequently, fiscal reforms are necessary to strengthen fiscal sustainability, particularly through measures aimed at improving revenue collection, rationalizing public expenditures, and reallocating government resources toward productive sectors that support long-term economic growth. Strengthening fiscal discipline and enhancing the efficiency of public spending are therefore critical for maintaining macroeconomic stability and supporting sustainable development.

To complement this descriptive evidence, Figure 1 presents the evolution of external and government debt as a percentage of GDP for the period 2000–2023, illustrating the long-term dynamics of public indebtedness in North Macedonia.

Figure 1: North Macedonia's External and Government Debt as % of GDP (2000–2023)



Source: Ministry of Finance of the Republic of North Macedonia; National Bank of the Republic of North Macedonia, authors' calculations.

According to data from the Ministry of Finance, the general government debt at the end of the second quarter of 2023 amounted to approximately €7,254.2 million, representing about 50.4% of the projected GDP. This level reflects a substantial increase compared to the period preceding the COVID-19 crisis, when the average public debt ratio between 2015 and 2020 was approximately 34.9% of GDP. The rise in debt largely reflects fiscal responses to recent external shocks, including the pandemic, the energy crisis, and inflationary pressures. Nevertheless, when compared with other Western Balkan economies, North Macedonia’s public debt remains relatively moderate and has historically remained below the regional average of approximately 38% of GDP. From a policy perspective, maintaining debt sustainability will require a careful balance between supporting economic recovery and ensuring fiscal consolidation, particularly through structural reforms in taxation, improved budget management, and stronger institutional capacity in public finance administration.

Table 2 presents the total expenditures of general government as a percentage of GDP for Western Balkan countries during the period 2015–2022. The data indicate considerable variation in public spending levels across the region. Montenegro records the highest average level of government expenditures (47.7% of GDP), followed by Serbia (43.9%) and Bosnia and Herzegovina (41.4%). In contrast, Kosovo and Albania exhibit relatively lower levels of government spending, with averages of 29.5% and 30.4% of GDP respectively. North Macedonia shows a moderate level of public expenditures, averaging 34.9% of GDP, which remains below the regional average of 38.0% for the Western Balkans. However, a noticeable increase in government expenditures can be observed in 2020 and 2021, reflecting the fiscal response to the COVID-19 crisis and related economic support measures. This trend is consistent with broader fiscal developments in the region, where governments expanded public spending in order to mitigate the economic impact of the pandemic. Overall, the data suggest that fiscal policy in Western Balkan countries has been characterized by significant expansion of public expenditures during crisis periods, highlighting the importance of maintaining fiscal discipline and improving the efficiency of public spending in order to ensure long-term fiscal sustainability.

Table 2. Total Expenditures of General Government as % GDP

Country	2015	2016	2017	2018	2019	2020	2021	2022	Average 2015–2022
Albania	30.5	29.5	29.8	29.1	29.1	32.6	32.1	30.4	30.4
Bosnia and Herzegovina	44.0	41.5	40.8	39.6	40.6	43.4	40.8	40.0	41.4
Kosovo	27.6	27.7	27.8	29.2	29.7	33.0	28.9	32.4	29.5
Montenegro	50.0	46.2	46.8	46.2	45.4	55.7	46.2	44.8	47.7
North Macedonia	34.4	33.2	33.8	31.5	33.5	38.1	37.8	36.9	34.9
Serbia	42.7	41.9	40.4	40.9	42.2	49.0	47.4	46.9	43.9
Western Balkan (average)	38.2	36.7	36.6	36.1	36.7	42.0	38.9	38.6	38.0

Source: Ministry of Finance and Statistical Offices of the respective countries

These descriptive trends provide an important macroeconomic context for the empirical analysis that follows. In particular, the evolution of government expenditures and fiscal pressures in the region highlights the relevance of examining how fiscal variables, especially taxation and public spending, affect economic growth dynamics in North Macedonia.

3. Empirical Methodology

Data and Variables

This study analyses the relationship between taxation structure and economic growth in North Macedonia using quarterly time-series data covering the period 2010Q1–2023Q4. The dataset was compiled from several official sources, including the National Bank of the Republic of North Macedonia (NBRM), the State Statistical Office (SSO), and the Ministry of Finance (MoF).

The empirical analysis incorporates several macroeconomic indicators that are commonly used in studies examining the relationship between fiscal policy and economic performance. The dependent variable is real GDP (RGDP), which serves as a proxy for economic growth. The main explanatory variables include direct taxes (DT) and indirect taxes (IT), which capture the structure of the tax system. Additional control variables are introduced to account for broader macroeconomic conditions, including government expenditures (GOVEXP), trade openness (TO), income inequality (IN), employment rate (EMP), inflation (INF), and the anti-corruption indicator (AC). To eliminate seasonal fluctuations, all variables were seasonally adjusted using the ARIMA X-12 procedure. Furthermore, the variables were transformed into logarithmic form in order to stabilize variance and facilitate interpretation of the estimated coefficients as elasticities.

Table 3. Data Description

Abbreviation	Variable	Description	Source
RGDP	REAL GDP	GDP with constant prices (based on 2010)	SSO
DT	Direct taxes	Direct taxes from 2010 to 2023	NBRM
GOVEXP	Government expenditures	Government expenditures from 2010-2023	SSO, MF
IT	Indirect taxes	Indirect taxes from 2010 to 2023	NBRM
TO	Trade openness	Trade openness	SSO, NBRM
IN	Income inequality	Income allocation	SSO, NBRM
EMP	Employment	Rate of employment from 2010 to 2023	SSO
AC	Anti-corruption factor	Anti-corruption ratio	SSO
Inf	Inflation	Inflation over the years from 2010 to 2023	NBRM

Source: Authors calculation

Unit Root and Stationarity Tests

The results of the unit root tests are presented in Table 4 and Table 5, which report the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) test statistics respectively. The findings indicate that most variables are non-stationary in levels but become stationary after first differencing, implying that they are integrated of order one, $I(1)$. In contrast, the inflation variable becomes stationary only after the 2nd difference, indicating an integration order of $I(2)$.

Table 4. Augmented Dickey–Fuller Unit Root Test Results

Variable	T-Statistic	Critical value	Significance level	Integration Order	Trend specification
RGDP	-1.669	-2.958	5%	$I(1)$	No trend
DRGDP	-2.630	-2.613	10%		
DT	-1.900	-2.958	5%	$I(1)$	No trend
DDT	-4.186	-2.961	5%		

Variable	T-Statistic	Critical value	Significance level	Integration Order	Trend specification
IT	-2.647	-2.958	5%	I(1)	No trend
DIT	-3.081	-2.961	5%		
TO	-1.566	-2.958	5%	I(1)	No trend
DTO	-3.201	-2.961	5%		
IN	0.021	-2.958	5%	I(1)	No trend
DIN	-3.021	-2.961	5%		
AC	-1.722	-2.958	5%	I(1)	No trend
DAC	-3.391	-2.961	5%		
EMP	-0.565	-2.958	5%	I(1)	No trend
DEMP	-3.107	-2.961	5%		
GOVEXP	-1.821	-2.958	5%	I(1)	No trend
DGOVEXP	-3.201	-2.961	5%		
INF	0.634	-2.958	5%	I(2)	No trend
DINF	-2.418	-2.961	5%		
D2INF	-4.093	-2.964	5%		

Source: Authors' calculations based on data from NBRM, SSO, Ministry of Finance of North Macedonia.

After presenting the results of the Augmented Dickey–Fuller test in Table 4, the stationarity of the variables was further examined using the Phillips–Perron (PP) unit root test to ensure the robustness of the findings. The PP test is widely used in time-series econometrics because it corrects for potential serial correlation and heteroskedasticity in the residuals without modifying the test regression structure. The results of the Phillips–Perron test are reported in Table 5 and largely confirm the conclusions obtained from the ADF test.

Table 5. Phillips–Perron Unit Root Test Results

Variable	T-Statistic	Critical value P-value	Significance level	Integration Order	Trend Specification
RGDP	-0.819	-2.947	5%	I(1)	No trend
DRGDP	-9.556	-2.950	10%		
DT	-2.939	-2.947	5%	I(1)	No trend
DDT	-4.396	-2.950	5%		
IT	-3.002	-2.947	5%	I(1)	No trend
DIT	-6.354	-2.950	5%		
TO	-1.551	-2.947	5%	I(1)	No trend
DTO	-6.005	-2.950	5%		
IN	-1.694	-2.947	5%	I(1)	No trend
DIN	-9.313	-2.950	5%		
AC	-0.641	-2.947	5%	I(1)	No trend
DAC	-5.412	-2.950	5%		
INF	0.390	-2.947	5%	I(2)	No trend
DINF	-6.569	-2.950	5%		
D2INF	-12.943	-2.952	5%		
EMP	-0.043	-2.947	5%	I(1)	No trend
DEMP	-5.786	-2.950	5%		
GOVEXP	-1.175	-2.947	5%	I(1)	No trend
DGOVEXP	-10.932	-2.950	5%		

Source: Authors' calculations based on data from NBRM, SSO, Ministry of Finance of North Macedonia.

The PP test results are consistent with the ADF test outcomes, confirming that most variables are integrated of order I(1), while inflation becomes stationary after second differencing.

Given these results, the stationary transformed variables are used in the subsequent estimation of the Vector Autoregression (VAR) model to analyse the dynamic relationships among the variables.

VAR Model Specification

To test the relationship between economic growth and the taxes, as well as other macroeconomic indicators described above, we present the general linear regression model as follows:

$$\ln \text{RGDP}_i = c + \beta_1 \ln \text{DT}_i + \sum_{m=2}^M \beta_m \ln X_{im} + \gamma D_s + \varepsilon_i$$

where: GDP is real GDP (2010-2023); c - term constant; DT - explanatory variable representing tax rate; X_m - explanatory variables of macroeconomic environment; ε - error term, or the stochastic factor that is supposed to be with a conditional mean of zero and constant variance, i.e., $E(\varepsilon_i) = 0$ for every period i .

The data used has been transformed into logarithmic. As seen in the model, the dummy variable is also included to capture the effect of the crisis. The dummy variable is the separation period: $D=1$ if the data belong to the crisis period; $D=0$ if the data belong to non-crisis period.

The VAR model has been proven to be particularly necessary to describe the dynamic behaviour of time series as well as predict the impact of variables over a longer period of time. So, it is a dynamic system of equations where the current level of each variable in the system depends on the movements of that variable and other variables in the past period. Also, after evaluating the coefficients of the VAR model, the impulsive responses of the VAR model results are performed. A general VAR model system can be expressed as in the following form:

$$Z_t = \mu + A_1 Z_{t-1} + A_2 Z_{t-2} + \dots + A_p Z_{t-p} + \varepsilon_t$$

where: Z_t is a vector of endogenous variables at time t , A_i ($i = 1, \dots, p$) is the matrix of coefficients, p is the number of time delays included in the system, μ is the vector of the term constant, and ε_t is the vector of the term of residuals. So, the VAR model is a set of k -regressions of time series, where regressive are the time delays of all k -series.

The specification of the equation from the econometric system of the VAR model for economic growth and interest rate, as well as other determinants of economic growth, can be expressed as follows:

$$\begin{aligned} \ln Y_t = & c + \alpha_{1i} \sum_{i=1}^k \ln \text{RGDP}_{t-i} + \alpha_{2i} \sum_{i=1}^k \ln \text{DT}_{t-i} + \alpha_{3i} \sum_{i=1}^k \ln \text{EXP}_{t-i} + \alpha_{4i} \sum_{i=1}^k \ln \text{IT}_{t-i} + \\ & \alpha_{5i} \sum_{i=1}^k \ln \text{TO}_{t-i} + \alpha_{6i} \sum_{i=1}^k \ln \text{IN}_{t-i} + \alpha_{7i} \sum_{i=1}^k \ln \text{EMP}_{t-i} + \alpha_{8i} \sum_{i=1}^k \ln \text{AC}_{t-i} + \\ & \alpha_{9i} \sum_{i=1}^k \ln \text{INF}_{t-i} + \varepsilon_t. \end{aligned}$$

where: Y_t - vector of endogenous variables which are RGDP, DT, EXP, IT, TO, IN, EMP, AC and INF; c is the vector of the terms of the constant; α_i - represent the vector of the coefficients; ε_t represents the vector of the terms of error (white noise vector) that is assumed not to correlate with the variables with delays in the corresponding equation.

4. Empirical Results

OLS Regression Results

The initial empirical assessment of the relationship between taxation and economic growth was conducted using Ordinary Least Squares (OLS) regression models. The estimated models examine the impact of direct taxes and indirect taxes on real GDP while controlling for additional macroeconomic factors such as government expenditures, trade openness, employment, inflation, and institutional quality indicators (Nawata, 2021).

The regression results are presented in Table 6. The estimates suggest that indirect taxes have a statistically significant positive relationship with economic growth, indicating that consumption-based taxation may contribute to fiscal stability and economic performance in North Macedonia. This finding is consistent with the theoretical literature, which suggests that indirect taxes generally produce fewer distortions in investment and labour decisions compared with direct taxation.

Table 6: OLS Regression Results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
log_dt	1.13	1.38	1.20	1.34	1.75	3.14
log_it	8.16	8.50	4.58	2.09	4.96	4.66
log_to	-0.63		0.70			
log_in	2.66	2.88	2.47	4.46	3.58	3.69
log_ac	6.07	6.16			6.36	6.22
log_govexp				3.21	3.50	3.64
log_emp						0.97
Observations	56	56	56	56	56	56
R ²	0.9735	0.9732	0.9485	0.9585	0.9796	0.9807
Adj R-squared	0.9701	0.9705	0.9433	0.9543	0.9770	0.9774

Note: The dependent variable in all estimated models is the logarithm of real GDP (log_rgdp); Inflation (log_inf) was initially included in the regression specification; however, due to multicollinearity with other macroeconomic variables, it was excluded from the final models.

Source: Authors' calculations based on data from NBRM, SSO, Ministry of Finance of North Macedonia.

In contrast, direct taxes appear to have a weaker and statistically less significant relationship with economic growth, suggesting that higher direct taxation may impose greater distortions on economic activity. These results are broadly consistent with previous empirical studies on tax structures in transition economies (Gemmell et al., 2014).

Among the control variables, government expenditures and trade openness show positive associations with economic growth, reflecting the role of public spending and international trade in supporting economic activity. Inflation, on the other hand, demonstrates a negative relationship with growth, highlighting the importance of macroeconomic stability.

Overall, the regression results provide preliminary evidence that the structure of taxation may influence economic performance, with indirect taxation playing a more supportive role in economic growth dynamics.

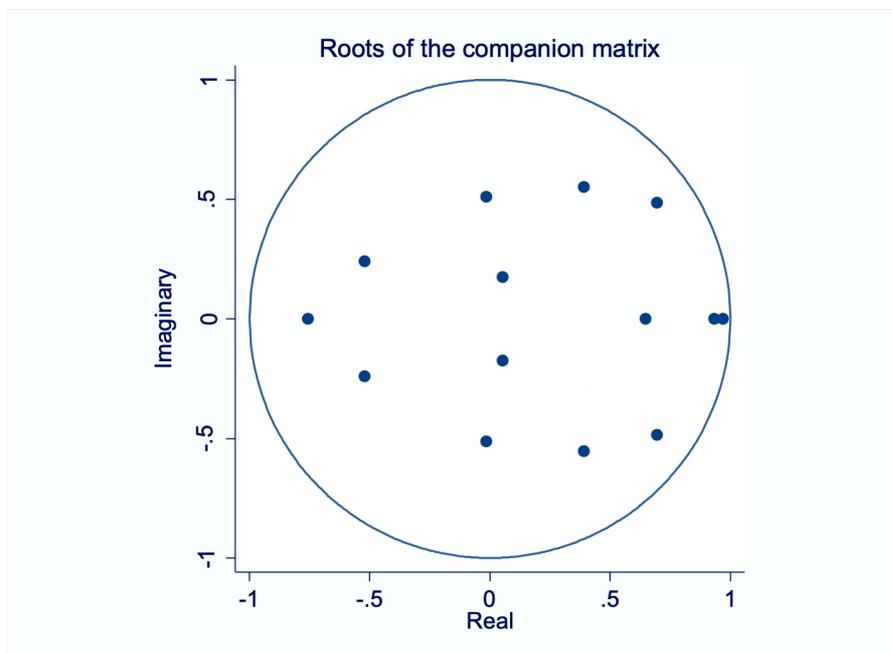
VAR Model Results

To further investigate the dynamic interactions between taxation and economic growth, a Vector Autoregression (VAR) model was estimated. VAR models allow all variables in the system to be treated as endogenous and capture the dynamic interdependencies among macroeconomic variables over time (Hamilton, 1994).

The optimal lag length for the VAR model was determined using the Akaike Information Criterion (AIC), which indicated that a lag structure of three periods ($p = 3$) provides the most appropriate specification.

To verify the stability of the estimated VAR model, the roots of the companion matrix were examined. As shown in Figure 2, all characteristic roots lie inside the unit circle, indicating that the VAR system satisfies the stability condition. This result confirms that the estimated model is dynamically stable and that the impulse response functions derived from the VAR model are reliable for analysing the transmission effects of fiscal variables on economic growth.

Figure 2: VAR Stability Test (Roots of Companion Matrix)



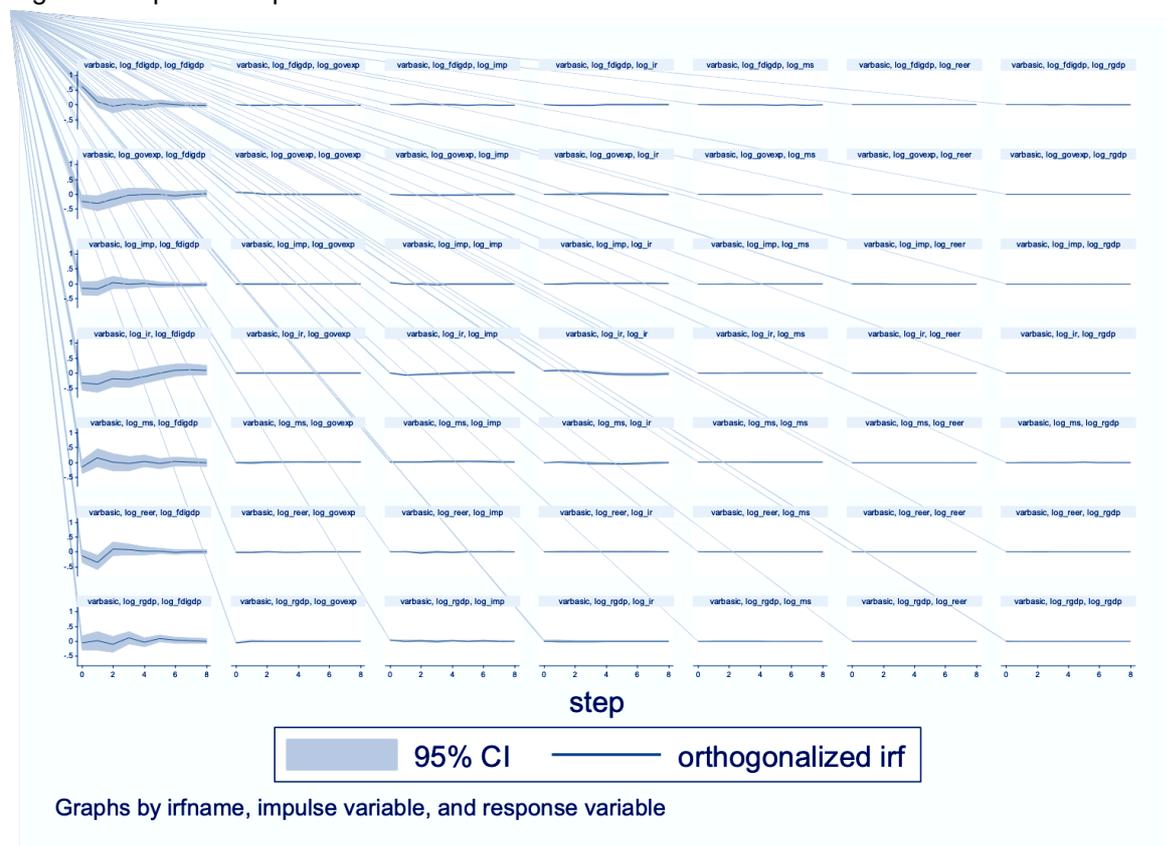
Source: Authors' calculations using EViews based on data from the National Bank of the Republic of North Macedonia, the State Statistical Office, and the Ministry of Finance.

The results indicate that changes in indirect taxation and government expenditures generate measurable responses in real GDP over time, suggesting that fiscal policy instruments influence economic growth not only contemporaneously but also through dynamic transmission mechanisms. In particular, positive shocks to indirect tax revenues are associated with gradual increases in economic output, reflecting the role of stable fiscal revenues in supporting macroeconomic stability.

Impulse response analysis further confirms that fiscal variables exert persistent effects on economic activity, although the magnitude and duration of these effects vary across variables. The results suggest that fiscal policy adjustments may influence economic growth with a time lag, emphasizing the importance of considering dynamic interactions when evaluating tax reforms.

The dynamic effects of fiscal variables on economic growth are further analysed using orthogonalized impulse response functions, presented in Figure 3. In addition to impulse response functions, forecast error variance decomposition was performed to evaluate the relative contribution of each variable to fluctuations in real GDP. The results indicate that indirect taxation and government expenditures account for a substantial share of GDP variance over the forecast horizon, while inflation and institutional variables contribute a smaller proportion of the variation. These findings further support the role of fiscal policy variables as important drivers of macroeconomic dynamics in North Macedonia.

Figure 3. Impulse Response Functions of Real GDP to Fiscal and Macroeconomic Shocks



Source: Authors' calculations using EViews.

5. Discussion and Findings

The main objective for having a fair, transparent, effective, neutral and efficient modern tax system in North Macedonia can be achieved using and implementing the fiscal measures and activities for the fiscal consolidation, expansion of tax base, reduction of tax evasion and also increase of the tax transparency. In the other side is very important to have modern and digital administration capacities, improvement of institutional coordination and digital technologies and innovations in the field of taxation for having sustainable economic and social growth.

The empirical findings provide important insights into the relationship between tax structure and economic growth in North Macedonia. The results of the OLS regression models indicate that indirect taxation has a statistically significant positive association with economic growth, while the effect of direct taxation appears weaker and less robust across model specifications. These results are broadly consistent with the theoretical literature suggesting that consumption-based taxes tend to generate fewer distortions in investment, labour supply, and capital allocation compared with direct taxes (Gemmell et al., 2014).

The findings also highlight the role of broader macroeconomic conditions in shaping economic performance. Government expenditures and trade openness demonstrate positive relationships with economic growth, reflecting the importance of public investment and international economic integration in supporting economic activity in small open economies. Inflation, by contrast, shows a negative association with economic growth, emphasizing the importance of maintaining macroeconomic stability in order to sustain long-term economic development.

The results obtained from the Vector Autoregression (VAR) model provide additional insights into the dynamic interactions between fiscal variables and economic growth. The stability diagnostics confirm that the VAR model satisfies the stability condition, with all characteristic roots located within the unit circle. This confirms that the estimated system is dynamically stable and that the impulse response functions can be interpreted as valid representations of the dynamic effects of fiscal shocks.

The impulse response analysis indicates that shocks to indirect tax revenues and government expenditures generate gradual positive responses in real GDP over several periods. These results suggest that fiscal policy influences economic activity not only contemporaneously but also through dynamic transmission mechanisms that unfold over time. In contrast, shocks related to inflation and institutional variables produce more volatile and less persistent responses, indicating that macroeconomic instability may weaken the growth effects of fiscal policy measures.

Further insights are obtained from the variance decomposition analysis, which evaluates the relative contribution of different variables to fluctuations in real GDP. The results indicate that indirect taxation and government expenditures account for a significant share of GDP variance over the forecast horizon, confirming the importance of fiscal policy instruments in shaping macroeconomic dynamics in North Macedonia. Although GDP remains largely influenced by its own past values, fiscal variables gradually become more influential in explaining output variability as the forecast horizon increases.

The main purpose of the sustainable economic and social system in North Macedonia can be achieved only through implementing more than necessary the tax reforms in the Republic of North Macedonia, as the main basis of the current reform strategy, to achieve equality in the tax system, which is proven in both analysis through empirical analysis and through the comparative analysis, where we recommend that the Republic of North Macedonia have to focus on introducing progressive tax rates on income tax and on profit tax in order to better collect revenue, to be focused on effective spending and fair and transparent allocation of revenues for having more equality in income allocation and also to reduce the tax evasion by implementing efficient and effective control and effective tax administration, as well as digitalization of tax services in order to avoid tax evasion and achieve equality in income distribution and sustainable economic and social development.

According to the results this study is focused on fiscal sustainability for better economic growth, and there are more than necessary the fiscal reforms. The fiscal system of North Macedonia has to be focused on deficit reduction to fulfil the deficit rule 3%.

Also, the public spending should be improved by better management of spendings by optimizing the public administration of spendings, better management of local government spending and investing in the fields and sectors where is more than necessary to be invested in such as health, education, and social assistance. As very important field is also the focus on strengthening the fiscal institutions by using the fiscal strategy for having digital services and avoiding the tax evasion.

Limitations

As all the studies also, this study has some limitations. First, although the data are taken from National Bank of North Macedonia there were some complications with the data because they aren't regularly updated or some of them are partially estimated and we had to take them from other legitimated institutions. Second, North Macedonia is an open economy which is vulnerable to external shocks which can distort the fiscal and growth outcomes, and can have an impact on the reforms and the fiscal system. Third, implementation of the reforms depends also on the political and institutional constraints, which can be faced by resistance from interest groups and realized by some other groups and depend very much on the political will.

Future directions

Firstly, the reforms are more than necessary to be focused on introducing progressive property taxation and green taxes, to reduce tax evasion and the informal economy for having more stability on the economic system. Secondly, North Macedonia has to improve the public spending efficiency for using the government spendings in effective and efficient way. Thirdly, North Macedonia has to improve transparency for strengthening fiscal rules and digitalization of the administration and services.

Credit Authorship Contribution Statement

Seferi, L. contributed to the conceptualization of the research, development of the methodological framework, data analysis, and preparation of the original manuscript draft. Vehapi, M. F. contributed to the investigation process, literature review development, data interpretation, and critical revision of the manuscript. Alija, S. contributed to data curation, validation of the econometric analysis, and review and editing of the manuscript. All authors reviewed and approved the final version of the manuscript for publication.

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Conflict of Interest Statement

The authors declare that no commercial or financial relationships exist that could be construed as a potential conflict of interest.

Data Availability Statement

The data used in this study are derived from publicly available macroeconomic databases, including the National Bank of the Republic of North Macedonia, the State Statistical Office, and the Ministry of Finance of the Republic of North Macedonia. The dataset covers quarterly macroeconomic indicators for the period 2010Q1–2023Q4. All data sources are publicly accessible, and the compiled dataset used in the analysis can be obtained from the corresponding author upon reasonable request.

Ethical Approval Statement

This study does not involve human participants, personal data, or experimental procedures. The research is based exclusively on secondary macroeconomic data obtained from publicly available official databases. Therefore, formal ethical approval was not required. The study was conducted in accordance with standard academic research ethics and principles of transparency, integrity, and proper citation of data sources.

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APPENDIX

Budget of the Republic of North Macedonia (2015–2023)

Table A1. Budget Structure – Revenues (% of GDP)

Budget of the Republic of North Macedonia (Central Budget and Budget of the Funds)									
Denar million	2015	2016	2017	2018	2019	2020	2021	2022	2023 Budget
TOTAL REVENUES	161,207	169,356	179,673	188,505	203,822	189,554	218,021	243,085	282,052
Tax Revenues and Contributions	140,826	150,362	157,537	170,994	178,895	173,464	196,317	220,186	250,689
Taxes	91,357	98,457	103,217	112,774	116,729	105,713	125,690	140,518	160,330
Contributions	47,900	50,300	52,890	56,538	62,166	66,564	70,627	77,619	88,089
Non-Tax Revenues	12,859	12,973	13,396	12,260	18,687	11,173	13,882	17,189	19,894
Capital Revenues	2,265	1,977	1,316	2,197	2,369	1,846	1,928	2,273	2,800
Foreign Donations	4,733	3,648	7,171	2,978	3,871	3,071	5,894	3,437	8,669
Revenues on the basis of loan repayment	524	396	253	76	0	0	0	0	0
TOTAL EXPENDITURES	180,632	185,407	196,561	200,071	217,445	243,421	256,906	278,596	324,810
Current Expenditures	161,965	168,433	176,698	187,924	199,633	227,306	233,496	249,959	276,059
Wages and Allowances	24,685	25,958	26,204	26,355	27,752	29,775	31,010	32,459	34,880
Goods and Services	18,088	16,702	15,344	14,554	16,266	15,423	20,110	21,001	23,631
Transfers	112,734	118,902	126,762	139,323	147,513	174,077	121,439	187,659	204,625
Transfers (SRA)	1,592	1,517	1,879	1,779	1,932	4,330	2,343	1,955	1,439
Social Transfers	82,903	89,005	94,690	100,678	108,129	117,799	121,439	131,758	144,951
Pensions	50,285	54,622	58,084	61,243	65,179	68,824	71,522	78,394	86,799
Unemployment Benefits	1,482	1,216	1,305	1,922	2,498	2,691	2,753	2,702	2,976
Social Benefits	7,489	7,571	8,261	8,566	9,654	11,591	12,120	12,505	13,111
Health Care	23,647	25,596	27,040	28,947	30,798	34,693	35,044	38,157	42,064
Other Transfers	28,239	28,380	30,193	36,866	37,452	51,948	49,510	53,946	58,235
Transfers to Local Government	16,323	16,647	17,014	18,057	19,097	21,373	21,218	23,365	26,687
Agricultural Subsidies	6,583	5,596	6,600	7,039	7,399	7,088	7,987	7,682	7,490
Other	5,333	6,137	6,579	11,770	10,956	23,487	20,305	22,899	24,058
Interest	6,458	6,871	8,388	7,692	8,102	8,031	9,086	9,140	12,923
Capital Expenditures	18,667	16,974	19,863	12,147	17,812	16,115	23,408	28,637	48,751
BUDGET BALANCE	-19,425	-16,051	-16,888	-11,566	-13,623	-53,867	-38,885	-35,511	-42,759
Financing	19,425	16,051	16,888	11,566	13,623	53,867	38,885	35,511	42,759
Inflow	47,846	36,836	34,470	39,706	29,691	95,695	81,480	46,869	94,876
Other Inflows	45	125	371	287	609	960	540	906	0
Foreign Loans	19,866	30,892	3,464	32,499	8,814	65,247	61,258	24,895	66,876
Deposits	10,265	-5,318	10,549	-9,636	1,210	-6,859	-3,467	6,387	-5,626
Domestic Borrowing	17,654	11,116	20,086	16,539	19,028	36,347	23,136	14,681	33,616
Sell of Shares	16	21	0	17	30	0	13	0	10
Outflow	28,421	20,785	17,582	28,140	16,068	41,828	42,595	11,358	52,117
Repayment of Principal	28,421	20,785	17,582	28,140	16,068	41,828	42,595	11,358	52,117
Foreign	22,131	11,609	8,281	15,928	5,754	26,567	36,472	5,787	36,506
Domestic	6,290	9,176	9,301	12,212	10,314	15,261	6,123	5,571	15,611

Share in GDP									
Denar million	2015	2016	2017	2018	2019	2020	2021	2022	2023 Budget
TOTAL REVENUES	28.8%	28.5%	29.1%	28.5%	29.4%	28.3%	30.3%	30.6%	31.8%
Tax Revenues and Contributions	25.2%	25.3%	25.5%	25.9%	25.8%	25.9%	27.3%	27.7%	28.3%
Taxes	16.3%	16.6%	16.7%	17.1%	16.9%	15.8%	17.4%	17.7%	18.1%
Contributions	8.6%	8.5%	8.6%	8.6%	9.0%	9.9%	9.8%	9.8%	9.9%
Non-Tax Revenues	2.3%	2.2%	2.2%	1.9%	2.7%	1.7%	1.9%	2.2%	2.2%
Capital Revenues	0.4%	0.3%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Foreign Donations	0.8%	0.6%	1.2%	0.5%	0.6%	0.5%	0.8%	0.4%	1.0%
Revenues on the basis of loan repayment									
TOTAL EXPENDITURES	32.3%	31.2%	31.8%	30.3%	31.4%	36.4%	35.7%	35.1%	36.6%
Current Expenditures	29.0%	28.3%	28.6%	28.4%	28.8%	34.0%	32.4%	31.4%	31.1%
Wages and Allowances	4.4%	4.4%	4.2%	4.0%	4.0%	4.4%	4.3%	4.1%	3.9%
Goods and Services	3.2%	2.8%	2.5%	2.2%	2.3%	2.3%	2.8%	2.6%	2.7%
Transfers	20.2%	20.0%	20.5%	21.1%	21.3%	26.0%	16.9%	23.6%	23.1%
Transfers (SRA)	0.3%	0.3%	0.3%	0.3%	0.3%	0.6%	0.3%	0.2%	0.2%
Social Transfers	14.8%	15.0%	15.3%	15.2%	15.6%	17.6%	16.9%	16.6%	16.3%
Pensions	9.0%	9.2%	9.4%	9.3%	9.4%	10.3%	9.9%	9.9%	9.8%
Unemployment Benefits	0.3%	0.2%	0.2%	0.3%	0.4%	0.4%	0.4%	0.3%	0.3%
Social Benefits	1.3%	1.3%	1.3%	1.3%	1.4%	1.7%	1.7%	1.6%	1.5%
Health Care	4.2%	4.3%	4.4%	4.4%	4.4%	5.2%	4.9%	4.8%	4.7%
Other Transfers	5.1%	4.8%	4.9%	5.6%	5.4%	7.8%	6.9%	6.8%	6.6%
Transfers to Local Government	2.9%	2.8%	2.8%	2.7%	2.8%	3.2%	2.9%	2.9%	3.0%
Agricultural Subsidies	1.2%	0.9%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	0.8%
Other	1.0%	1.0%	1.1%	1.8%	1.6%	3.5%	2.8%	2.9%	2.7%
Interest	1.2%	1.2%	1.4%	1.2%	1.2%	1.2%	1.3%	1.1%	1.5%
Capital Expenditures	3.3%	2.9%	3.2%	1.8%	2.6%	2.4%	3.2%	3.6%	5.5%
BUDGET BALANCE	-3.5%	-2.7%	-2.7%	-1.8%	-2.0%	-8.0%	-5.4%	-4.5%	-4.8%

Source: Ministry of Finances of North Macedonia

Table A2. Budget Structure – Expenditures (% of GDP)

Revenues and Expenditures Structure									
In million denars									2023
	2015	2016	2017	2018	2019	2020	2021	2022	Budget
TOTAL REVENUES	161,207	169,356	179,673	188,505	203,822	189,554	218,021	243,085	282,052
Tax Revenues and Contributions	87.4%	88.8%	87.7%	90.7%	87.8%	91.5%	90.0%	78.1%	88.9%
Taxes	56.7%	58.1%	57.4%	59.8%	57.3%	55.8%	57.7%	49.8%	56.8%
Contributions	29.7%	29.7%	29.4%	30.0%	30.5%	35.1%	32.4%	27.5%	31.2%
Non-Tax Revenues	8.0%	7.7%	7.5%	6.5%	9.2%	5.9%	6.4%	6.1%	7.1%
Capital Revenues	1.4%	1.2%	0.7%	1.2%	1.2%	1.0%	0.9%	0.8%	1.0%
Foreign Donations	2.9%	2.2%	4.0%	1.6%	1.9%	1.6%	2.7%	1.2%	3.1%
Revenues on the basis of loan repayment	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL EXPENDITURES	180,632	185,407	196,561	200,071	217,445	243,421	256,906	278,596	324,810
Current Expenditures	89.7%	90.8%	89.9%	93.9%	91.8%	93.4%	90.9%	89.7%	85.0%
Wages and Allowances	13.7%	14.0%	13.3%	13.2%	12.8%	12.2%	12.1%	11.7%	10.7%
Goods and Services	10.1%	9.0%	7.8%	7.3%	7.5%	6.3%	7.8%	7.5%	7.3%
Transfers	62.4%	64.1%	64.5%	69.6%	67.8%	71.5%	67.5%	67.4%	63.0%
Transfers (SRA)	0.9%	0.8%	1.0%	0.9%	0.9%	1.8%	0.9%	0.7%	0.4%
Social Transfers	45.9%	48.0%	48.2%	50.3%	49.7%	48.4%	47.3%	47.3%	44.6%
Pensions	27.8%	29.5%	29.6%	30.6%	30.0%	28.3%	27.8%	28.1%	26.7%
Unemployment Benefits	0.8%	0.7%	0.7%	1.0%	1.1%	1.1%	1.1%	1.0%	0.9%
Social Benefits	4.1%	4.1%	4.2%	4.3%	4.4%	4.8%	4.7%	4.5%	4.0%
Health Care	13.1%	13.8%	13.8%	14.5%	14.2%	14.3%	13.6%	13.7%	13.0%
Other Transfers	15.6%	15.3%	15.4%	18.4%	17.2%	21.3%	19.3%	19.4%	17.9%
Transfers to Local Government	9.0%	9.0%	8.7%	9.0%	8.8%	8.8%	8.8%	8.4%	8.2%
Agricultural Subsidies	3.6%	3.0%	3.4%	3.5%	3.4%	2.9%	3.2%	2.8%	2.3%
Other	3.0%	3.3%	3.3%	5.9%	5.0%	9.6%	7.9%	8.2%	7.4%
Interest	3.6%	3.7%	4.3%	3.8%	3.7%	3.3%	3.5%	3.3%	4.0%
Capital Expenditures	10.3%	9.2%	10.1%	6.1%	3.6%	6.6%	9.1%	10.3%	15.0%

Source: Ministry of Finances of North Macedonia

Table A3. Budget Balance Indicators

In million denars	Annual Growth Rates								2023/2022 Budget
	2015/2014	2016/2015	2017/2016	2018/2017	2019/2018	2020/2019	2021/2020	2022/2021	
TOTAL REVENUES	10.5%	5.1%	6.1%	4.9%	8.1%	-7.0%	15.0%	11.5%	16.0%
Tax Revenues and Contributions	8.9%	6.8%	4.8%	8.5%	4.6%	-3.0%	13.2%	12.2%	13.9%
Taxes	9.0%	7.8%	4.8%	9.3%	3.5%	-9.4%	18.9%	11.8%	14.1%
Contributions	8.4%	5.0%	5.1%	6.9%	10.0%	7.1%	6.1%	9.9%	13.5%
Non-Tax Revenues	20.9%	0.9%	3.3%	-8.5%	52.4%	-40.2%	24.2%	23.8%	15.7%
Capital Revenues	20.9%	-12.7%	-33.4%	66.9%	7.8%	-22.1%	4.4%	17.9%	23.2%
Foreign Donations	39.9%	-22.9%	96.6%	-58.5%	30.0%	-20.7%	91.9%	-41.7%	152.2%
Revenues from repayment of loans	-28.0%	-24.4%	-36.1%	-70.0%					
TOTAL EXPENDITURES	7.5%	2.6%	6.0%	1.8%	8.7%	11.9%	5.5%	8.4%	16.6%
Current Expenditures	7.7%	4.0%	4.9%	6.4%	6.2%	13.9%	2.7%	7.1%	10.4%
Wages and Allowances	6.9%	5.2%	0.9%	0.6%	5.3%	7.3%	4.1%	4.7%	7.5%
Goods and Services	16.9%	-7.7%	-8.1%	-5.1%	11.8%	-5.2%	30.4%	4.4%	12.5%
Transfers	5.6%	5.5%	6.6%	9.9%	5.9%	18.0%	-30.2%	54.5%	9.0%
Transfers (SRA)	65.5%	-4.7%	23.9%	-5.3%	8.6%	124.1%	-45.9%	-16.6%	-26.4%
Social Transfers	5.8%	7.4%	6.4%	6.3%	7.4%	8.9%	3.1%	8.5%	10.0%
Pensions	4.6%	8.6%	6.3%	5.4%	6.4%	5.6%	3.9%	9.6%	10.7%
Unemployment Benefits	-12.9%	-17.9%	7.3%	47.3%	30.0%	7.7%	2.3%	-1.9%	10.1%
Social Benefits	15.9%	1.1%	9.1%	3.7%	12.7%	20.1%	4.6%	3.2%	4.8%
Health Care	6.9%	8.2%	5.6%	7.1%	6.4%	12.6%	1.0%	8.9%	10.2%
Other Transfers	2.8%	0.5%	6.4%	22.1%	1.6%	38.7%	-4.7%	9.0%	8.0%
Transfers to Local Government	2.1%	2.0%	2.2%	6.1%	5.8%	11.9%	-0.7%	10.1%	14.2%
Agricultural Subsidies	-0.2%	-15.0%	17.9%	6.7%	5.1%	-4.2%	12.7%	-3.8%	-2.5%
Other	9.4%	15.1%	7.2%	78.9%	-6.9%	114.4%	-13.5%	12.8%	5.1%
Interest	26.9%	6.4%	22.1%	-8.3%	5.3%	-0.9%	13.1%	0.6%	41.4%
Capital Expenditures	5.9%	-9.1%	17.0%	-38.8%	46.6%	-9.5%	45.3%	22.3%	70.2%

Source: Ministry of Finances of North Macedonia