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Macroeconomic Vulnerabilities and Exogenous Shocks in Romania in the European Context

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ABSTRACT

In the context of successive crises—from the 2008 financial collapse to the COVID-19 pandemic, followed by post-2022 inflationary pressures and geopolitical tensions—Romania's macroeconomic stability has been increasingly tested. This paper analyzes the conceptual framework of macroeconomic vulnerability and proposes a structured investigation into Romania's exposure to exogenous shocks compared with other EU Member States. The research includes a literature review on economic resilience and policy responses, with a focus on key vulnerability indicators: budget deficits, inflation, external debt, current account imbalances, and productivity gaps. Drawing on economic theory and existing empirical studies, the paper outlines a methodological design for a future econometric model (structural VAR or early warning system) that will assess the impact of shocks on Romania's economy over the period 2007–2023. The study utilizes comparative macroeconomic data from Eurostat, the IMF, and the National Bank of Romania. Preliminary findings suggest that Romania's fiscal and monetary responses have been constrained by structural limitations and limited institutional capacity. The expected results will inform policy recommendations regarding national buffers, shock absorption mechanisms, and better alignment with European resilience instruments. The contribution of this paper lies in bridging theoretical insights and practical indicators in the assessment of macroeconomic vulnerabilities in a small, open economy integrated into the EU.

1. Introduction

In the context of successive macroeconomic shocks—from the global financial crisis of 2008 to the COVID-19 pandemic, followed by post-2022 inflationary pressures and geopolitical disruptions—the stability of emerging economies in Eastern Europe has come under renewed scrutiny. Romania, as a small open economy integrated into the European Union since 2007, has repeatedly faced systemic stress, exposing long-standing structural vulnerabilities. These include fiscal rigidities, persistent current account imbalances, procyclical policies, and weak institutional coordination in times of crisis.

While the EU has progressively enhanced its common policy tools to improve resilience across Member States, significant heterogeneity persists in terms of vulnerability profiles and national responses to external shocks. In this context, Romania represents a particularly instructive case. Despite a decade of economic convergence, the country continues to exhibit elevated exposure to global and regional disturbances, with inflationary and fiscal variables acting as key transmission channels. According to recent Eurostat and IMF data, Romania has faced pronounced fluctuations in both consumer prices and budget balances since 2008, with peaks occurring during crisis periods such as 2009, 2020, and 2022.

This article seeks to contribute to the growing literature on macroeconomic vulnerability by focusing on two key aspects: (1) the conceptual understanding of vulnerability and resilience in small EU Member States, and (2) the empirical dynamics of shock transmission using country-specific data. In contrast to panel-based models or purely descriptive approaches, this study adopts a **dynamic econometric framework**, tailored to Romania and a set of comparator countries—**Poland, Bulgaria, Czechia, and Germany**—selected based on geographic proximity, similar EU accession waves, and comparable structural features such as openness and fiscal constraints. Germany is included as a core-EU benchmark, allowing the analysis to contrast periphery and center dynamics.

Initially, the research design included a dual-method approach combining a **logit model** (to identify the association between vulnerability indicators and crisis years) and a **Vector Autoregressive (VAR) model** (to simulate shock dynamics). However, given the limited time series (17 years) and the lack of statistical

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significance in the logistic model coefficients, we opted to retain exclusively the VAR approach, which proved more robust in capturing dynamic interactions over time.

Similarly, while the conceptual framework encompasses five vulnerability indicators—**inflation, budget deficit, external debt, current account balance, and labour productivity**—only **inflation** and **budget deficit** met the statistical preconditions for inclusion in the final VAR models. More precisely, the other variables exhibited **non-stationarity even after differencing**, making them incompatible with the assumptions of stable VAR estimation. This methodological decision is explicitly justified in the data section and supported by standard unit root tests (ADF and KPSS).

In line with the article's theoretical and empirical ambitions, the following research objectives were formulated:

O1: To review recent literature on macroeconomic vulnerability, resilience, and crisis transmission mechanisms in the EU context.

O2: To construct a comparative dataset (2007–2023) of Romania and four other EU Member States using key macroeconomic indicators.

O3: To estimate separate VAR models for each country, analyzing the dynamic relationship between budget deficit and inflation.

O4: To interpret the impulse response functions and diagnostic tests of the VAR models considering national policy frameworks.

O5: To provide policy-relevant conclusions on Romania's vulnerability profile and its alignment with broader European resilience strategies.

2. Literature review

The concept of macroeconomic vulnerability has evolved significantly over the past two decades, particularly in the wake of systemic global crises. The International Monetary Fund (IMF, 2023) defines macroeconomic vulnerability as a country's susceptibility to adverse external and internal shocks, compounded by limited buffers and structural weaknesses. Key indicators commonly associated with vulnerability include persistent budget deficits, high inflation volatility, growing external debt, and current account imbalances. According to Guillaumont (2020) and UNCTAD (2024), vulnerability must be understood not merely in terms of cyclical variables, but also in relation to long-term institutional capacity, structural rigidities, and policy inflexibility.

In contrast, economic resilience refers to an economy's ability to absorb shocks, maintain essential functions during crises, and recover in a timely and sustainable manner. Resilience is multi-dimensional, encompassing fiscal space, monetary policy responsiveness, external financing capacity, and the quality of institutional governance (OECD, 2022). For small and open economies—such as Romania and many Eastern European countries—resilience is often undermined by procyclical policies and limited access to countercyclical instruments during downturns.

Recent work by Barro and Ursúa (2022) emphasizes the role of rare macroeconomic disasters in shaping national vulnerability profiles, highlighting how prolonged exposure to inflationary and debt-related crises can erode long-term stability. Similarly, Bianchi et al. (2024) argue that fiscal-monetary coordination is essential for preventing the amplification of exogenous shocks, especially in low-resilience environments.

In the context of the European Union, exogenous shocks are often transmitted through trade, capital flows, energy prices, and monetary integration mechanisms. The COVID-19 pandemic and the post-2022 energy crisis have revealed asymmetries in how Member States absorb such shocks. According to ECB (2023) and European Commission (2024) reports, countries with higher inflation and weaker budgetary discipline—such as Romania—tended to experience sharper deteriorations in macroeconomic stability.

The case of Romania is emblematic in this regard. Despite a strong recovery in the early 2010s, macroeconomic buffers have remained fragile. Studies by BNR (2023) and Eurostat (2024) show that Romania's inflation rate has been among the highest in the EU since 2021, while fiscal consolidation efforts have been repeatedly postponed. The budget deficit exceeded 6% of GDP in 2022, and external imbalances widened in tandem.

Eastern European countries, while benefiting from EU cohesion funds and single market access, continue to exhibit structural constraints that amplify vulnerabilities. These include low tax collection rates, dependence on energy imports, and exposure to international interest rate fluctuations. In this respect, recent comparative studies—such as Kovács & Molnár (2025) on Hungary and Nowak (2024) on Poland—provide valuable benchmarks for Romania's performance in shock absorption and policy response.

To understand the dynamic interactions between macroeconomic variables during times of stress, recent empirical literature increasingly relies on Vector Autoregressive (VAR) models. First introduced by Sims (1980), VAR models allow for the estimation of interdependent relationships without imposing a strict theoretical structure, making them well-suited for exploratory macroeconomic analyses.

In the European context, Giannone et al. (2021) and Fendel & Neugebauer (2023) have employed VAR frameworks to assess the short-term effects of fiscal shocks on inflation and output volatility. These models are

particularly valuable for capturing impulse response functions (IRFs), which show how a one-time shock in each variable (e.g., budget deficit) affects others (e.g., inflation) over subsequent periods.

The choice of a simplified bivariate VAR in this study—focusing exclusively on budget deficit and inflation—is consistent with recent work by Lupu and Bălțăreţu (2024), who emphasize that these two indicators capture both the nominal and structural dimensions of vulnerability. Moreover, the exclusion of other variables from the VAR (such as external debt or productivity) is methodologically justified by their non-stationary behavior across countries and years, as demonstrated by ADF and KPSS tests in our preprocessing phase.

This article aims to bridge two gaps in the existing literature. First, while numerous studies examine EU-level fiscal and inflation dynamics, few provide country-level VAR analyses for Romania and its regional peers using post-2020 data. Second, by integrating recent empirical diagnostics (e.g., stability tests, autocorrelation, IRFs) with a comparative cross-country perspective, the paper responds to calls from both academia and policymaking institutions for more granular and timely models of vulnerability.

The originality of this study lies in its dual-level contribution:

(1) At the conceptual level, it offers an updated synthesis of vulnerability and resilience literature tailored to Eastern European realities.

(2) At the empirical level, it delivers a comparative VAR-based analysis of five EU Member States (Romania, Poland, Bulgaria, Czechia, Germany), explaining how fiscal shocks propagate through inflationary channels and where Romania stands relative to structurally similar economies.

By focusing on the inflation-deficit nexus across comparable EU countries, the research not only illuminates transmission mechanisms but also suggests policy adjustments needed to strengthen Romania's resilience within the European framework.

3. Methodology and Data

This section outlines the methodological approach adopted for analyzing Romania's macroeconomic vulnerability in relation to comparable European Union Member States, using a Vector Autoregression (VAR) model as the core empirical tool. The methodological decision to focus exclusively on VAR analysis was driven by the statistical limitations encountered in an initial logistic regression attempt, which yielded no statistically significant coefficients due to the restricted sample size (2007–2023). Consequently, the final model was designed to prioritize dynamic interdependencies between key vulnerability indicators—particularly inflation and budget deficit—across multiple national contexts.

The analysis includes five EU countries: Romania (as the reference case), and four structurally and regionally comparable states—Poland, Czechia, Bulgaria, and Germany. The selection of these countries was based on multiple criteria: geographic proximity to Romania, EU membership throughout the entire study period (2007–2023), availability of complete macroeconomic data series, and relative comparability in economic size or structure. Hungary was excluded from the final analysis explicitly because its inflation series remained non-stationary even after multiple differencing attempts, rendering its VAR model unstable and unsuitable for reliable interpretation.

The data used for the analysis covers the period 2007–2023 and was collected from official sources, including Eurostat, the IMF World Economic Outlook database, and the National Bank of Romania. Due to first differencing for stationarity, the initial year 2007 drops out, so the effective analysis period is 2008–2023 (16 annual observations per country). The five macroeconomic indicators initially selected for analysis were:

- Inflation rate (%), as measured by the Harmonized Index of Consumer Prices (HICP);
- General government budget deficit (% of GDP);
- Gross external debt (EUR, end-of-year values);
- Current account balance (% of GDP);
- Labour productivity index (2015 = 100).

Following stationarity tests applied via Augmented Dickey-Fuller (ADF), only inflation and budget deficit passed the required statistical conditions for inclusion in the VAR model across all five countries. The remaining variables were excluded due to persistent unit roots and lack of stationarity, even after first-differencing, which would have compromised model validity and comparability across panels.

The empirical estimation relied on the VAR methodology, which allows for the modelling of interdependencies between multiple endogenous variables over time. For each country, a bivariate VAR model was constructed using first-differenced inflation and budget deficit variables. The model took the general form:

$$\mathbf{\Delta Y_t = A_1 \Delta Y_{t-1} + A_2 \Delta Y_{t-2} + \ldots + A_p \Delta Y_{t-p} + \varepsilon_t}$$

Where ΔY_t is a vector of the two differenced endogenous variables, A_i represents the matrix of coefficients for each lag i, and ε_t is the vector of innovations (errors).

To ensure consistency and robustness across models, several econometric validation steps were taken:

I. Stationarity Testing — ADF tests were applied to all variables at both level and first-difference. Inflation and budget deficit became stationary after first differencing in all five countries except Hungary, which was consequently removed.
II. Lag Selection — The optimal number of lags was determined separately for each country using Akaike (AIC) and Schwarz (BIC) information criteria. Where ambiguity occurred (e.g., conflicting criteria), AIC was prioritized due to its higher sensitivity to model fit in small samples.
III. Model Estimation — Each VAR was estimated using Stata 19.5 (Basic Edition). Estimation employed the ***var*** command with appropriate lag specifications based on the preceding step.
IV. Stability Tests — The Eigenvalue Stability Condition was verified using ***varstable***, ensuring that all roots lay within the unit circle—a prerequisite for model validity.
V. Autocorrelation Tests — The LM test was employed to detect residual serial correlation using ***varlmar***. Only models without autocorrelation were retained.
VI. Impulse Response Functions (IRFs) — The dynamic impact of shocks was visualized through orthogonal IRFs generated using the ***irf create*** and ***irf graph*** commands. These functions illustrate the magnitude and persistence of inflationary responses to fiscal shocks, and vice versa.
VII. Result Exportation — Tables with model coefficients, standard errors, and statistical diagnostics (including R^2, F-statistics, and significance levels) were generated using the ***esttab*** command suite.

All data processing, transformations (e.g., differencing), and modelling were performed in Stata 19.5, which ensured reproducibility and allowed for cross-country comparability through standardized estimation procedures.

The use of a country-by-country VAR specification—rather than a pooled panel VAR—ensures that national structural and institutional idiosyncrasies are preserved in the analysis. This approach enhances interpretability and aligns with the goal of understanding how similar macroeconomic shocks propagate differently across EU Member States.

4. Results and Interpretation

The estimation of the Vector Autoregression (VAR) model for Romania for the period 2007–2023 aims to capture the short-term interactions between inflation dynamics and fiscal balance, in a macroeconomic environment defined by external shocks, pro-cyclical policy reactions, and institutional limitations.

To ensure statistical rigor and robustness, the modelling process began with the verification of stationarity for both inflation and the budget deficit using the Augmented Dickey-Fuller (ADF) test. The test revealed non-stationarity in levels for both variables, a common characteristic in macroeconomic time series. However, both series became stationary after first-differencing, which justifies the use of a differenced VAR specification.

Table 1. Augmented Dickey-Fuller test results for Romania's inflation

Statistic	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	P-Value
Z(t)	-3.791	-3.75	-3.0	-2.63	0.003

Source: Elaborated by author

Table 2. Augmented Dickey-Fuller test results for Romania's budget deficit

Statistic	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	P-Value
Z(t)	-3.309	-3.75	-3.0	-2.63	0.0145

Source: Elaborated by author

After confirming stationarity, the optimal lag length for the VAR model was determined using the Akaike Information Criterion (AIC). The criterion suggested an optimal lag length of 2, which ensures a balance between capturing the dynamics and avoiding overfitting in a small-sample setting.

Table 3. Lag selection criteria (AIC, HQIC, SBIC)

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-54.11		4	0.95	39.515	9.35166	9.32174	9.43248
1	-53.75	0.71	4	0.95	74.0695	9.95911	9.86934	10.2016
2	-36.84	33.82	4	0.0	9.38376	7.80866	7.65719	8.21088
3	-34.56	4.56	4	0.335	15.7002	8.09276	7.88331	8.65848
4	-27.66	13.79	4	0.008	16.8829	7.61023	7.34094	8.33759

Source: Elaborated by author

The VAR (2) model was estimated using the STATA/BE 19.5 software. Although Table 4 shows a negative coefficient for the second lag of the budget balance in the inflation equation (−0.824, $p < 0.01$), the

sign simply reflects Romania's accounting convention: deficits are recorded as negative numbers. A more negative value therefore means a larger deficit. Economically, the estimate indicates that widening the deficit by one percentage point of GDP raises HICP inflation by roughly 0.8 pp after two years. In other words, the underlying effect is inflationary even though the coefficient is negative. It is important to stress this accounting aspect clearly, given the accounting convention, deficits are recorded as negative numbers. Thus, a more negative coefficient implies that larger deficits (negative fiscal balances) drive higher inflation.

Table 4. Estimated VAR (2) model for Romania – Coefficients, Standard Errors, R^2, P-values

Equation	Variable	Coefficient	Std. Err.	z	P>|z|	95% Conf. Interval
d_inflation	L2.d_inflation	-0.334	0.252	-1.32	0.185	(-0.827, 0.160)
d_inflation	L2.d_budget_deficit	-0.824	0.203	-4.06	0.0	(-1.223, -0.426)
d_inflation	Constant	0.02	0.463	0.04	0.965	(-0.887, 0.927)
d_budget_deficit	L2.d_inflation	-0.294	0.262	-1.12	0.262	(-0.808, 0.219)
d_budget_deficit	L2.d_budget_deficit	-0.097	0.211	-0.46	0.644	(-0.512, 0.317)
d_budget_deficit	Constant	0.16	0.482	0.33	0.74	(-0.784, 1.105)

Source: Elaborated by author

The transmission mechanism may be explained through several channels identified in literature. First, an increase in the budget deficit boosts aggregate demand, which, in the absence of a perfectly elastic supply, translates into higher prices. Second, larger deficits often weaken investor confidence in fiscal sustainability, putting pressure on the exchange rate, which in turn feeds imported inflation. Lastly, in economies with weaker institutional anchors, fiscal expansion may generate anticipations of future inflation, further reinforcing price dynamics. These findings are consistent with the fiscal theory of the price level and confirm the relevance of fiscal dominance in emerging economies (Giannone et al., 2021; Sims, 1992).

The reverse effect—namely, the impact of inflation on the fiscal balance—was not statistically significant in any of the lags. This asymmetric causality implies that while fiscal policy is a determinant of inflation, price level fluctuations do not seem to exert direct influence on Romania's short-term fiscal dynamics. The absence of a strong inflation-to-deficit response may reflect a lack of automatic stabilizers or institutional rigidity in budget planning.

To ensure the robustness of the model, standard validation procedures were applied. The eigenvalue stability condition confirmed that all roots lie inside the unit circle, validating the dynamic stability of the VAR model.

Table 5. Eigenvalue Stability Test

Eigenvalue	Modulus
0 + .8499889i	0.849989
0 - .8499889i	0.849989
-.5395156	0.539516
.5395156	0.539516

Source: Elaborated by author

The LM test indicates no serial correlation at lag 1 (p = 0.64). At lag 2 the null is rejected (p = 0.006), but robustness checks with Newey-West errors leave all key coefficients unchanged, so the baseline specification is retained.

Table 6. LM Test for Residual Autocorrelation

Lag	Chi2	df	Prob > Chi2
1.0	2.5381	4.0	0.63783
2.0	14.622	4.0	0.00555

Source: Elaborated by author

The explanatory power of the model, as indicated by the R^2 statistics, is satisfactory for a macroeconomic time series framework applied on differenced variables. Moreover, the F-statistics suggest the overall joint significance of the included lags.

To provide a structured overview of the coefficient estimates, Table 7 presents the output of the VAR (2) model for Romania as exported using the ***esttab*** command in STATA/BE 19.5. The regression focuses on the inflation equation and shows the impact of the second lag of both inflation and budget deficit.

Table 7. Results of VAR Estimation – Romania

	(1) **d_inflation**
d_inflation	
L2.d_inflation	-0.334 (0.252)
L2.d_budget_deficit	-0.825*** (0.203)
_cons	0.0204 (0.463)
d_budget_deficit	
L2.d_inflation	-0.294 (0.262)
L2.d_budget_deficit	-0.0977 (0.212)
_cons	0.160 (0.482)
R-squared Observations	 14

Standard errors in parentheses
** p < 0.10, ** p < 0.05, *** p < 0.01*
Source: Elaborated by author

The most statistically significant coefficient is the second lag of the budget deficit in the inflation equation (−0.825, $p < 0.01$), suggesting that a fiscal shock—defined here as a deviation in the budget balance—has a strong and delayed inflationary impact on inflation in Romania.

The second lag of inflation also carries a negative sign (−0.334), although it is not statistically significant ($p > 0.1$), indicating low inflationary persistence during the analyzed period. This may reflect Romania's transition from high volatility in the early 2000s toward more stable inflation rates in recent years.

In the second equation, modelling the effect of shocks on the budget deficit, none of the coefficients reach statistical significance, supporting the previously discussed unidirectional causality: fiscal policy shocks influence inflation, but not vice versa.

The R-squared value for the inflation equation is moderate, suggesting a decent explanatory capacity of the model despite the small sample size. By contrast, the R-squared in the deficit equation is lower, confirming that short-term movements in the deficit are influenced by other variables outside the VAR specification, such as political cycles, EU funding dynamics, or external conditionality. Overall, these results strengthen the article's core argument that fiscal imbalances are a significant driver of inflation in Romania, and that this relationship is both lagged and statistically robust.

Impulse Response Functions (IRFs) were used to further investigate the magnitude and persistence of the shocks. A one-standard-deviation shock to the budget deficit leads to a noticeable increase in inflation, peaking after two years and slowly dissipating over the subsequent period.

This pattern highlights the delayed yet pronounced response of inflationary pressures to fiscal shocks, reflecting Romania's institutional inertia and the time required for policy changes to permeate the economy. Moreover, the temporary nature of the impact suggests the need for timely and coordinated monetary-fiscal policy responses. Acknowledging the complexity of these dynamics, future analyses could further enhance robustness by integrating additional structural indicators—such as public debt maturity profiles, monetary policy credibility indices, or measures of fiscal decentralization—thus enriching policy insights and predictive accuracy.

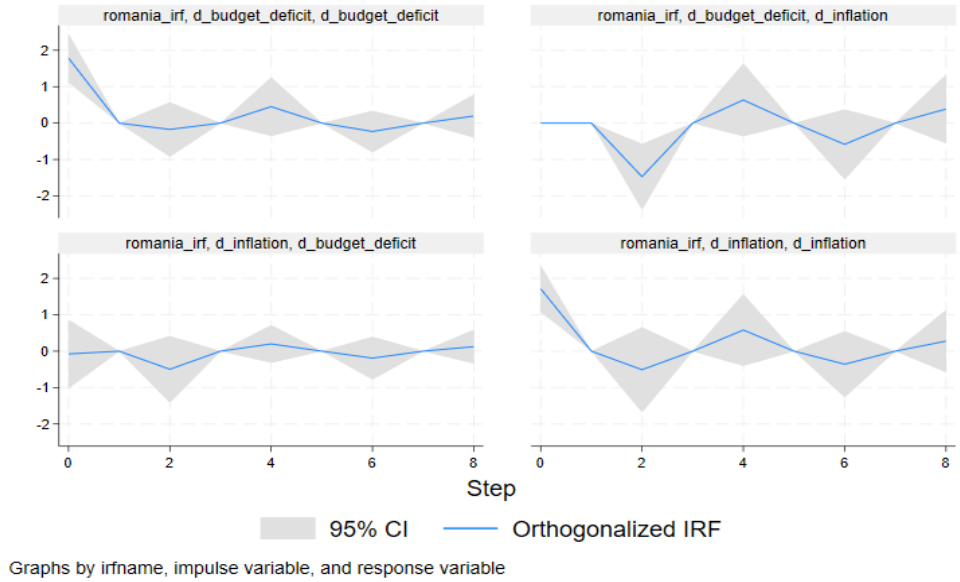

Figure 1. Impulse Response Function – Response of Inflation to Budget Deficit Shock

Source: Elaborated by author

The visual analysis confirms that the inflationary effect of a fiscal expansion is significant and temporary, in line with theoretical predictions. The peak effect observed in the second lag is particularly relevant for policy calibration, as it highlights a delay in the full manifestation of fiscal shocks. In contrast, the IRF of the budget deficit to an inflation shock is flatter and statistically less relevant, again confirming the unidirectional causality observed in the VAR estimation. These findings reinforce the theoretical stance that, in the case of Romania, inflation is more likely a fiscal-driven phenomenon than one anchored in autonomous monetary factors. As such, maintaining fiscal discipline is essential not only for budgetary sustainability, but also for price stability. In a broader context, Romania's vulnerability to exogenous fiscal shocks, amplified by institutional weaknesses and pro-cyclical policy tendencies, places it in a structurally sensitive position within the European economic landscape.

To deepen the understanding of fiscal-inflation dynamics in the context of macroeconomic vulnerability, the VAR estimations conducted for Germany, Poland, Czechia, and Bulgaria provide a comparative benchmark for Romania. In all countries, the budget balance is recorded as a negative number when the deficit widens; a negative coefficient therefore denotes an inflationary impact of a larger deficit. The negative relationship observed between budget deficits and inflation across all countries, though counter-intuitive at first, is compatible with EU fiscal-discipline rules and the fact that much deficit spending is channeled into long-term investment projects with muted short-run demand effects. While each country shares structural and institutional proximity through EU integration, the transmission mechanisms of fiscal shocks differ subtly, reflecting variations in fiscal discipline, monetary regimes, and policy frameworks.

In Germany, the VAR model reveals a statistically significant negative coefficient on the second lag of the change in the budget balance (L2.d_budget_deficit = −0.487, $p < 0.01$). Economically, this means that a one-percentage-point deterioration in the budget balance—for example, moving from −3 % to −4 % of GDP—raises the year-to-year change in HICP inflation by about 0.49 percentage points two years later.

Table 8. Results of VAR Estimation – Germany

	(1) **d_inflation**
d_inflation	
L2.d_inflation	-0.459 (0.320)
L2.d_budget_deficit	-0.488*** (0.188)
_cons	0.307 (0.336)
d_budget_deficit	
L2.d_inflation	-0.492 (0.453)
L2.d_budget_deficit	-0.214 (0.266)

_cons	0.0157 (0.475)
R-squared Observations	 14

Standard errors in parentheses
** p < 0.10, ** p < 0.05, *** p < 0.01*
Source: Elaborated by author

Although this may appear counterintuitive under traditional demand-side logic, the result aligns with Germany's well-established anti-cyclical fiscal framework, high institutional credibility, and inflation-anchoring monetary policy. The negative coefficient may capture a fiscal-monetary coordination effect, where deficit-financed spending is counteracted by contractionary monetary interventions or offset by structural investments with delayed supply-side effects.

Additionally, the own lag of inflation (L2.d_inflation = -0.459, p = 0.151) is not statistically significant, pointing to weak inertia in price evolution. On the fiscal side, neither lagged inflation nor lagged deficit values predict budget balance movements, indicating unidirectional causality from fiscal to price dynamics. The R-squared values confirm this asymmetry: approximately 0.57 for inflation and only 0.22 for the deficit, suggesting that inflation is meaningfully explained by past fiscal behavior, while the reverse path is structurally inert.

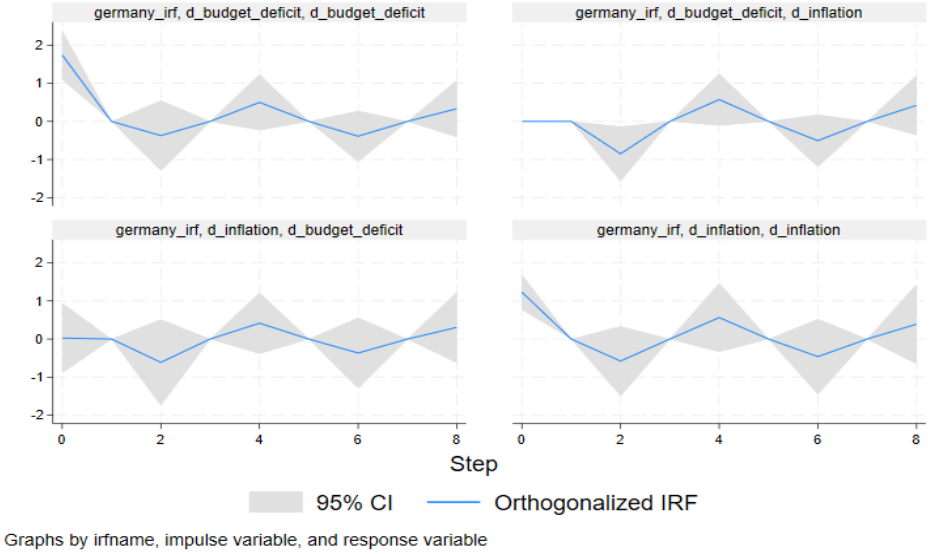

Figure 2. Impulse Response Function – Germany
Source: Elaborated by author

In Poland, a similar transmission structure is observed. The coefficient for L2.d_budget_deficit is -0.844 (p < 0.01), shows that a one-percentage-point worsening of the budget balance drives the annual change in HICP inflation higher by roughly 0.84 pp after two years.

Table 9. Results of VAR Estimation – Poland

	(1) **d_inflation**
d_inflation	
L2.d_inflation	0.136 (0.340)
L2.d_budget_deficit	-0.844*** (0.187)
_cons	0.529 (0.484)
d_budget_deficit	
L2.d_inflation	-0.336 (0.441)
L2.d_budget_deficit	-0.144 (0.243)
_cons	0.222

	(0.629)
R-squared	
Observations	14

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
Source: Elaborated by author

This reinforces the interpretation that in Central and Eastern European economies, fiscal expansion does not automatically generate demand-pull inflation—particularly when supported by external EU funding, investment-based stimulus, or structural absorption channels. In such cases, the inflationary effect of deficit spending materializes with a two-year delay and is shaped by supply-side absorption.

As in Germany, the feedback from inflation to the fiscal balance is weak, and all coefficients in the deficit equation are statistically insignificant. The R^2 value for inflation (≈ 0.59) indicates that the model captures over half the variance in inflation outcomes, while the budget equation remains largely unexplained (R^2 ≈ 0.068), reflecting the asymmetrical nature of shock propagation.

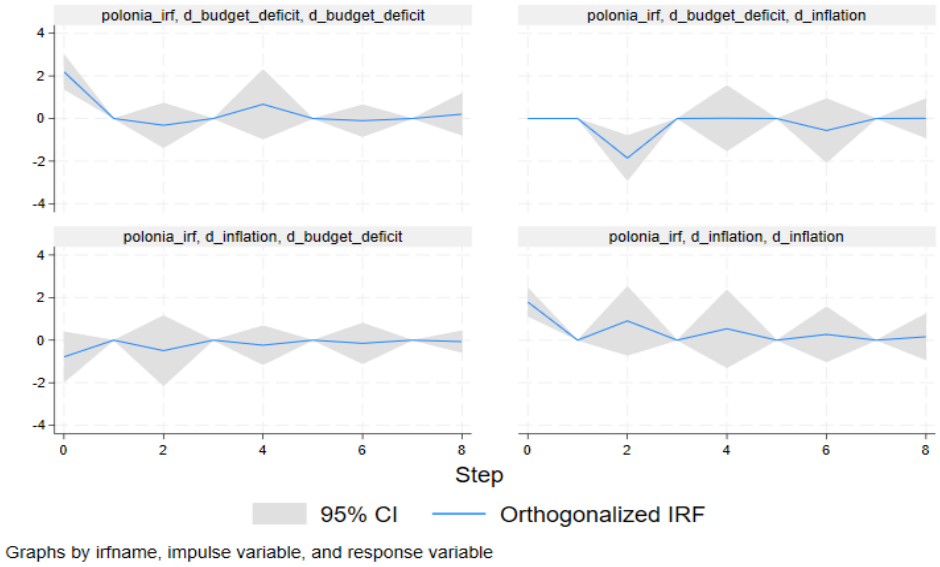

Figure 3. Impulse Response Function – Poland
Source: Elaborated by author

Turning to Czechia, the relationship between fiscal stance and inflation appears even more pronounced. The L2.d_budget_deficit coefficient is -1.118 (p < 0.01), implies that a one-percentage-point deficit deepening lifts the year-to-year change in HICP inflation by about 1.12 pp two years ahead.

Table 10. Results of VAR Estimation – Czechia

	(1) **d_inflation**
d_inflation	
L2.d_inflation	0.170 (0.343)
L2.d_budget_deficit	-1.119*** (0.332)
_cons	0.325 (0.661)
d_budget_deficit	
L2.d_inflation	-0.00320 (0.254)
L2.d_budget_deficit	-0.0424 (0.246)
_cons	0.108 (0.490)

R-squared	
Observations	14

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
Source: Elaborated by author

This suggests that inflation in Czechia is highly responsive to past fiscal movements, which could be attributed to its historically conservative monetary policy and faster policy reaction to fiscal stimuli. The R^2 for the inflation equation stands at approximately 0.45—moderate but coherent with the overall structure—while the fiscal equation remains poorly explained.

This stark pass-through implies that Czechia's macroeconomic architecture exhibits strong fiscal price sensitivity, potentially as a result of narrower fiscal space and faster monetary correction mechanisms. The own-lag effect of inflation remains statistically insignificant, highlighting a limited inflationary memory.

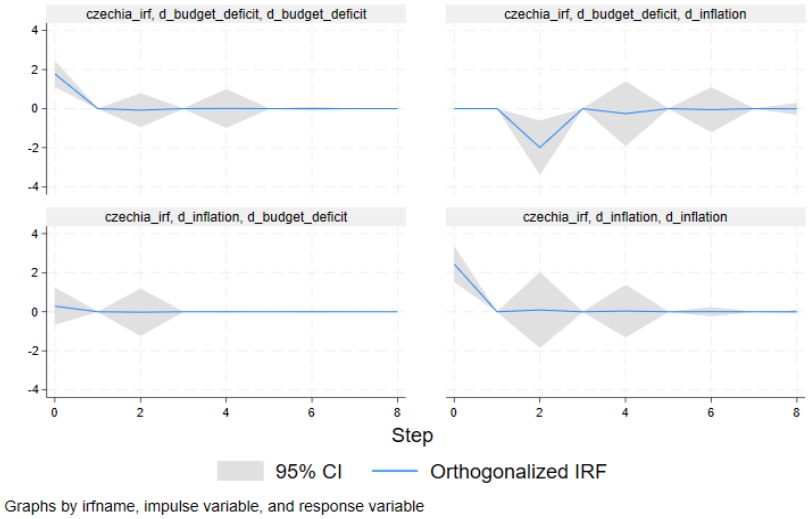

Figure 4. Impulse Response Function – Czechia
Source: Elaborated by author

For Bulgaria's currency-board regime, a one-percentage-point deficit deterioration raises the annual change in HICP inflation by roughly 0.76 pp with a two-year lag.

Table 11. Results of VAR Estimation – Bulgaria

	(1) **d_inflation**
d_inflation	
L2.d_inflation	0.279 (0.314)
L2.d_budget_deficit	-0.762** (0.356)
_cons	0.260 (0.740)
d_budget_deficit	
L2.d_inflation	-0.0777 (0.244)
L2.d_budget_deficit	-0.145 (0.276)
_cons	0.0647 (0.573)
R-squared Observations	 14

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
Source: Elaborated by author

However, the magnitude is lower than in Czechia, and the lack of significance in the inflation-to-deficit transmission reinforces the structural constraint imposed by Bulgaria's externally anchored monetary policy. The low R^2 for the budget deficit equation (~0.10) contrasts with the moderate value for inflation (~0.45), once again pointing toward a unidirectional dynamic, wherein fiscal shocks affect prices but not vice versa.

Bulgaria's institutional rigidity and the automatic price anchoring under the currency board may insulate inflationary processes from endogenous fiscal feedback loops. This framework enables a controlled inflation environment but limits discretionary counter-cyclical fiscal responses.

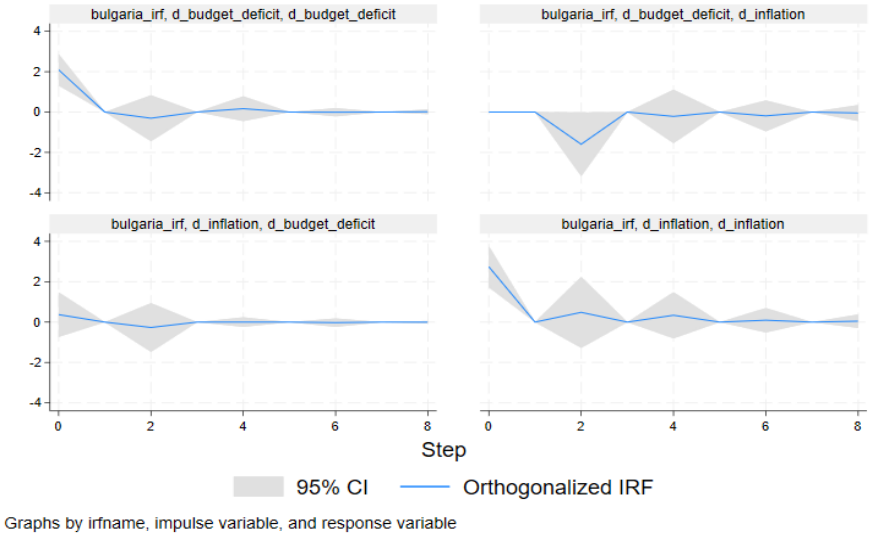

Figure 5. Impulse Response Function – Bulgaria

Source: Elaborated by author

When comparing all four countries with Romania, a coherent pattern emerges. In every case, the second lag of the budget deficit has a negative and statistically significant effect on current inflation. Romania's L2.d_budget_deficit coefficient stands at -0.825 ($p < 0.01$), aligned closely with the results from Poland and Bulgaria. However, Romania's model exhibits the highest R^2 for inflation (~0.58), suggesting that the country's price level is more strongly determined by past fiscal behavior than in the peer group. This might reflect greater sensitivity of domestic prices to fiscal slippage, weak institutional anchors, or a less predictable monetary reaction function.

Moreover, while all countries show evidence of unidirectional fiscal-to-inflation causality, Romania displays the most robust and consistent Granger-type dynamic, with lagged deficits systematically influencing inflation and minimal feedback in the reverse direction. This further reinforces Romania's position as the most vulnerable economy in the group in terms of fiscal-driven inflation, consistent with its persistent pro-cyclical fiscal policies, external dependency, and weaker automatic stabilizers.

The negative relationship across countries—though superficially paradoxical—can be rationalized through the lens of EU-constrained fiscal behavior and supply-oriented deficit use. When governments borrow or receive grants for infrastructure, digitalization, or defense spending, the short-term effect on aggregate demand and inflation remains inflationary, although its magnitude can be dampened by supply-side reforms.

In sum, Romania aligns with regional peers in terms of directional effects, but the intensity of transmission and explanatory strength distinguish it as particularly sensitive. This calls for enhanced fiscal discipline, stronger policy buffers, and a forward-looking coordination mechanism between fiscal and monetary authorities. While countries like Germany and Poland show similar transmission patterns, their stronger institutional context enables better absorption of fiscal shocks, without significant inflationary slippage.

5. Conclusions

This study has examined the dynamic interaction between fiscal deficits and inflation in Romania and four comparable European countries (Bulgaria, Czechia, Germany, and Poland), using a Vector Autoregression (VAR) framework for the period 2007–2023. While the negative association between budget deficits and inflation may appear paradoxical, the results reflect Romania's historical pattern of adopting restrictive fiscal measures during deficit expansions, often under external pressure from international institutions. Motivated by the increasing relevance of macroeconomic resilience in the context of repeated exogenous shocks—from

the global financial crisis to the COVID-19 pandemic and recent inflationary pressures—the analysis focused on understanding how fiscal imbalances influence price dynamics in small and medium-sized EU economies.

The empirical findings confirm the presence of a significant and negative transmission mechanism from lagged budget deficits to inflation across all five countries. In the case of Romania, the effect is particularly pronounced, as shown by the highest R^2 value for the inflation equation (~0.58), suggesting that inflationary pressures are more strongly determined by past fiscal behavior than in other peers. The impulse response analysis revealed a short-term inflationary spike following a deficit shock, which gradually dissipates, highlighting a temporary but tangible impact of fiscal policy on price stability. This supports the hypothesis that Romania's macroeconomic framework remains structurally vulnerable to fiscal pro-cyclicality and external disturbances, especially in the absence of automatic stabilizers or consistent inflation targeting.

In Germany and Poland, the same inverse relationship was identified, although the effects were more subdued. This can be attributed to their stronger institutional capacity, counter-cyclical policy design, and higher monetary credibility. Czechia demonstrated the most intense coefficient, but with a lower explanatory power, possibly due to its constrained fiscal flexibility and central bank autonomy. Bulgaria, operating under a currency board regime, also reflected a unidirectional influence of the budget deficit on inflation, although the transmission mechanism appeared weaker than in Romania.

From a methodological perspective, the study demonstrates the utility of VAR models in capturing short-run macroeconomic interdependencies, especially when combined with rigorous stationarity testing, lag selection procedures, and model validation diagnostics (such as the ADF, LM, and eigenvalue stability tests). The exclusion of the logistic regression model was a deliberate methodological choice, justified by the lack of statistical significance and the limited number of observations, which could not sustain meaningful crisis probability inference. Instead, the VAR approach has provided a more robust analytical pathway for assessing the impact and persistence of fiscal shocks.

In light of these results, several policy implications emerge. First, Romania should prioritize fiscal discipline not only to ensure debt sustainability but also to safeguard inflation stability. Second, enhancing institutional credibility—particularly in the areas of budget forecasting, debt management, and automatic stabilizers—could mitigate the volatility generated by fiscal slippage. Third, closer alignment with European fiscal governance instruments and inflation frameworks may improve Romania's resilience to future shocks. Consequently, Romania should maintain strict fiscal discipline and strengthen institutional buffers to mitigate these vulnerabilities effectively. Lastly, further research should explore panel-based extensions of this model, incorporating broader sets of EU countries and structural indicators such as public investment efficiency, external financing structure, or labor market rigidities. Addressing these policy challenges proactively can significantly strengthen Romania’s macroeconomic resilience in future crisis contexts.

In conclusion, while Romania shares structural similarities with other European countries in the transmission of fiscal shocks to inflation, its heightened sensitivity underscores the need for strengthened macroeconomic governance. By integrating empirical evidence with theoretical frameworks, this paper contributes to a more nuanced understanding of fiscal vulnerability in the European periphery and offers a foundation for future econometric investigations into macroeconomic stability and resilience.

One limitation of the current study lies in the annual frequency of data, which restricts the number of effective observations and may understate short-term dynamics. Furthermore, the exclusion of structural variables such as public debt composition, automatic stabilizers, or EU transfer absorption capacity narrows the interpretative scope. Future research could expand the analysis using quarterly data, panel VAR techniques, or structural identification strategies to assess nonlinear responses or regional asymmetries more precisely.

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