EMPIRICAL ANALYSIS OF THE TWIN DEFICITS HYPOTHESIS IN THE REPUBLIC OF NORTH MACEDONIA

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Abstract

The twin deficits hypothesis is widely considered one of the most frequently employed phenomena in the economic literature. An econometric analysis of the twin deficit hypothesis is of special importance in understanding the perspective on macroeconomic stability in the Republic of North Macedonia. This paper aims to empirically test the validity of this hypothesis in the Republic of North Macedonia. To do so, we utilized quarterly data on Macedonia's budget deficit, the current account deficit, exchange rate, interest rate, GDP, government expenditure, and money supply, starting from the first quarter of 2001 to the fourth quarter of 2022. Through the application of the ARDL model, the study found that between the variables taken into analysis, there exists a short and long-run relationship. More specifically exchange rate, government expenditure, and GDP result in improvement on the budget deficit, both in the short run and long run. While current account deficit, interest rate, and money supply result in worsening the budget deficit, both in the short run and long run.

Keywords: North Macedonia; twin deficits; budget deficit; current account deficit; ARDL model

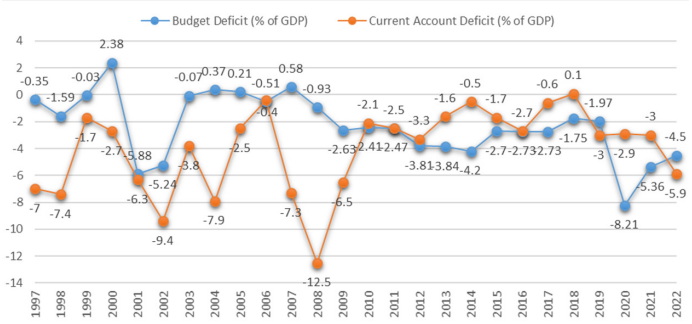
1. INTRODUCTION

Economies with both fiscal and current account deficits are commonly known as having "twin deficits". According to the twin deficit hypothesis, there exists a long-term positive relationship between the budget and the current account deficit, with the budget deficit causing the current account deficit. The importance of this phenomenon rose in the 1980s because of the rapid expansion of the twin deficits in the United States and many other countries around the world.

Analyzing the empirical relationship between budget and current account deficits is important for EU candidate countries and those with aspirations for potential candidacy. Over the past two decades, North Macedonia has faced concurrent budget and current account deficits:

- In 2022, North Macedonia registered a budget deficit amounting to 4.50% of its GDP. Over the period from 1997 until 2022, the budget deficit averaged -2.32% of GDP, reaching its highest point of 2.38% of GDP in 2000 and its lowest point of -8.21% of GDP in 2020, and
- In 2022, North Macedonia reported a current account deficit amounting to 6% of its GDP. The average current account to GDP ratio in North Macedonia from 1997 to 2022 was -4.04%, reaching its peak at 0.10% of GDP in 2018 and its lowest point at -12.5% of GDP in 2008.

Figure 1.
Budget Deficit as a percentage of the GDP and Current Account Deficit as a percentage of the GDP



Source: Authors based on data from the trading economics

In addition to the introduction. The following sections of the paper are structured in the following manner: the following section provides a literature review, followed by the description of data and methodology in Section three. Section four presents and deliberates on the empirical findings. Lastly, the conclusion is presented in Section five.

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2. LITERATURE REVIEW

In this section, we analyze relevant empirical literature, discussing four testable hypotheses regarding the twin deficit.

The first hypothesis, following Keynesian theory, proposes that an increase in the budget deficit will lead to a similar increase in the current account deficit. However, variations among countries and the evolution of their respective economies may lead to different levels of impact. Several empirical studies provide evidence in support of this perspective. For example, Harko (2009) estimates the causal link between twin deficits and other macroeconomic variables by using multivariate time series data for Pakistan. The estimates from the VAR model indicate that the causal relationship of deficit flows comes from the budget deficit to prices, then to interest rates, capital flows, exchange rates, and finally to the trade deficit. Additionally, there is evidence to suggest that reducing budget deficits could contribute to moderating price levels. Tarawalie (2014) found evidence supporting the Twin Deficits Hypothesis for Sierra Leone through the use of a multivariate model instead of direct comparison between the budget deficit and the current account deficit.

The second hypothesis, known as the Recardian Equivalence Hypothesis, suggests that a change between taxes and budget deficits has no effect on the real interest rate, investment quantity, or the current account balance. Using monthly data and the bounds-testing approach to co-integration, Ratha (2009) finds that the twin-deficits theory holds for India in the short run. But, there's no such correlation in the long run. Hence, it's concluded that the Keynesian perspective dominates in the short run, while the neo-classical theory dominates in the long run. Rahman and Mishra (2001) found that budget and current account deficits have no possibility of reverting to a long-run equilibrium relationship in the United States during the period 1946–1988.

The third hypothesis suggests a one-way causality, implying that the budget deficit is influenced exclusively by the current account deficit. Based on this statement, Alkswani (2002) examines the relationship between twin deficits in the Saudi Arabian economy employing annual data and argues that in the oil economy, neither the REH nor the Keynesian proposition is valid. Alkswani contends that export revenue affects government income, expenditure, and the exports of goods and services. They conclude that the two deficits are positively correlated, with causality running from the trade deficit to the budget deficit. Empirical evidence from Saeed and Khan (2012) indicates long run relationship between the two deficits in Pakistan, with causality running from the current account deficit to the budget deficit during the period 1972 to 2008. Sobrino (2013), analyzing quarterly data from 1980 to 2012, rejects the twin deficits hypothesis for Peru. His findings strongly imply reverse causality, suggesting that the current account deficit affects the fiscal deficit.

The last hypothesis addresses the two-way causality between the budget deficit and the current account deficit. Lau and Tang (2009) find that there is a bi-directional causality between the budget deficit and the current account deficit in Cambodia. Pahlavani and Saleh (2009) investigated the twin deficits for the Philippines and Mukhtar, Zakaria, and Ahmde (2007) for Pakistan. Both studies confirm a two-way causality among budget deficit and current account deficit. Lau and Baharumshah (2006) argue that interest rates, exchange rates, and budget deficits play an important role in explaining the current account balance. Omoniyi et al. (2012), studied the Twin Deficits Hypothesis in Nigeria from 1970 to 2008 and presented findings suggesting a two-way causality between budget deficits and trade deficits.

Regarding our country, we have the studies of:

- Rilind Ademi and Zana Beqiri Luma (2023) tested the twin deficit hypothesis's validity of North Macedonia by analyzing quarterly data on the budget and trade deficit from 2006 to 2021. Their use of Granger causality and VAR model yielded partially supportive results for the twin deficit hypothesis. The observed weak relationship among budget and trade deficit is not unexpected for a small open economy like North Macedonia, characterized by a fixed exchange rate and foreign direct investments primarily influenced by business conditions rather than the interest rates.
- Vesna Bucevska (2020) tested the validity of the twin deficit hypothesis by applying multiple econometrics techniques, including Granger causality, VAR model, and VECM model. Her analysis indicates that efforts aimed at reducing current account imbalances via fiscal policy may not be effective in the short run.
- Vesna Stojcevska and Mite Miteski (2016) investigated empirically whether the proposition of a positive relationship between the budget balance and the trade balance, i.e. the twin deficit hypothesis, holds in the case of the Republic of Macedonia. The study was conducted using the VAR model, following the methodology established by Kim and Roubini (2007). The key empirical findings indicate a positive relationship among the selected trade and fiscal variables, suggesting a potential relationship among budget balance and trade balance.

3. DATA AND METHODOLOGY

This study attempts to explore the twin deficits hypothesis in the context of North Macedonia utilizing quarterly data. The study spans from the first quarter of 2001 to the fourth quarter of 2022 and relies on secondary data sourced from annual reports and various publications of the National Bank of North Macedonia.

The variables employed in the empirical analysis are defined as follows:
- CAD = Current account deficit, as the sum of net exports of goods and services and net factor income.
- BD = The budget deficit, as the difference of government revenue and government expenditure.
- IR = Interest rate represented by the nominal deposit rate, (as %).
- ER = The exchange rate represents the comparative value of one currency expressed in relation to another currency (EUR/MKD).
- GDP = GDP at constant prices (REAL GDP) - reference year 2005 (in million denars).
- GE = Government expenditure at current prices (as % of GDP).
- M1 = an indicator of the money supply reflecting the liquidity within the economy.

The model has the following form:

$$BD = \beta_0 + \beta_1 CAD + \beta_2 IR + \beta_3 ER + \beta_4 GDP + \beta_5 GE + \beta_6 M1 + \varepsilon$$

The model has the following form:

Table 1

Variables and their expected signs based on the theories

Variable	Notation	Units	Expected Relation
Budget deficit	BD	Million MKD	
Current account deficit	CD	Million MKD	Positive (+)
Interest rate	IR	%	Positive(+) / Negative (-)
Exchange rate	ER	MKD	Positive (+)
Gross Domestic Production	GDP	Million MKD	Negative(-)
Government expenditure	GE	% of GDP	Negative (-)
Money supply	M1	Million MKD	Positive (+)

Source: Author's illustration

4. EMPIRICAL RESULTS

Since we are dealing with time series data, it's crucial to assess its properties. To assess the unit root among the variables, the ADF Test is performed.
The unit root tests presented in Table 2 reveal a combination of I(0) and I(1) order of integration. Some variables have zero-order integration, such as the budget deficit, current account deficit, interest rate, and, government expenditure. Whereas the other variables have a first-order integration like exchange rate, GDP, and money supply (M1).

Table 2

Findings from of the ADF Test

Variables	Lags	Level		First-Difference		Result
		t	*5%*	*t*	*5%*	
BD	2	-2.901	-2.902	-11.631	-2.903	I(0)
CAD	4	-3.391	-2.904	-4.975	-2.904	I(0)
IR	1	-4.416	-2.901	-5.491	-2.902	I(0)
ER	1	-2.758	-2.901	-8.591	-2.903	I(1)
GDP	4	-1.402	-3.535	-5.509	-2.905	I(1)
GE	4	-4.550	-2.907	-2.049	-2.904	I(0)
M1	0	3.090	-2.901	-2.991	-2.901	I(1)

Source: Researcher's calculation using Stata14

Since there are both order-zero and first-order stationary variables in the series, the ARDL model was used as a more suitable model to perform the empirical analysis. The ARDL bounds technique was applied to assess the cointegration or the long-run relationship by comparing F-statistics with the specific critical values for the period from 2001 to 2022.
According to the results of Table 3, it surmised the existence of a long-run relationship among budget deficit, current account deficit, interest rate, exchange rate, government expenditure, GDP, and money supply. With the F statistic surpassing the critical value of the upper bounds (I(1)) at significance levels, we can reject the null hypothesis.

Table 3

ARDL Bound Test of Cointegration

Number of regressors	Test statistic	Critical Value Bounds							
		10%		5%		2.5%		1%	
k	F- statistic	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
6	9.330	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43
k	t-statistic								
6	-5.701	-2.57	-4.04	-2.86	-4.38	-3.13	-4.66	-3.43	-4.99

Source: Researcher's calculation using Stata14

As we have detected a long-run relationship. In progress, it is going to be checked the effect of the current account deficit, interest rate, exchange rate, GDP, government expenditure, and money supply on budget deficit in the long run.

Table 4 presents the findings for the long-run coefficients of our ARDL model. According to the findings, the budget deficit is positively affected by the current account deficit, interest rate, and GDP. While it is negatively affected by the exchange rate, government expenditure, and money supply. A million denar rise in the current account deficit results in a 17.47 million denar rise in the budget deficit in the long run, ceteris paribus. A 1% rise in the interest rate results in a 983 million denars rise in the budget deficit in the long run, ceteris paribus. A million denar rise in the GDP results in a 0.299 million denar rise in the budget deficit in the long run, ceteris paribus. A 1% rise in the exchange rate results in a 17851 million denar reduction in the budget deficit in the long run, ceteris paribus. A million denar rise in government expenditure results in a 996 million denars reduction in the budget deficit in the long run, ceteris paribus. A million denar rise in the money supply results in a 0.047 million denars reduction in the budget deficit in the long run, ceteris paribus.

Table 4

The long-run coefficients estimated by the ARDL model

	Coefficient	Standard Errors	t	p
CAD	17.46636	5.812726	3.00	0.004
IR	983.3241	430.1644	2.29	0.026
ER	-17851.24	4429.19	-4.03	0.000
GDP	0.2988884	0.0791987	3.77	0.000
GE	-996.4996	382.5934	-2.60	0.012
M1	-0.0471629	0.0141642	-3.33	0.002

Source: Researcher's calculation using Stata14

To analyze the short-run movement's tendency on long-run equilibrium, the ECM was used. Table 5 presents the findings for the short-run coefficients of our ARDL model. Furthermore, the short-run results show that there exists a significant effect of the previous budget deficit, the current account deficit, the lags of the previous interest rate, the lags of the previous exchange rate, the current GDP, and the lags of the previous GDP, the lags of the previous government expenditure, and the current money supply and the lags of the previous money supply.

Table 5

The short-run coefficients estimated by the ARDL model

Variables	Coefficient	Standard Errors	t	p
$D(BD_{t-1})$	-0.3063539	0.1145497	-2.67	0.010
D(CAD)	-8.971048	3.308936	-2.71	0.009
D(IR)	-540.3945	719.5372	-0.75	0.456
$D(IR_{t-1})$	-510.0563	702.0378	-0.73	0.471
$D(IR_{t-2})$	-2448.754	815.2928	-3.00	0.004
$D(IR_{t-3})$	-1528.178	642.8127	-2.38	0.021
D(ER)	-272.8927	5522.632	-0.05	0.961
$D(ER_{t-1})$	561.249	5067.7	1.00	0.323
$D(ER_{t-2})$	16834.57	4891.849	3.44	0.001
$D(ER_{t-3})$	11629.65	5217.378	2.23	0.030
D(GDP)	0.190993	0.1063222	1.80	0.078
$D(GDP_{t-1})$	0.4707283	0.1157968	4.07	0.000
$D(GDP_{t-2})$	0.6437658	0.122321	5.26	0.000
$D(GDP_{t-3})$	0.558236	0.1088065	5.13	0.000
D(GE)	814.6386	498.9487	1.63	0.109
$D(GE_{t-1})$	1764.947	458.2273	3.85	0.000
$D(GE_{t-2})$	1750.688	381.8274	4.59	0.000
$D(GE_{t-3})$	856.9683	293.2239	2.92	0.005
D(M1)	-0.3874849	0.1247578	-3.11	0.003
$D(M1_{t-1})$	-0.2862412	0.1297733	-2.21	0.032
ADJ(ECM)	-1.023593	0.1795419	-5.70	0.000

Source: Researcher's calculation using Stata14

The short-run coefficient of the previous budget deficit has a negative effect on the current budget deficit, i.e. 1 million denar rise of the first lags of the budget deficit results in a 0.306 million denar reduction in the current budget deficit, ceteris paribus.

The budget deficit is negatively affected by the short-run coefficient of the current account deficit, i.e. 1 million denar rise in the current account deficit results in an 8.97 million denar reduction in the budget deficit, ceteris paribus.

The budget deficit is negatively affected by the short-run coefficient of the previous interest rate, along with the second and third lags of the interest rate, i.e. 1% rise of the second lags interest rate results in a 2448.754 million denar reduction in the budget deficit, ceteris paribus; and 1% rise of the third lags of the interest rate results in a 1528.178 million denar reduction in the budget deficit, ceteris paribus.

The budget deficit is affected positively by short-run coefficient of the previous exchange rate, along with the second and third lags of the exchange rate, i.e. a million denar rise of the second lags of the interest rate results in a 16834.57 million denar rise in the budget deficit, ceteris paribus; and a million denar rise of the third lags of the exchange rate results in a 11629.65 million denar rise in the budget deficit, ceteris paribus. The short-run coefficient current GDP and the lags of the previous GDP have a positive effect on the budget deficit, i.e. a million denar rise in the current GDP results in a 0.1909 million denar rise in the budget deficit, ceteris paribus; a million denar rise of the first lags of the GDP results in a 0.4707 million denar rise in the budget deficit, ceteris paribus; a million denar rise of the second lags of the GDP results in a 0.6476 million denar rise in the budget deficit, ceteris paribus; a million denar rise of the third lags of the GDP results in a 0.5582 million denar rise in the budget deficit, ceteris paribus.

The short-run coefficient of the previous government expenditure, such as the first, second, and third lags of the government expenditure have a positive effect on budget deficit; a 1% rise of the first lags of the government expenditure results in a 1764.947 million denar rise in the budget deficit, ceteris paribus; 1% rise of the second lags of the government expenditure results in a 1750.688 million denar rise in the budget deficit, ceteris paribus; a 1% rise of the third lags of the government expenditure results in a 856.968 million denar rise in the budget deficit, ceteris paribus.

The budget deficit is negatively affected by short-run coefficient of the current money supply and the lags of the previous money supply; i.e. a million denar rise of the current money supply results in a 0.3875 million denar reduction in the budget deficit, ceteris paribus; a million denar rise of the first lags of the money supply results in a 0.2862 million denar reduction in the budget deficit, ceteris paribus.

Finally, the negative ECM coefficient (−1.023593) and the high speed of adjustment (-5.70) have worked to bring equilibrium to the economy, with exogenous and endogenous shocks contributing to its restoration over a long period.

Table 6 presents the results of diagnostic tests conducted to confirm that our model is free from issues such as serial correlation, heteroskedasticity, normality, multicollinearity, and correct specification.

Table 6

Diagnostic Tests Results

Tests	Chi-squared value	prob
Autocorrelation Test		
– Breusch-Godfrey	3.864	0.0510
Heteroskedasticity Test		
– Breusch-Pagan	1.04	0.3085
Normality Test		
– Skewness/Kurtosis	3.98	0.1365
Multicollinearity Test		
– VIF	7.27	
Model Specification Test		
– Ramsey RESET	2.44	0.0751

Source: Researcher's calculation using Stata 14

The probability of all tests is higher than 0.05 or 5% which means that our model is free from autocorrelation problems, and hetero-scedasticity problems and the model is normal. Ramsey RESET test value (0.0751) is greater than 0.05 so this means that there is no functional misspecification in the model or other words the function of the model is correct. In terms of VIF test for multicollinearity, the resulting value is below 8, suggesting that multicollinearity is not present.

5. CONCLUSION

This paper aimed to empirically assess the validity of the twin deficit hypothesis in North Macedonia. To accomplish this goal, we employed quarterly data for the time period from 2001 to 2022 on Macedonia's budget deficit, the current account deficit, exchange rate, interest rate, GDP, government expenditure, and money supply. Our analysis was conducted using the ARDL model.

The empirical findings suggest the existence of short-run and long-run relationships among the budget deficit, current account deficit, exchange rate, interest rate, GDP, government expenditure, and money supply.

In the short run, the budget deficit is negatively affected by the previous budget deficit, the current account deficit, the previous interest rate, the current money supply, and the previous money supply. On the other hand, the budget deficit is positively affected by the previous exchange rate, the previous government expenditures, and current GDP and previous GDP.

In the long run, the budget deficit is positively affected by the current account deficit, interest rate, and GDP. While it is negatively affected by the exchange rate, government expenditure, and money supply.

The findings of the analyzed studies and this paper's results highlight the importance of government policymakers exercising caution in managing fiscal policies. Specifically, they should focus on controlling public expenditures, as these tend to outweigh benefits, leading to increased budget deficits and state debt.

It's also important to prioritize productivity growth and enhance competitiveness in foreign markets to achieve long-term positive impacts and reduce trade deficits. By focusing on initiatives such as investment in innovation, infrastructure, and education, countries can improve their ability to compete globally, leading to increased exports and decreased reliance on imports. This strategic approach can contribute to a more balanced trade position over time.

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