THE MACROECONOMIC EFFECTS OF FISCAL CONSOLIDATION AFTER CRISES: EVIDENCE FROM A SMALL OPEN ECONOMY

Faton Sulejmani
Faculty of Economics-Skopje,
Ss. Cyril and Methodius University in Skopje, North Macedonia
fatonsulejmani@gmail.com

Dragan Tevdovski
Faculty of Economics-Skopje,
Ss. Cyril and Methodius University in Skopje, North Macedonia
dragan.tevdovski@eccf.ukim.edu.mk

ABSTRACT
This paper investigates the macroeconomic effects of fiscal policy in North Macedonia, with a focus on fiscal consolidation episodes after major crisis periods, including the Global Financial Crisis (2008–2009), the COVID-19 pandemic (2020), and the recent inflationary and energy shocks (2022–2023). We estimate a structural vector autoregression (SVAR) model with recursive identification to analyze the dynamic responses of key macroeconomic variables to discretionary fiscal tightening, captured by positive shocks to the cyclically adjusted primary balance (CAPB). The model includes domestic variables—output gap, interbank interest rate (SKIBOR), and inflation—alongside exogenous indicators of Eurozone economic conditions. The empirical results show that fiscal consolidations have contractionary effects in the short run. Output declines significantly following a tightening shock, with the output gap reaching its trough within the first two quarters. Inflation decreases moderately and persistently, while the interbank interest rate responds with a temporary decline, indicating a counter-cyclical monetary policy reaction. These findings are consistent with the Keynesian view of fiscal multipliers in small open economies and highlight the importance of fiscal-monetary coordination.

Keywords: *Fiscal consolidation, Vector auto regression, Inflation, Output gap*

JEL Classification: *C32, E12, E62, E63, E65*

1. INTRODUCTION

Small and open economies face heightened vulnerabilities when exposed to global shocks, owing to their strong trade linkages, limited domestic demand, and often constrained monetary and fiscal policy space. Over the past two decades, these economies have been repeatedly challenged by major global disruptions, including the Global Financial Crisis (2008–2009), the COVID-19 pandemic (2020), and the energy and price shocks stemming from the war in Ukraine. In response to these crises, governments around the world, including in small and open economies, enacted large-scale fiscal expansions to stabilize output, protect households and businesses, and support essential services. However, as crisis conditions receded, the need to restore fiscal sustainability prompted a return to fiscal consolidation, raising important questions about the short-term macroeconomic consequences of such policy shifts.

The effectiveness and cost of fiscal consolidation in the post-crisis environment are a subject of particular concern in small and open economies. Unlike advanced economies, which

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typically benefit from deep capital markets and greater institutional capacity, small and open economies often operate under tighter budget constraints and more rigid monetary frameworks—such as exchange rate pegs or limited inflation-targeting regimes. In these settings, fiscal policy plays an outsized role in macroeconomic management, but the transition from stimulus to consolidation can risk undermining fragile recoveries. This is especially relevant in countries like North Macedonia, where the de facto exchange rate peg to the euro limits the flexibility of monetary policy, and where fiscal consolidation efforts following crisis-driven spending have been a central policy challenge.

While the empirical literature on fiscal policy is vast, much of it focuses on the effects of fiscal stimulus during recessions or on the average fiscal multiplier across the business cycle. Research on fiscal consolidations is more limited, and even less attention has been paid to their effects specifically in small and open economies following large external shocks. Studies such as Auerbach and Gorodnichenko (2012) and Ramey and Zubairy (2018) highlight that the timing and state of the economy significantly influence fiscal multipliers. Ilzetzki *et al*. (2013) suggest that multipliers are smaller in open economies, but they may be larger during synchronized global downturns. More recent work by Deb *et al*. (2022) and Furceri *et al*. (2021) examines the effectiveness of fiscal responses during the COVID-19 pandemic, yet the consequences of fiscal tightening in the recovery phase remain underexplored.

This paper contributes to the literature by assessing the macroeconomic effects of fiscal consolidation in North Macedonia, a small and open economy in Southeastern Europe, in the aftermath of multiple crisis episodes. Using quarterly data from 2007 to 2024, we estimate a structural vector autoregression (SVAR) model to examine the short-term dynamic effects of fiscal tightening, measured by a positive shock to the cyclically adjusted primary balance (CAPB). The model includes four domestic variables—output gap, CAPB, interbank interest rate (SKIBOR), and inflation—alongside exogenous Eurozone variables that reflect the broader external environment. The identification strategy follows a recursive (Cholesky) ordering, allowing for a clear interpretation of contemporaneous interactions.

Our findings indicate that fiscal consolidations in the post-crisis period lead to significant short-term declines in output and inflation, while the interbank interest rate falls in response, suggesting a counter-cyclical monetary adjustment. These results highlight the short-run costs associated with restoring fiscal discipline after crisis episodes and emphasize the importance of timing, coordination, and external conditions in shaping the effectiveness of consolidation policies in small and open economies.

The remainder of the paper is organized as follows. Section 2 reviews the relevant empirical literature. Section 3 describes the data and key macroeconomic variables. Section 4 outlines the SVAR model and identification strategy. Section 5 presents the empirical results, and Section 6 concludes with policy implications and suggestions for future research.

2. LITERATURE REVIEW

This literature review examines the state of research on fiscal policy in the face of external shocks, with a focus on methodological advancements, the heterogeneity of fiscal multipliers, external constraints in small and open economies, and the empirical evidence emerging from recent crises.

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External shocks such as global pandemics, commodity price surges, and geopolitical conflicts differ from conventional business cycle fluctuations in their simultaneity, persistence, and global scope. Unlike domestic recessions, these shocks simultaneously affect demand, supply, and external balances, complicating the design of fiscal interventions. The literature has increasingly emphasized the need for state-contingent fiscal policy, wherein the effectiveness of government spending and tax measures depends on the macroeconomic environment (Auerbach and Gorodnichenko, 2012; Ramey and Zubairy, 2018).

Fiscal consolidation refers to deliberate policy measures aimed at reducing government deficits and debt accumulation to restore fiscal sustainability and maintain macroeconomic stability. It can be achieved through expenditure-based consolidation, which relies on spending cuts, or revenue-based consolidation, which depends on increasing taxes or broadening the tax base. Empirical studies generally find that expenditure-based consolidations are more durable and less contractionary than revenue-based ones (Alesina and Ardagna, 2010; Alesina, *et al.*, 2019), though their short-term effects depend on economic conditions and the composition of adjustment. For instance, IMF (2010) and OECD (2012) analyses highlight that consolidations implemented during economic expansions and those focusing on reducing current expenditures—rather than public investment—tend to have smaller negative impacts on growth. Conversely, when fiscal adjustments rely heavily on tax hikes or occur during recessions, they may exacerbate output contractions (Guajardo *et al.*, 2014). Overall, the literature suggests that the design, timing, and credibility of fiscal consolidation strategies are crucial in determining their macroeconomic consequences and long-term success.

Large body of literature aims to assess the fiscal policy effects in small and open economies (for example, Mirdala, 2009; Caraiani, 2010; Franta, 2012; Jemec *et al*., 2011; Karagyozova-Markova *et al*., 2013; Bobasu, 2015; Boiciuc, 2015; Asandului *et al*., 2021) while there is smaller strand that has focused on Western Balkans region and North Macedonia specifically (see for example Hinic and Miletic, 2013; Petrevski *et al*., 2016; Krajišnik *et al*., 2019 and Tevdovski *et al*., 2019). These economies face structural features that tend to dampen the effects of fiscal expansion, including high import propensities, shallow capital markets, and external vulnerability. Ilzetzki *et al*. (2013) show that the degree of openness and exchange rate flexibility are key determinants of fiscal multiplier size, with small and open economies often experiencing leakages through trade balances. However, more recent work suggests that external synchronization of shocks and policy responses—as seen during the COVID-19 crisis—can offset these leakages, leading to larger effective multipliers (Chudik *et al*., 2021).

Crisis conditions - especially those involving simultaneous shocks - have motivated methodological innovations in identifying and estimating the effects of fiscal policy. Traditional structural VARs (Blanchard and Perotti, 2002) have been expanded through narrative identification (Romer and Romer, 2010) and instrumental variable approaches using external instruments (Stock and Watson, 2012). These techniques help isolate exogenous fiscal policy changes from endogenous responses, particularly during emergencies when policy actions are large and swift.

During the COVID-19 pandemic, researchers employed cross-country panel VARs (Deb *et al*., 2022) and machine learning tools (Forni *et al*., 2021) to estimate the effects of health-related spending, income support, and public investment. The war in Ukraine and its economic consequences prompted an evolution in policy focus from direct stimulus to targeted relief (e.g., energy subsidies) and strategic investments (e.g., defense, energy independence). The literature emphasizes the risks of untargeted subsidies, which can be regressive and

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inflationary, and recommends well-designed automatic stabilizers and social protection systems (OECD, 2023).

3. DATA

This paper analyzes the macroeconomic effects of fiscal policy in North Macedonia. We use quarterly annualized data spanning from the first quarter of 2007 to the fourth quarter of 2024, yielding a total of 72 observations. Following the approach of Petrevski *et al*. (2016), the model includes two sets of variables: exogenous and endogenous.

The exogenous variables capture developments in the Eurozone, reflecting the high degree of economic integration between North Macedonia and the EU. The Macedonian denar is de facto pegged to the euro, and the EU is by far North Macedonia's largest trading and investment partner. Approximately 80% of Macedonian exports are directed to the EU, and nearly 80% of the capital in the domestic banking sector originates from EU sources. In this context, the exogenous set includes the Eurozone output gap and the quarterly annualized inflation rate of the Euro area.

The endogenous variables pertain to domestic macroeconomic conditions and include the output gap, the interbank interest rate (SKIBOR), the cyclically adjusted primary balance, and the quarterly annualized inflation rate. All data were obtained from the national authorities' sources, i.e., the Ministry of Finance, the National Bank, and the State Statistical Office.

The output gap is calculated as the difference between actual and potential real GDP, with the latter estimated using the Hodrick-Prescott filter and a smoothing parameter (λ) of 1600, which remains the most frequently used method, although it is important to acknowledge inherent limitations related to it, such as edge effects and end-point bias. SKIBOR serves as a proxy for monetary policy developments, as it is influenced by the central bank's policy rate through the monetary transmission mechanism. The cyclically adjusted primary balance is used as an indicator of the fiscal policy stance. The table below provides descriptive statistics for the selected variables, followed by visual representations and a discussion of their dynamics.

Table 1: Descriptive statistics of the selected variables

	CAPB	OUTPUTGAP_MK	INFLQ_MK	SKIBOR	OUTPUTGAP_EMU	INFLQ_EMU	EURIBOR
Mean	-2.224232	0.078215	3.1018	3.631429	0.062976	2.126962	1.023575
Median	-2.016893	0.21534	1.995577	3.245	0.095911	1.730464	0.2322
Maximum	5.314951	8.778409	19.35582	9.523333	3.331535	9.955108	4.9818
Minimum	-11.88386	-12.55775	-2.052688	1.316667	-12.76361	-0.377058	-0.5664
Std. Dev.	2.475184	2.493732	4.199629	2.305428	2.152172	2.132859	1.725291
Skewness	-0.435303	-1.165463	2.018262	0.958283	-2.947265	1.886333	1.067764
Kurtosis	6.8233	12.42915	7.248788	3.123667	18.61997	6.762257	2.673977

(Source: National authorities, Eurostat, Authors' calculations)

Figure 1 presents the dynamics of external macroeconomic conditions—particularly in the Eurozone, which are critical for understanding developments in North Macedonia's small open economy. The left panel presents the Eurozone output gap, which reflects cyclical fluctuations in the EU economy. The period from 2007 to 2024 captures several major global shocks and their transmission to the broader European economic environment.

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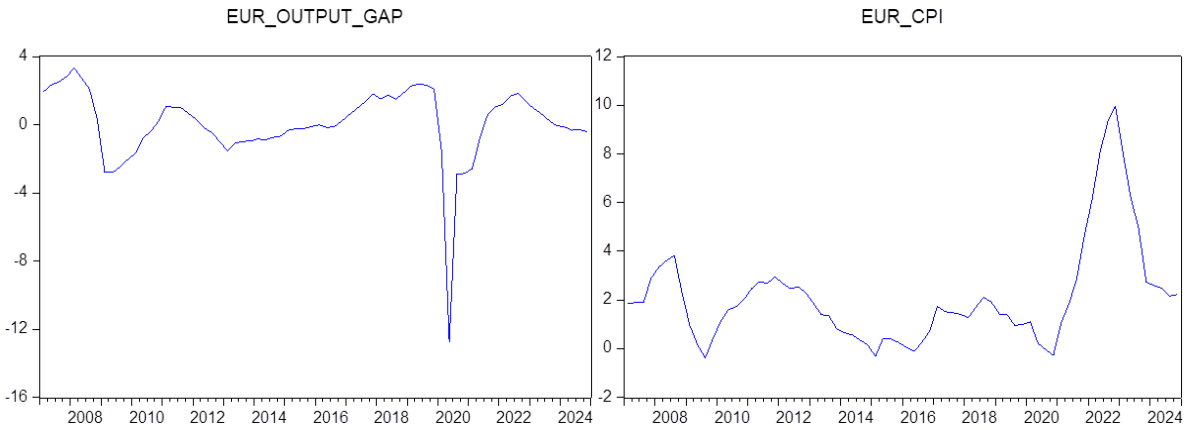
Figure 1: Time series of the exogenous variables



(Source: Eurostat, Authors' calculations)

During the Global Financial Crisis (2008–2009), the Eurozone output gap turned sharply negative, reflecting a deep recession across member states. A slow recovery followed, although the aftermath of the crisis and the euro area sovereign debt crisis (2011–2013) kept the output gap in negative territory through much of the early 2010s. Gradual improvement is visible between 2014 and 2019, with the gap approaching neutral levels as economic conditions stabilized across the Eurozone. However, in 2020, the COVID-19 pandemic caused an unprecedented collapse in output, as evidenced by the abrupt and severe drop in the output gap—one of the sharpest in the sample period. The subsequent recovery in 2021–2022 was relatively strong but short-lived, with the gap narrowing and returning to slightly positive values. From 2023 onward, the Eurozone economy showed signs of deceleration amid tightening monetary conditions, declining external demand, and geopolitical uncertainty, leading to a modestly negative output gap.

The right panel illustrates the quarterly annualized inflation rate (CPI) in the Euro area. Inflation remained relatively low and stable for most of the period from 2007 to 2020. Brief fluctuations occurred during the post-crisis recovery years, but inflation generally remained below the European Central Bank's target, prompting a prolonged period of accommodative monetary policy. Beginning in 2021, inflation surged dramatically, driven by a combination of global supply bottlenecks, strong post-pandemic demand, and a sharp increase in energy and food prices following the outbreak of the war in Ukraine in early 2022. The inflation rate peaked at historically high levels in 2022, before starting to moderate in 2023. By 2024, inflation had declined but remained above pre-pandemic levels, suggesting persistent price pressures despite monetary tightening.

These two Eurozone variables—output gap and inflation—are included in our empirical model as exogenous drivers, capturing the broader external environment. They serve to control for spillover effects from the EU economy on domestic output, inflation, and policy responses in North Macedonia.

Figure 2 presents the evolution of the domestic (endogenous) variables in the Macedonian economy over the observed period. As shown in the top-left panel, the output gap in North Macedonia displays a dynamic pattern over the period 2007–2024, reflecting key macroeconomic shocks and phases of the business cycle. The period of the Global Financial Crisis (2008–2009) is marked by a sharp swing into negative territory, indicative of a significant contraction in economic activity. This was followed by a gradual recovery, although

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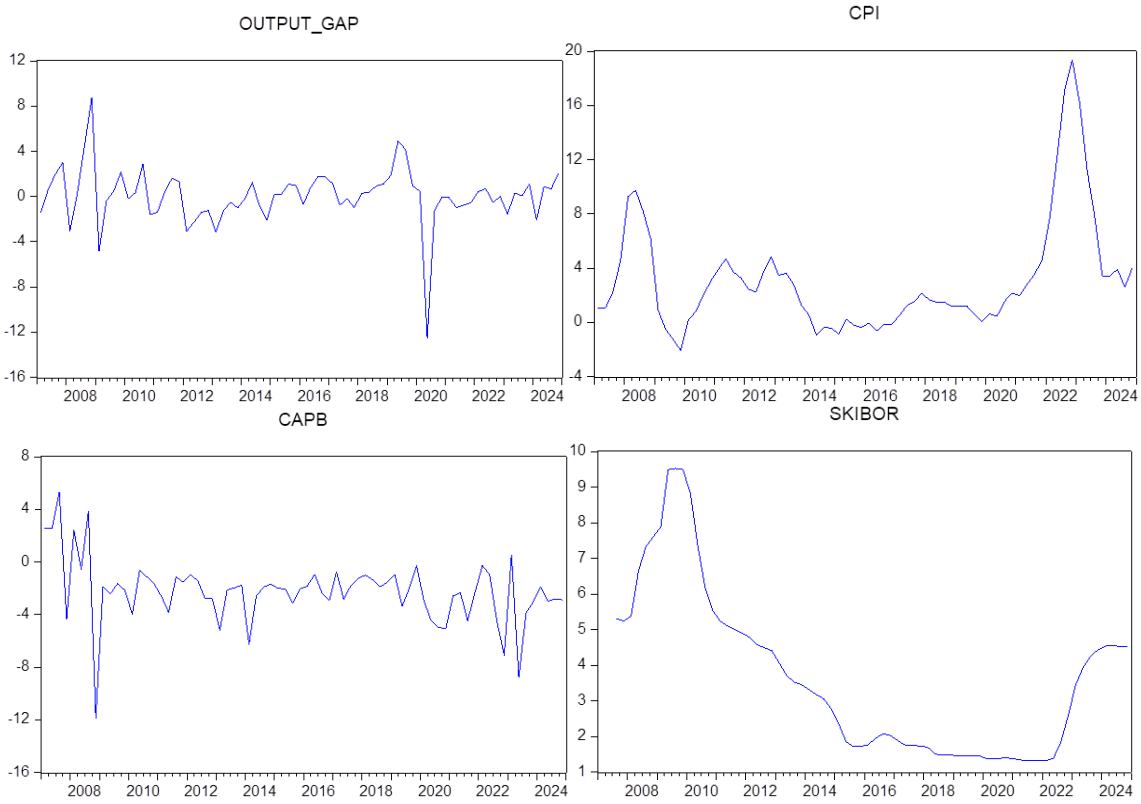
the output gap remained volatile, particularly during the euro area sovereign debt crisis (2011–2013), which adversely affected external demand. Between 2015 and 2019, the output gap fluctuated moderately around zero, consistent with a relatively stable macroeconomic environment. A sharp contraction reappears in 2020 due to the COVID-19 pandemic, followed by a strong positive rebound in 2021 and modestly positive gaps in subsequent years, pointing to a recovery phase and increasing utilization of economic capacity.

Figure 2: Time series of the endogenous variables



(Source: National authorities, Authors' calculations)

Inflation developments are depicted in the top-right panel. The quarterly annualized CPI rate shows moderate variation during the early part of the sample, with slightly elevated rates following the Global Financial Crisis. A period of price stability characterizes the years 2015–2019, during which inflation remained subdued. However, inflation spiked markedly in 2022, primarily driven by global supply disruptions, the energy crisis, and war-related commodity price shocks. This upward surge proved temporary, as inflation rates began to normalize in 2023 and returned closer to historical trends by 2024.

The bottom-right panel illustrates the behavior of the cyclically adjusted primary balance (CAPB), an indicator of the fiscal policy stance. The CAPB turns strongly negative during the Global Financial Crisis, consistent with countercyclical fiscal policy. Throughout the 2010s, the fiscal position remained mildly accommodative, with short-lived episodes of consolidation. A significant deterioration occurred in 2020 in response to the pandemic, as the government deployed substantial fiscal support. From 2021 onward, the CAPB gradually recovered, suggesting a return to a more prudent fiscal path, though periodic negative values highlight continued fiscal support during the overlapping energy and inflation crises of 2022.

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Finally, the bottom-left panel displays the evolution of the interbank interest rate (SKIBOR), serving as a proxy for the stance of monetary policy. The rate remained elevated during the pre-crisis period and declined gradually after 2010, in line with accommodative monetary policy. From 2015 to 2020, SKIBOR hovered near historic lows, reflecting subdued inflation and a supportive policy environment. The rate began to increase in 2022 in response to heightened inflation, indicating a gradual tightening of monetary conditions by the central bank.

Together, these four series underscore the complex interplay between economic activity, inflationary pressures, and policy responses. The observed fluctuations provide a compelling empirical context for assessing the effectiveness of fiscal policy in a small open economy facing a sequence of global shocks.

Before proceeding with the modeling, all series were tested for stationarity using the Augmented Dickey-Fuller test. The results indicated that all series were stationary except for the money market rate (SKIBOR), to which a first-difference transformation was performed.

4. METHODOLOGY

To examine the macroeconomic effects of fiscal policy, we estimate vector autoregression (VAR) models using a recursive (Cholesky) identification scheme. VAR models are well-suited for analyzing dynamic interactions among macroeconomic variables without imposing strong theoretical priors, making them particularly useful in empirical macroeconomics (Sims, 1980). In this framework, each variable is treated as endogenous and its evolution is explained by its own lags as well as the lags of all other variables in the system.

We employ a recursive structural VAR (SVAR), in which identification is achieved through a Cholesky decomposition of the reduced-form residuals. This imposes a contemporaneous triangular causal structure: each variable is allowed to contemporaneously affect only those ordered after it, while being contemporaneously unaffected by those that follow (Blanchard and Quah, 1989). This identification strategy is widely used in empirical fiscal policy literature (Perotti, 2007; Auerbach and Gorodnichenko, 2012) due to its transparency and minimal assumptions.

The ordering of the endogenous domestic variables in our baseline specification is as follows: output gap, cyclically adjusted primary balance (CAPB), interbank interest rate (SKIBOR), and inflation. This ordering implies that the output gap contemporaneously influences fiscal policy (CAPB), monetary conditions (SKIBOR), and inflation, but is not itself affected by them within the same period. Fiscal policy is assumed to react contemporaneously to output conditions, but not to changes in monetary policy or inflation. SKIBOR, as a proxy for monetary policy, is assumed to respond to both output and fiscal policy within the quarter, but not to inflation. Finally, inflation is placed last, responding contemporaneously to all other variables but exerting no immediate effect.

Variables capturing Eurozone conditions—namely the Eurozone output gap, money market interest rate, and inflation—are included as exogenous variables in the model. Given the high degree of economic integration between North Macedonia and the Eurozone, it is assumed that these external factors contemporaneously influence all domestic variables, but are not affected

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by domestic developments. This assumption reflects the small open economy nature of North Macedonia.

Our empirical strategy proceeds in two stages. In the first stage, we estimate an unrestricted VAR to determine the appropriate lag length. Given the relatively short sample size in relation to the number of estimated parameters, model parsimony is essential. Lag length is selected based on the Schwartz information criterion (BIC), which indicates a two-lag structure.

In the second stage, we evaluate the adequacy and stability of the VAR model through standard residual-based diagnostic tests. These include tests for serial correlation (Portmanteau and Lagrange Multiplier tests), normality (Jarque–Bera test), and conditional heteroskedasticity (ARCH–LM test). Only when the specification passes these diagnostic checks do we proceed to structural identification and impulse response analysis. This methodological framework enables us to recover structural fiscal shocks and trace their dynamic impact on key macroeconomic variables such as output, inflation, and interest rates. By controlling for both domestic and external conditions, the model captures the transmission mechanisms and timing of fiscal policy effects in a small open economy context.

5. EMPIRICAL RESULTS

The impulse response functions (IRFs) trace the dynamic effects of a positive one-standard-deviation structural shock to the cyclically adjusted primary balance (CAPB)—interpreted as a discretionary fiscal consolidation—on key macroeconomic variables in North Macedonia (Figure 3). The IRFs are derived from the recursively identified VAR model described in the methodology and are plotted over a 10-quarter horizon with 68% confidence bands.

As shown in the top-left panel, the output gap responds negatively to a fiscal consolidation shock. The effect is immediate and statistically significant in the first two quarters, peaking at approximately −0.4 percentage points in quarter 2, before gradually returning to zero. This pattern is consistent with standard Keynesian effects, whereby fiscal tightening—through higher taxes or lower public spending—dampens aggregate demand and reduces real economic activity in the short run.

The top-right panel shows the response of the cyclically adjusted primary balance, confirming the identification of the fiscal shock. The CAPB rises sharply and immediately, by more than 2 percentage points on impact, and gradually dissipates over the following quarters. This strong and transitory reaction supports the interpretation of the shock as an exogenous fiscal tightening episode.

In the bottom-left panel, the interbank interest rate (SKIBOR) responds negatively to the fiscal shock, declining by nearly 1 percentage point in the short term. This suggests that monetary policy may react counter-cyclically to fiscal tightening, likely reflecting attempts by the central bank to mitigate contractionary effects through lower interest rates. This reaction is economically plausible in the context of a small open economy with constrained fiscal space and an active role for monetary stabilization.

The bottom-right panel presents the response of inflation. Following the fiscal consolidation, inflation decreases gradually, reaching a trough after 4–6 quarters. The maximum decline is approximately 0.5 percentage points, after which the effect begins to fade. The disinflationary

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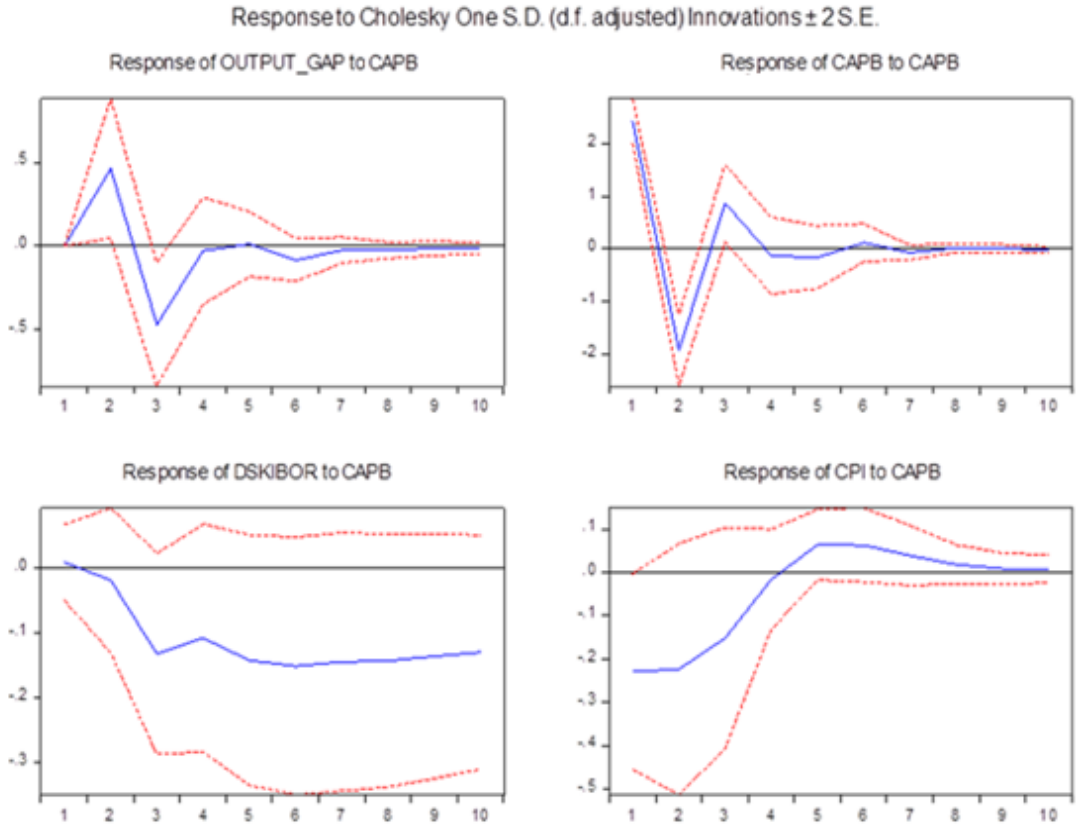
response is consistent with the decline in aggregate demand triggered by fiscal tightening and further reinforced by reduced cost-push pressures in a slackening economy.

Figure 3: Responses from shocks in the cyclically adjusted primary balance



(Source: Authors' calculations)

Taken together, the impulse responses provide evidence that fiscal consolidations in North Macedonia are contractionary in the short run, with adverse effects on output and inflation. Monetary policy appears to respond in a counter-cyclical manner, providing partial stabilization through lower interest rates. These findings are broadly consistent with the empirical literature on fiscal multipliers in small open economies (see Alesina *et al*., 2015; Ilzetzki *et al*., 2013), where fiscal policy tends to have significant real effects, particularly in economies with limited monetary-fiscal coordination or institutional buffers.

6. DISCUSSION AND CONCLUSION

This paper investigates the macroeconomic effects of fiscal policy in North Macedonia using a structural vector autoregression (SVAR) framework with a recursive identification scheme. The model incorporates both domestic and external macroeconomic variables, capturing the high degree of economic integration between North Macedonia and the Eurozone. Our analysis covers the period from 2007 to 2024 and includes key episodes such as the Global Financial Crisis, the COVID-19 pandemic, and the recent inflationary and energy price shocks.

The impulse response analysis provides robust evidence that fiscal consolidations—captured through positive shocks to the cyclically adjusted primary balance—have contractionary effects on output in the short run. Real activity, measured by the output gap, declines

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significantly in the first few quarters following a fiscal tightening. Inflation also decreases, albeit with a lag, indicating disinflationary pressures due to weakened aggregate demand. Interestingly, monetary conditions, proxied by the interbank interest rate (SKIBOR), appear to ease in response to fiscal shocks, suggesting that the central bank may act to offset the adverse effects of fiscal consolidation. The findings regarding the effects of fiscal consolidation on real economic activity appear to differ from those reported by Petrevski *et al*. (2016) and Tevdovski *et al*. (2019) for North Macedonia. However, they appear broadly consistent with these studies concerning the impact on inflation and the response of monetary policy. Overall, as previously noted, the results align broadly with the empirical literature on fiscal multipliers in small open economies.

These findings carry important policy implications. First, they highlight the macroeconomic costs of short-term fiscal consolidation in a small open economy, particularly in times of economic slack. Policymakers should be cautious about implementing pro-cyclical fiscal tightening during downturns, as it may amplify economic volatility. Second, the observed monetary policy response underscores the importance of fiscal-monetary coordination in achieving macroeconomic stability. In an economy with a fixed exchange rate regime and limited independent monetary space, such coordination becomes even more critical.

Despite its contributions, the analysis in this paper faces several limitations. The relatively short sample period and the need for parsimony in the VAR model may constrain the robustness of the estimates. Additionally, the identification strategy, while commonly used, is based on timing assumptions that may not fully capture more complex contemporaneous interactions between policy instruments and macroeconomic outcomes. The cyclically adjusted primary balance, although a widely accepted proxy for discretionary fiscal policy, is also subject to measurement errors and estimation uncertainty.

Future research could build on this work by incorporating alternative identification schemes, such as sign restrictions or narrative-based approaches, to validate and strengthen causal inference. Extending the analysis to include distributional effects of fiscal policy, particularly on employment and income inequality, could also offer a richer perspective. Moreover, integrating nonlinear methods or regime-switching VARs may help capture asymmetries in fiscal policy effects during different phases of the business cycle or crisis periods.

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