EVALUATING FISCAL MULTIPLIERS, PUBLIC INVESTMENT EFFICIENCY, AND GOVERNANCE IN NORTH MACEDONIA: EMPIRICAL EVIDENCE FROM A COINTEGRATED VECM FRAMEWORK

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Abstract

This study investigates the dynamic long-run and short-run macroeconomic relationships between public capital expenditure, government consumption, institutional quality, and real GDP growth in the Republic of North Macedonia. Utilizing quarterly macroeconomic time-series data covering 2005–2025 sourced from the State Statistical Office (MAKSTAT), the National Bank of the Republic of North Macedonia (NBRNM), and the Ministry of Finance, the empirical analysis applies a Johansen Cointegration and Vector Error Correction Model (VECM) framework. Given North Macedonia's de facto fixed exchange rate regime (Macedonian Denar pegged to the Euro), fiscal policy serves as the primary instrument for macroeconomic stabilization and long-term structural growth. The long-run cointegration analysis demonstrates that public capital expenditures exert a statistically significant positive multiplier on real GDP ($\beta=0.242, p<0.001$), whereas non-capital public consumption exhibits a negative long-run impact ($\beta=-0.118, p<0.01$). The error correction dynamics indicate a quarterly speed of adjustment of −14.2% toward long-run equilibrium. Policy recommendations emphasize optimizing the Public Investment Management (PIM) framework, modernizing tax administration through continuous transaction controls (such as the *e-Faktura* system), and enforcing organic budget law rules to ensure public debt sustainability.

Keywords: North Macedonia, Fiscal Policy Multipliers, Public Investment Management, Vector Error Correction Model (VECM), Macroeconomic Stabilization.

1. Introduction

As an open, small transition economy in the Western Balkans and an official EU accession candidate, the Republic of North Macedonia faces the dual imperative of boosting economic growth and ensuring fiscal sustainability. Under the monetary framework maintained by the National Bank of the Republic of North Macedonia (NBRNM), the Macedonian Denar (MKD) operates under a de facto fixed exchange rate pegged to the Euro. Consequently, independent monetary policy is heavily constrained, elevating fiscal policy—specifically the composition and quality of public expenditure—to the primary driver of macroeconomic stabilization and structural transformation.

Over the past two decades, North Macedonia's fiscal landscape has been characterized by structural deficits, expanding public debt, and persistent challenges in public capital project execution. While capital allocations toward major transport networks (e.g., Pan-European Corridors VIII and Xd) and green energy transitions aim to crowd in private capital and enhance export competitiveness, actual expenditure realization frequently lags behind budgeted targets due to procurement delays and institutional capacity constraints. Conversely, current expenditures—such as public sector wages, social transfers, and administrative consumption—have absorbed a disproportionate share of total public spending.

Furthermore, institutional governance and public financial management (PFM) reforms play a critical role in determining fiscal efficiency. Modernization initiatives within the Ministry of Finance and the Public Revenue Office—including the adoption of the Organic Budget Law,

fiscal rules, and automated tax governance tools like e-invoicing (*e-Faktura*)—aim to reduce tax evasion, increase budget transparency, and raise the marginal efficiency of public capital.
This paper evaluates the transmission channels connecting public expenditure components, governance metrics, and real economic output in North Macedonia. Specifically, the study addresses two key research questions:

1. What are the differential short-run and long-run multipliers of public capital expenditure versus government consumption on real output under North Macedonia's pegged exchange rate environment?
2. How efficiently does the macroeconomic system adjust toward long-run equilibrium following fiscal and institutional shocks?

2. Literature Review

The theoretical debate regarding fiscal multipliers hinges on the interaction between aggregate demand stimulation and potential crowding-out effects. In small open economies operating under fixed exchange rate regimes, Mundell-Fleming frameworks predict that fiscal multipliers are larger than under flexible exchange rates because monetary policy must accommodate fiscal expansion to maintain the exchange rate peg without inducing interest rate volatility. However, as Barro (1990) and Spilimbergo et al. (2009) highlight, the productivity of public investment dictates whether fiscal expansions generate sustainable long-run growth or merely accumulate public debt.
In the context of the Western Balkans and South-Eastern Europe, empirical studies (e.g., Murgasova et al., 2015; Besimi & Jovanovski, 2021) indicate that public capital investments in physical infrastructure, human capital, and green energy yield higher long-run output multipliers compared to current spending. However, the efficiency of public investment in transition economies is constrained by institutional bottlenecks, project implementation delays, and weak procurement oversight (Romp & de Haan, 2007).
For North Macedonia specifically, economic literature underscores the structural features of the domestic economy: high import dependence, a substantial informal sector, and supply-side constraints. Microeconomic and tax governance literature demonstrates that institutional reforms—such as continuous transaction controls, automated tax auditing, and public financial management digitalization—significantly boost fiscal space by reducing tax evasion and improving allocative efficiency (Micevska & Trenovski, 2020). Building upon these insights, this study models the cointegrating relationships and dynamic short-run error correction mechanisms governing North Macedonia's macroeconomy.
Dauti and Elezi (2022) empirically assess the relationship between fiscal policy sustainability factors—specifically fiscal deficits—and macroeconomic growth across Western Balkan (WB) and Central East European Union (CE-EU) economies over the period 2000–2021. Employing both static (Fixed Effects with Driscoll-Kraay standard errors) and dynamic panel estimators (System GMM), the authors analyze how fiscal rules, structural shocks, and macroeconomic control variables (including inflation, schooling, total investment, trade openness, and output gap) influence output dynamics.

3. Methodology & Empirical Specification

3.1 Structural Aggregate Production Function

The empirical model is grounded in an augmented production function incorporating private capital formation, government capital spending, government current consumption, exports, and an institutional quality index:

$$Y_t = A_t * K_{p,t}^{\alpha} * G_{k,t}^{\beta} * G_{c,t}^{\gamma} * X_t^{\delta} * e^{\theta INST_t + \varepsilon_t} \quad (1)$$

Taking natural logarithms (ln) yields the structural log-linear econometric specification for North Macedonia:

$$\ln Y_t = \beta_0 + \beta_1 \ln K_{p,t} + \beta_2 \ln G_{k,t} + \beta_3 \ln G_{c,t} + \beta_4 \ln X_t + \beta_5 INST_t + \varepsilon_t \quad (2)$$

Where:

- lnYt = Logarithm of real Gross Domestic Product (GDP) of North Macedonia (in constant MKD prices).
- lnKp,t = Logarithm of real gross private fixed capital formation.
- lnGk,t = Logarithm of real public capital expenditure (infrastructure investments, capital grants).
- lnGc,t = Logarithm of real general government final consumption expenditure (wages, administrative operational expenses).
- lnXt = Logarithm of real exports of goods and services.
- INSTt = Institutional governance quality metric (normalized index combining fiscal transparency and regulatory quality).
- εt = White-noise disturbance term.

3.2 Vector Error Correction Model (VECM)

To account for non-stationarity and cointegration among macroeconomic time series, the system is specified as a Vector Error Correction Model:

$$\Delta Z_t = \Pi Z_{t-1} + \sum_{j=1}^{p-1} \Gamma j \Delta Z_{t-j} + \Phi D_t + u_t \quad (3)$$

Where $Zt=[lnYt,lnKp,t,lnGk,t,lnGc,t,lnXt,INSTt]'$ is the vector of endogenous variables, $\Pi=\alpha\beta'$ contains the long-run cointegrating relationships (β') and speed of adjustment coefficients (α), Γj captures short-run dynamics across $p-1$ lags, and Dt accounts for structural break dummies (such as the 2008 Global Financial Crisis and the 2020 pandemic shock).

4. Empirical Evidence & Results

4.1 Unit Root Tests

Standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were performed on quarterly time series (2005Q1–2025Q4) for North Macedonia.

Table 1.Standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests

Variable	ADF Level Stat	Level p-value	ADF First Diff (Δ)	First Diff p-value	Decision	Order of integration
lnY (Real GDP)	−1.724	0.418	−5.812	<0.0001	Reject H0 at 1%	I(1)
lnKp (Private Investment)	−1.905	0.329	−4.631	0.0002	Reject H0 at 1%	I(1)
lnGk (Public Capital Expenditure)	−2.112	0.24	−6.104	<0.0001	Reject H0 at 1%	I(1)
lnGc (Government Consumption)	−1.450	0.556	−5.220	0.0001	Reject H0 at 1%	I(1)
lnX (Exports)	−2.043	0.268	−4.982	0.0001	Reject H0 at 1%	I(1)
INST (Governance Index)	−1.881	0.341	−4.415	0.0004	Reject H0 at 1%	I(1)

Source: Author's own calculation

All series are non-stationary in levels but stationary in first differences (I(1)), fulfilling the condition for Johansen cointegration testing.

4.2 Johansen Cointegration Analysis

The Johansen trace and maximum eigenvalue test statistics evaluate the presence of cointegrating vectors in the system.

Table 2.Johansen Cointegration

Null Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value	Cointegration Decision
r=0*	112.84	95.75	46.21	40.08	Reject H0 (r≥1)
r≤1	66.63	69.82	26.42	33.88	Fail to Reject
r≤2	40.21	47.85	18.15	27.58	Fail to Reject

Source: Author's own calculation

* *Significant at the 5% level.*

The test confirms the existence of r=1 long-run cointegrating relationship among the macroeconomic variables.

4.3 Estimated Long-Run Cointegrating Vector

Normalizing the long-run vector on real GDP (lnY) yields:

$$\ln Y_{t-1} = 2.148 + 0.385 \ln K_{p,t-1} + 0.242 \ln G_{k,t-1} - 0.118 \ln G_{c,t-1} + 0.291 \ln X_{t-1} + 0.008 \, INST_{t-1} \quad (4)$$

Table 3. Long-Run Cointegrating Vector

Variable	Long-Run Parameter	Standard Error	t-Statistic	p-value	Statistical Significance
lnKp,t−1	0.385	0.062	6.21	<0.001	Significant at 1% level
lnGk,t−1	0.242	0.051	4.745	<0.001	Significant at 1% level
lnGc,t−1	−0.118	0.043	−2.744	0.006	Significant at 1% level
lnXt−1	0.291	0.058	5.017	<0.001	Significant at 1% level
INSTt−1	0.008	0.002	4	<0.001	Significant at 1% level

Source: Author's own calculation

From the Long-Run estimation we can separate main findings:

- **Public Capital Multiplier (lnGk):** A 1% increase in public capital investment raises North Macedonia's real GDP by 0.242% in the long run ($p<0.001$), confirming the productive nature of infrastructure and capital investments.
- **Government Consumption Drag (lnGc):** Non-capital government consumption exerts a negative long-run impact ($-0.118, p=0.006$), reflecting structural crowding-out effects, import leakages, and administrative inefficiencies.
- **Institutional Governance (INST):** Institutional improvements significantly enhance real GDP output ($\beta=0.008, p<0.001$).
- **Exports (lnX):** Real exports display a strong positive output elasticity ($+0.291, p<0.001$), emphasizing North Macedonia's reliance on external trade integration (notably with EU trade partners).

4.4 VECM Short-Run Dynamic Results

The short-run error correction equation for real GDP growth ($\Delta \ln Y_t$) is estimated as follows:

$$\Delta \ln Y_t = 0.006 - 0.142 \, CoinEq1_{t-1} + 0.215 \, \Delta \ln Y_{t-1} + 0.164 \, \Delta \ln G_{k,t-1} - 0.082 \, \Delta \ln G_{c,t-1} + 0.112 \, \Delta \ln K_{p,t-1} + e_t \quad (5)$$

Table 4. VECM Short-Run

Variable	Parameter Coefficient	Standard Error	t-Statistic	p-value
CointEq1t−1 (α)	−0.142	0.038	−3.737	0.0002
ΔlnYt−1	0.215	0.081	2.654	0.008
ΔlnGk,t−1	0.164	0.052	3.154	0.0016
ΔlnGc,t−1	−0.082	0.039	−2.103	0.0355
ΔlnKp,t−1	0.112	0.044	2.545	0.0109

Source: Author's own calculation

From the Model Diagnostics:

- **Speed of Adjustment (α):** The error correction term (CointEq1t−1) is negative and statistically significant (−0.142,p<0.001). Approximately 14.2% of short-run deviation from long-run equilibrium is corrected each quarter, indicating a complete system adjustment in approximately 7 quarters.
- **Goodness of Fit & Diagnostics:** R2=0.684, Adjusted R2=0.651. The Jarque-Bera test confirms residual normality ($\chi 2$=3.12,p=0.210). Autocorrelation LM test confirms no residual serial correlation up to 4 lags ($\chi 2$=4.88,p=0.300).

5. Policy Recommendations for North Macedonia

a)Enhancing Public Investment Management (PIM) Execution Strengthen the Public Investment Management (PIM) unit within the Ministry of Finance to address execution bottlenecks. Given the positive public capital multiplier (β=+0.242), improving project selection, appraisal, and procurement for key infrastructure (e.g., Corridor VIII, renewable energy infrastructure) will directly accelerate long-term economic growth.

b)Fiscal Rebalancing toward Productive Spending:
Reallocate budgetary resources away from recurring non-capital consumption (β=−0.118) toward productive capital investments. Adhere strictly to fiscal rules outlined in the Organic Budget Law, capping public debt at 60% of GDP and fiscal deficits at 3% of GDP to safeguard fiscal sustainability under the exchange rate peg.

c)Digitalization of Tax Administration (*e-Faktura* & Continuous Transaction Controls):
Expand tax digitalization initiatives across the Public Revenue Office (*Управа за јавни приходи*). Accelerating the deployment of mandatory e-invoicing (*e-Faktura*) and continuous transaction controls (CTC) will widen the tax base, minimize VAT evasion, and generate stable domestic revenue to fund infrastructure without expanding debt.

d)Enhancing Local and Youth Fiscal Governance:
Improve municipal financial governance and participatory budgeting mechanisms across local self-government units (ZELS). Transparent budget allocation for municipal infrastructure and youth development policies enhances local capacity building and institutional effectiveness (INST).

6. Conclusion

This study investigated the short- and long-run macroeconomic impacts of public capital spending, government consumption, and institutional governance in North Macedonia using a cointegrated VECM framework. The empirical results demonstrate that public capital expenditure serves as a vital catalyst for long-term output expansion (β=0.242), whereas unproductive public consumption exerts a negative long-run drag. The system demonstrates a reliable error-correction mechanism, adjusting at a rate of 14.2% per quarter toward long-run equilibrium following macroeconomic shocks.

Under North Macedonia's monetary peg to the Euro, structural fiscal policies must focus on improving public capital execution efficiency, accelerating tax administration digitalization through systems like *e-Faktura*, and strictly enforcing fiscal rules to ensure fiscal stability and sustainable economic growth.

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