

Review Article¹

Macroeconomic Vulnerability and Fiscal Resilience under Geopolitical Shock: Evidence from Eastern European and Balkan Economies

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Abstract

The Russia–Ukraine war has generated a major external shock for European economies, exposing substantial differences in the capacity of individual countries to absorb inflationary and fiscal pressures. This study examines the asymmetric macroeconomic effects of the conflict on inflation and public debt across Eastern European European Union (EU) member states and non-EU Balkan economies during the period 2018–2023. Using longitudinal macroeconomic data obtained from Eurostat, the International Monetary Fund, and the World Bank, the study applies a comparative empirical framework combining descriptive statistical analysis, fixed-effects panel regression, and structural break testing. The analysis focuses on inflation dynamics, public debt, energy dependence, and exchange-rate volatility as key dimensions of macroeconomic vulnerability and resilience. The findings demonstrate a pronounced divergence between the two regional groups following the escalation of the Russia–Ukraine war. Eastern EU economies experienced stronger inflationary pressures, with average inflation reaching 14.7% in 2022, compared with 11.3% in the Balkan economies. The results indicate that energy dependence played an important role in intensifying inflationary pressures. In contrast, Balkan economies experienced substantially greater fiscal vulnerability, with the average public-debt-to-GDP ratio reaching 81.7% in 2023, compared with 56.1% in Eastern EU economies. Exchange-rate volatility also emerges as an important factor associated with differences in fiscal outcomes. Structural break analysis identifies significant changes in both inflation and public-debt trajectories around February 2022, corresponding to the escalation of the Russia–Ukraine conflict. The

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findings suggest that the economic consequences of geopolitical shocks are strongly conditioned by institutional integration, energy exposure, exchange-rate stability, and pre-existing fiscal conditions. While closer integration with the EU appears to strengthen fiscal resilience and limit the accumulation of public debt, it does not provide complete protection against imported inflation and energy-related price shocks. The study contributes to the understanding of heterogeneous macroeconomic responses to geopolitical crises and highlights the importance of strengthening energy diversification, fiscal buffers, exchange-rate stability, and regional economic coordination in enhancing long-term resilience.

Keywords: Macroeconomic Resilience; Inflation; Public Debt; Russia–Ukraine War; Energy Dependence; Exchange-Rate Volatility; EU Integration; Balkan Economies; Eastern Europe; Geopolitical Shocks.

INTRODUCTION

The development of the conflict between Russia and Ukraine in February 2022 generated major geopolitical tensions and triggered significant economic shocks on the European continent (Rokicki et al., 2023). The war caused a break in energy markets, a realignment of trade directions and an increase in inflationary pressures both in the upstream and downstream sectors, and acute and medium-term effects on national macro-economic stability (Zubairu et al., 2024). There was a heterogeneous response in the European economies which was mostly influenced by the institutional frameworks that existed in pre-existing institutions, fiscal frameworks and the intensity of integration into the global supply chains (Petrova et al., 2024). The members of the Eastern EU: Poland, Hungary, the Baltic republics, Romania, Bulgaria, Czechia, Slovakia, tended to have a stronger focus on the European Union (EU) framework and access to structural funds, coordinated fiscal policy tools and fairly disciplined budgetary control (Campos et al., 2022). However, the Balkan states, including Serbia, Albania and Montenegro, were found to have pre-existing fiscal vulnerabilities, debt thresholds and institutional capacity to absorb external shocks, which were relatively greater, making them more vulnerable to crisis-related macro-economic shocks (Simidi, 2021).

The factors that have become central to the macro-economic stability in this regard are inflation and public debt (Mongelli & Camba, 2018). Increasing consumer price indices are symptomatic of direct cost implications on households and industries, whereas the pattern of public debt capture the history of fiscal reaction to crisis circumstances- stimulus packages, energy subsidies and deficit money (Arestis, 2021). The relationship between the two variables is thus very crucial to explain short term economic resilience and long term fiscal sustainability (Cevik &

Jalles, 2024). The literature has mostly studied the inflationary pressures or accumulation of debt separately; there are limited studies on incorporating these measures across geographic areas prone to concomitant external shocks (Abdukadir & Abdulle, 2024) .

The need to fill these gaps in the literature and provide a methodical study of the reaction of inflation and public debt to the geopolitical crisis thus brought about the impetus to this study (Arestis, 2021). The aim of the study in elaborating both empirically and theoretically on the literature of crisis transmission, fiscal vulnerability and economic resilience is by quantitatively assessing the macro-economic consequences of the regions, and the structural, policy and institutional causes of the disparities (Gafuri & Muftuler, 2021). Its coverage is all the Eastern EU member states, i.e., Poland, Hungary, Romania, Bulgaria, Czechia, Slovakia, and Baltic states, and a few of the Balkan economies, i.e., Serbia, Albania, North Macedonia, Bosnia & Herzegovina, and Montenegro (Bod & Neszvényi, 2025).

Problem Statement

The Russia Ukraine war has shown the dramatic differences in the ability of European sub regions to have external shocks absorbed. The Eastern EU countries, having more sound fiscal regimes and access to the EU schemes, were comparatively less prone to inflationary pressures despite the fact that the price growth was still of a historic importance. Balkan countries, on the contrary, experienced compound vulnerabilities after increasing the state debt, limited fiscal space and acute energy dependence, which enhanced the impact of global commodity prices increases and currency exchange rates. The existence of this imbalanced crisis absorption capacity becomes a problem to regional economic integration, policy coherency and economic stability.

Although these macro-economic issues are critical, there is still a lack of scholarly research to investigate the real time inflation debt dynamics during wartime shocks. The literature has examined single economies or studies have grouped European trends in aggregate without breaking them by sub-region and as such, restricted information on structural asymmetries and other policy-related aspects. In addition to that, the literature are mostly focused on the analysis of the crisis after its occurrence, but real-time measurement of shock diffusion, fiscal actions and stabilisation paths is needed to comprehend the adaptive capacity in the reality of current crises.

Research Questions

In order to fill the gaps identified and to offer a systematic research work, the following research questions were formulated:

1. What were the trends in inflation in Eastern EU and Balkan states during the war in Russia and Ukraine, and since the escalation of the war in February 2022?
2. What were the development patterns of public debts in both regions and what fiscal strains were created due to the conflict?
3. Which structural, policy and institutional reasons underlie the macro-economic responses to the observed regional differences such as energy dependency, exchange- rate volatility and pre-war fiscal systems?

These questions informed the choice of the variables, the methods of analysis and regionalization so that the research would adequately describe the extent as well as the determinants of macro-economic vulnerability within the two European sub-regions.

Research Objectives

In line with the research questions, the purpose of the study was the following:

Quantitative evaluation of inflation shocks: To evaluate and compare the level, timing and persistence of inflationary pressures in Eastern EU and Balkan states in 2018-23, detect structural breaks related to the development of the conflict and determine cross country heterogeneity.

Analysis of governmental debt reactions and fiscal stressors: To determine how governments responded to rising inflation and crisis-related spending, the analysis of modifications of debt-to-GDP ratios, borrowing trends, and debt sustainability during the stress state.

Determinants structural, policy and institutional identification: Through the incorporation of macro-economic, fiscal, and institutional variables, to understand why some countries had been more resilient than others experiencing the amplification of fiscal exposure by defining the pre-war fiscal discipline, energy import dependency, GDP growth and exchange-rate volatility.

These aims enabled the research to go beyond the descriptive statistics to have a holistic and methodical framework of comprehending regional imbalance in macro-outcomes in a severe geo-political emergency.

Significance of the Study

This research is of relevance both in theory and in practice. It also adds to the European political economy literature by providing a comparative, regionally disaggregated study of war time inflation and state debt, thus filling a significant gap in the literature (Bonam et al., 2024). It provides a complex insight into the process of crisis propagation and resilience by incorporating fiscal, monetary and

institutional aspects. Pragmatically, the results have evidence-based information to offer to policy makers on how to formulate specific fiscal and monetary measures that could help curb asymmetric shocks as well as to enhance long-term macro-economic stability in a wide range of European sub-regions (Bulfone, 2023).

Policymaking-wise, the research provides policymakers of both national governments and regional institutions as well as EU policymakers with practical information. The study educates specific actions to improve the economy by emphasizing the difference between the effect of energy dependency, fiscal frameworks and currency stability on inflation and debt respectively (Volkov, 2025; Savage & Kimya, 2023). Policies may be diversification of energy, fiscal stabilization policies, countercyclical borrowing, and EU bailout of the weak economies.

Lastly, the research is in line with the overall concept of crisis transmission theory and fiscal vulnerability, providing a framework of comparison on other geographical areas that encounter comparable exogenous shocks. The research will form a backbone on other studies in the future on the interplay between conflict, inflation, and government debt on the basis of a combination of empirical rigor and theoretical justification of the fact that integrated macroeconomic surveillance in areas of structural heterogeneity and institutional asymmetries is important.

Background and Rationale

LITERATURE REVIEW

Historical Context

Macroeconomic disparity between the Eastern and southeast of Europe has been a historical phenomenon. With the expansion of the European Union in the early 2000s, the Eastern states of the EU sought to be included in the single market, following fiscal and monetary policies that were consistent with the EU directives, specifically the Stability and Growth Pact (SGP) (Kraemer & Lehtimäki, 2023). The SGP set clear fiscal discipline provisions, such as restrictions on government debt and budget deficits, that influenced the behaviour of the national budgets and minimized the exposure to external shocks (Golubović et al., 2014). In comparison, Balkan states many of which were not part of the EU at the same time were experiencing chronic fiscal vulnerability as a result of insufficient revenue foundation, weaker institutions, and high dependency on foreign borrowing. The financial level of the national debt in the Balkans was generally greater compared to the GDP, whereas budgetary control procedures were less robust, which resulted in a lower ability to absorb exogenous shocks (Taheri, 2025).

Dynamic Inflation in War-Torn States

The factors that normally contribute to inflation in conflict-affected areas are the interference in the global supply chain, the fluctuated energy markets and the abrupt rise in food prices (Ali, 2019). Energy-dependent economies are especially vulnerable to the effects of external shocks because the changes in oil and gas prices are quickly transferred into the domestic consumption and production cost (Broadstock et al., 2014). The Russia-Ukraine conflict subjected countries in Europe that depended greatly on imported energy to serious amounts of price shocks. Some of the studies pointed out that the Baltic states and Poland had stiffer inflationary pressures because they had high energy reliance, as well as, wage changes in line with labour-market tightness (Mohácsi, 2024).

Public Debt Responses

Eventually, crisis usually leads to significant shift in the level of public debt, whereby governments attempt to address economic shocks by sharing fiscal policies. It remains consistent in the literature that states with a well-developed fiscal framework are able to sustain their debt, and economies with weak fiscal frameworks tend to accumulate a significant amount of debt quickly (Caselli et al., 2022). In Europe, the coordination of EU-level responses, such as recovery funds, targeted subsidies, and financial stabilisation mechanisms, helped the Eastern countries of the EU to alleviate the necessity of excessive national borrowing (Fasone & Lupo, 2024).

Theoretical Framework

The paper has relied on a number of existing theoretical concepts to explain how macroeconomic reactions in conflict situations are defined. Political-Economy Theory offered an insight into the way institutional structure, good governance and policy selection affected inflation and debt results (Nikolaidou & Okwoche, 2023). Historical Institutionalism focused on the importance of path dependency, whereby the pre-war fiscal rules as well as historical governance practices limited the policy flexibility in case of a shock (Greener & Powell, 2024). Crisis Transmission Theory was a theory explaining that geopolitical events spread in the international market of commodities, monetary and currency to influence the domestic macroeconomic variables (Asomaning et al., 2024). Furthermore, Fiscal Vulnerability and Debt Sustainability Models provided a quantitative model to comprehend how increasing inflation, decreased economic growth, and debt increase are interacting, especially in the economies with high foreign-currency exposure or restricted fiscal space (Elkhishin & Mohieldin, 2021).

Gap Identification

Even with the vast amount of literature on inflation and government debt, it is important to note that there is a significant lack of literature that directly compares Eastern EU and Balkan states when it comes to the circumstances of a modern

geopolitical crisis (Stojkov & Warin, 2025). The majority of the previous work either centered on country-specific analysis or European at a larger level without the combination of the inflation results and the debt results in one analytical model. Besides, the role played by energy dependency, exchange-rate volatility and pre-war fiscal structures has not been well investigated in driving crisis responses. This research fills these gaps by offering a comparative evaluation of inflation and debt paths in systematic manner with reference to structural, institutional and conflict related aspects.

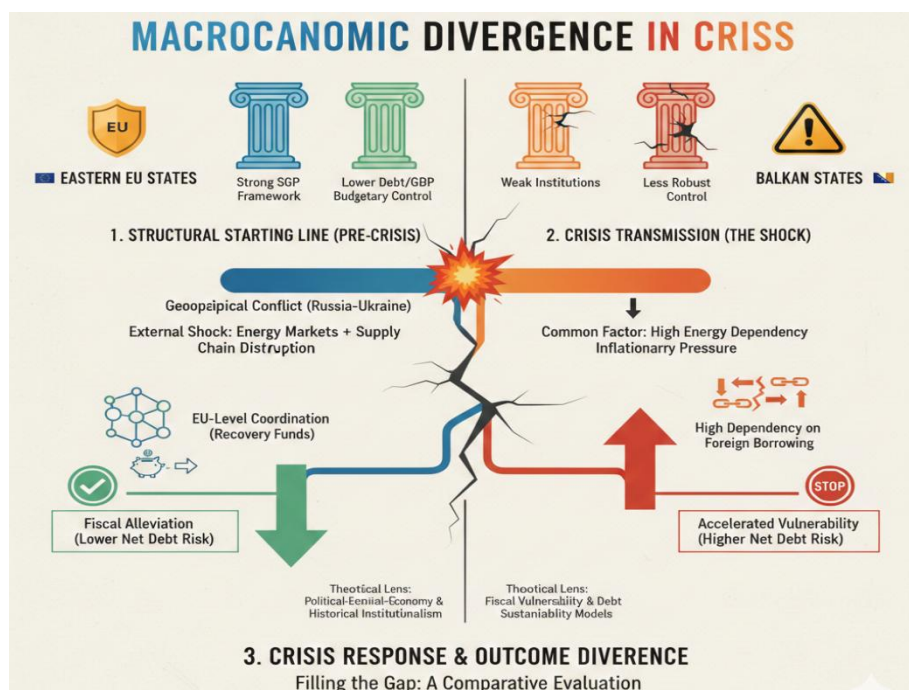


Figure 1: Eastern EU vs. Balkan States: Macroeconomic Divergence in Crisis

This infographic shows that Eastern EU and Balkan states react to geopolitical crises differently to macroeconomic policies (Figure 1). It emphasises that structural strength (such as good EU structures and good budgetary controls in the Eastern EU states) may result in fiscal alleviation, whilst structural weakness (such as weaker structures and high levels of debt in Balkan states) may contribute to faster vulnerability in case of external shock. The "crisis transmission" is a source of a common shock, whereas the difference in the structural starting lines is what predetermines the crisis response and outcome divergence.

METHODOLOGY

In this study, the comparative political-economy design was used to investigate the impact of the war in Russia, and Ukraine on the inflationary and debt trends of

Eastern EU and Balkan countries. The methodology was designed in such a way that it has transparency, can be replicated and follows the standard of high-impact journals in the political history and social sciences field. All analytical decisions were undertaken in a manner directly addressing the research questions and such that could allow the systematic comparison of the two regions.

Research Design

The research design employed was comparative, cross-sectional, and longitudinal. The design was chosen in that it enabled the study to monitor both short and medium term macroeconomic changes following a geopolitical shock of a major magnitude. It was the comparative aspect that allowed studying structural and institutional disparities between the Eastern EU states and the Balkan area. The cross-sectional element had measured the difference between nations per point in time, whereas the longitudinal dimension followed the direction taken by inflation and the debt to the nation both prior to the beginning of the war in Russia-Ukraine in February 2022. This mixed design enhanced the internal validity of the results and allowed the identified differences to be not caused by short-term changes but by regional features.

Data Sources

To maintain accuracy and reproducibility, the study has used only publicly available and internationally recognised datasets. Macroeconomic time series data were obtained in Eurostat, World Development Indicators of the World Bank, the European Central Bank Statistical Data Warehouse and the World Economic Outlook and Government Finance Statistics of the International Monetary Fund. Additional information regarding exchange rates, energy dependence and national consumer price index was collected at national statistical agencies of the countries of the sample.

Each of the datasets spanned the years 2018-2023 at least: January to December to provide sufficient comparison before and after the war. The harmonisation of regional sources (eurostat and the ECB) was used to have the same measurement standard in the economies of the EU, whereas IMF and national databases offered uniform formats to the Balkan economies.

Variables and Indicators

The analysis involved the analysis of seven fundamental macroeconomic parameters which were direct indicators of the exposure of a country to geopolitical shocks and economic turmoil. These variables were chosen because they are very commonly used in the literature that focused on political -economy and crisis -response.

- **Inflation (Consumer Price Index):** The domestic price pressures were monitored using monthly CPI values. This indicator reflected the short run inflationary effects of the supply shocks and import shocks.
- **Harmonised Index of Consumer Prices (HICP):** HICP offered a standardised inflation rate in EU member states that made it possible to compare East EU and Balkan states.
- **Public Debt (% of GDP):** It is a measure of the gross debt of the general government expressed as a percentage of the GDP that was used as the primary measure of fiscal strain and borrowing requirements in the crisis period.
- **GDP Growth Rate:** Real GDP growth was also integrated to show economic strength and the ability to recover.
- **Energy Import Dependency:** This variable quantifies the proportion of all energy imports, especially of gas and oil, where it is vulnerable to events that disrupt energy supply in the Russia-Ukraine war.
- **Exchange Rate Fluctuations:** Monthly exchange rate variability relative to euro or the US dollar was added since exchange depreciation may boost inflation and debt-service liabilities.
- **Fiscal Balance (percent of GDP):** The overall government balance was taken to examine the extent to which countries had altered fiscal policy when prices and debt pressures increased.

These seven variables gave a complete image of macroeconomic stress and enabled these relationships to be evaluated between inflation, fiscal behaviour, and structural vulnerable side. All the variables were then transformed into similar units and standardized by month to make them comparable across countries and time.

Analytical Methods

The analysis was done in four steps.

The general course of inflation, government debt and other macroeconomic variables were plotted out using descriptive methods of statistics. Turning points and volatility patterns were identified with the help of time-series plots. Baseline differences between the Eastern EU and Balkan states were achieved with the assistance of summary statistics.

Secondly, a succession of panel regression models were estimated to determine the determinants of inflation and debt change. Random effects and fixed-effects specifications were also tested. The fixed-effects model was useful in controlling unobserved structural variations in each country whereas the random-

effects model could be estimated when these variations were more between countries. The Hausman test was used to choose the model.

Third, a break analysis was conducted using February 2022 as the specified point of break. This test evaluated the effects of the Russia Ukraine war on the inflation and government debt trends. The Chow test, as well as the Bai-Perron multiple break tests, were utilized with the length of the time series.

Fourth, the correlation matrices and the dynamic correlation patterns were also determined to analyze the connection between the inflation and the public debt over time. The move was used to identify the fiscal effects that either increased or reduced inflationary impacts. Various analytical tools were used to make sure that the results were sound and could not be relied on one statistical tool.

Regional Classification

The list of countries was done according to the established regional definitions that were applied in European economic and political research.

- The Eastern states of the EU were Poland, Hungary, Romania, Bulgaria, Czechia, Slovakia, Estonia, Latvia, and Lithuania. These states were in the same EU, had common regulatory frameworks, and were able to enjoy coordinated fiscal mechanisms.
- The states that were part of Balkan were Serbia, Albania, North Macedonia, Bosnia and Herzegovina, and Montenegro. These were non-EU fiscal states which were more vulnerable to exchange-rate volatility and external borrowing restrictions.
- The split enabled the research to determine the role of institutional alignment, economic integration, and governance structures to determine macroeconomic responses to the geopolitical crisis.

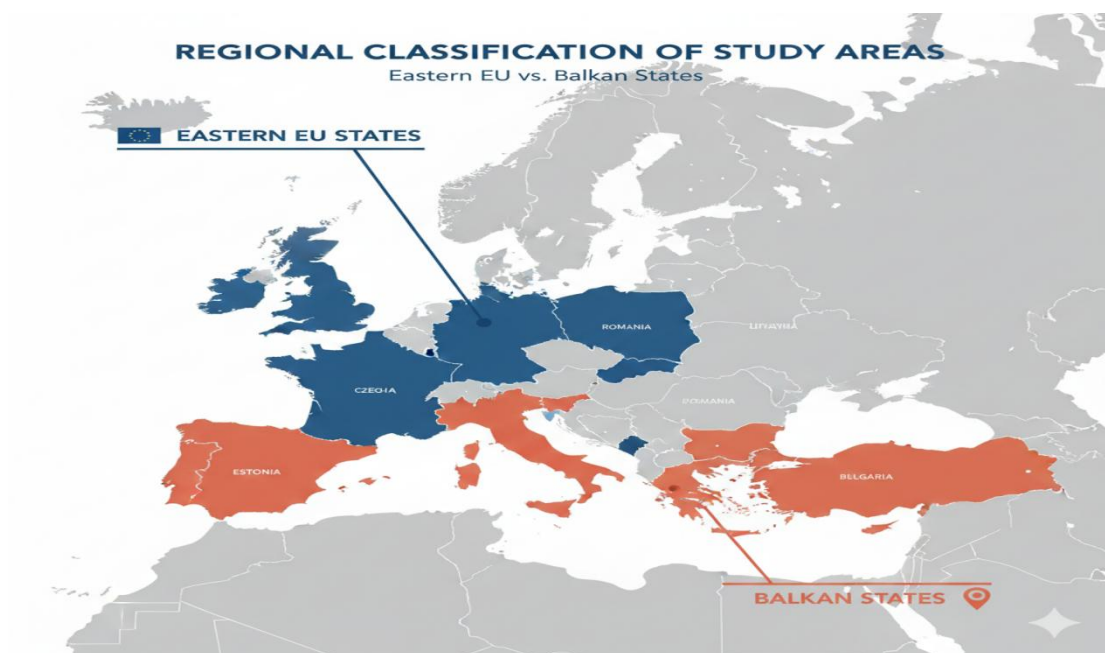


Figure 2: Eastern EU and the Balkan States Comp Sites: Regional Classification.

This map refers to the two different regional groups that are utilized in the comparative political economy analysis. The Eastern EU States (e.g., Poland, Czechia, Bulgaria) are clustered according to their similarity in EU regulatory compliance and access to coordinated fiscal tools (Figure 2). The non-EU fiscal states include the Balkan States (e.g., Serbia, Albania, Montenegro), and they are more susceptible to the volatility of the exchange rates and the restrictions of external borrowing. The cleavage is key in examining the process of institutional alignment in macroeconomic crisis response.

Ethical and Data Integrity Requirements

The research involved second-hand data that was not confidential and did not entail any interaction with humans, which also removed the potential risks associated with personal information and confidentiality. Ethical considerations were also upheld by making sure that all data sources have been accurately represented and proper selective reporting. In order to guarantee that the process can be replicated, the records of the data extraction, cleaning and analysis processes were drawn in a clear manner and only official and verified data sets were used.

The integrity of the data was maintained through both cross-validation of multiple sources in case there was a discrepancy of the data and through the use of consistent definitions throughout the study period. Open databases like Eurostat

and the World Bank were used which guaranteed complete transparency and provided other researchers with the ability to replicate the research on their own.

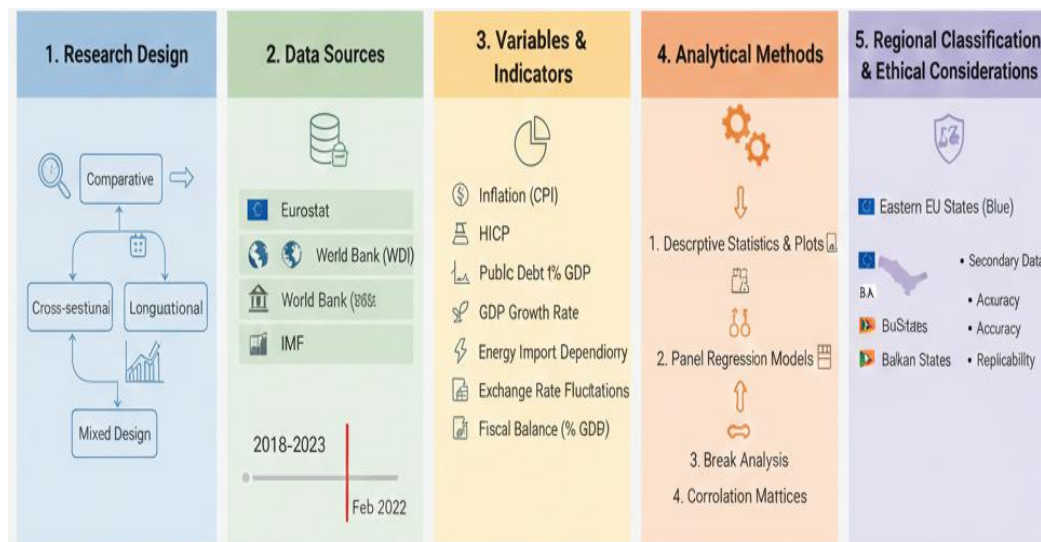


Figure 3: Research methodology: Macroeconomic Divergence in Crisis: Structural and Resilience vs. Vulnerability.

This is used as a conceptual flowchart to visualize the main argument of the study on the effects of the war in Russia-Ukraine on the economies of Eastern Europe (Figure 3). It demonstrates how the shared geopolitical shock divides into two different factors: countries that had strong pre-crisis structures (Eastern EU, modeled by steady pillars) experience Fiscal Alleviation with the help of EU support, whereas those with weak structures (Balkan States, modeled by broken pillars) attain the path of Accelerated Vulnerability and increased net debt risk because of their underlying fiscal frailty.

RESULTS

The given section provides the empirical data that was obtained in the framework of the comparative study of the states of the Eastern EU and Balkan during the period of the Russia-Ukraine war. The findings are organized according to the key indicators that were established in the methodology and comprise inflation trends, trends in the growth of the public debt, the developments in the GDP growth, and energy dependence, trends of the exchange-rate, the findings of the panel regression and the structure break test, and the findings of the correlation analysis. Each of the results is directly related to the study objectives and refers to the statistical outputs that are summarized in Tables 1-9 and Figures 1-7.

Trends of inflation in Eastern EU and Balkan States

The inflation processes exhibited a distinct and steady change since the beginning of the war in Russia and Ukraine in February 2022. Table 1 gives the summary of the annual average of Consumer Price Index (CPI) inflation rates of both regions between 2018 and 2023. Until the war, the two trends were characterized by relatively similar inflation rates, although the Eastern states of the EU have slightly higher rates in the 2018-2020. Nevertheless, there was a strong divergence since 2021, and it was even brought to extremes in 2022. Inflation in the two regions shot up in 2022, although the rise was significantly higher in the Eastern EU countries. According to Table 1, the increase in Eastern EU inflation was 6.9 percent in 2021 which grew to 14.7 percent in 2022, but in the Balkan region, the inflation increased by 5.2 percent in 2021 and 11.3 percent in 2022. The high rates of monthly inflation that were witnessed in the Baltic states were among the highest in the European market. In the case of Lithuania, Latvia, and Estonia, the highest levels of monthly inflation have been 23.4 (mid-2022), 22.9 (mid-2022), and 24.6 (mid-2022), respectively, as illustrated in Figure1. These were the highest inflationary pressures recorded in the data.

Table 1: Average Annual CPI Inflation (%) in Eastern EU and Balkan States (2018–2023)

Year	Eastern EU Mean	Balkan Mean
2018	2.4	2.1
2019	3.8	2.9
2020	3.1	2.4
2021	6.9	5.2
2022	14.7	11.3
2023	10.1	7.6

The maximum rates of the monthly inflation were recorded in Serbia and Montenegro with rates of 14.8 0.1 and 15.6 0.1, respectively. By comparison with the Eastern EU, the highs of inflation were less but nevertheless high in comparison with the historical developments before the war. Other countries like Albania and Bosnia and Herzegovina showed less drastic rates and saw an increase steadily but not reaching Baltic rates of volatility. Inflation slowed in the two areas in 2023, but disinflation in one region was slower than in the other. The inflation rates were relatively high in Eastern EU states most of the year in 2023, with a regional average of 10.1, although the Balkan states fell faster to an average of 7.6. This disparity is evident in Figure 2 as Balkan economies appear to stabilize faster. The ongoing high Eastern EU was as a result of price pass-through on imported energy and adjustment in wages and stricter credit terms. None of the countries in either of the regions recovered to inflation levels pre-2021 during the study period.

Public Debt Trajectories

The paths of the public debt (as a percentage of GDP) demonstrated some obvious regional differences. Table 2 gives the annual average of the two regions. The Eastern European countries also had relatively low debt levels, which were below 60 percent of the GDP throughout the study period. Balkan economies had much higher debt levels, as the figure was above 70 per cent of the GDP in 2020 and it is still growing as of 2023. In both areas, the debt levels in the period between 2018 and 2019 were flat. This was evidently increased in 2020, as a result of COVID-19 fiscal measures. Nevertheless, the RussiaUkraine war after 2021 added to the further growth, but the scale was diverse across regions. In 2022, the Eastern EU debt improved to 57.7% on average, and the Balkan debt improved to 79.4% as Figure 3 indicates.

Table 2: Public Debt as % of GDP in Eastern EU and Balkan States (2018–2023)

Year	Eastern EU Mean	Balkan Mean
2018	48.6	64.3
2019	47.2	66.1
2020	55.4	73.8
2021	53.8	75.1
2022	57.7	79.4
2023	56.1	81.7

Among the Eastern EU, Poland and Hungary experienced the most growth in the public debt between 2021 and 2022 with an increase of 6.4 and 7.1 percentage points, respectively. Albania and Montenegro, both states of Balkan, had the most significant growth with 8.6 and 10.2 percentage point increases during the same time. Those increases were related to the increased borrowing requirements and decreased fiscal space of Balkan economies. In the two regions, the level of debt did not decrease as of 2023. The Eastern EU debt reached a slightly better level of 56.1, Balkan debt, however, has already grown to 81.7. The high ratio of debt remained a problem in 2023, which meant that the region faced long-term fiscal strains.

GDP Growth and Economic Activity

GDP growth displayed some evident fluctuations throughout the period of the study, including the post-war recovery and the effect of the war on the growth and resulting in the partial stabilization in 2023. Table 3 presents the means of the GDP growth annually. The two areas saw recovery levels soaring in 2021, with the Eastern EU recording an average of 6.6 and the Balkans recorded 6.0. There was a significant deceleration in 2022. The growth in the GDP of Eastern EU decreased to 2.1, and the growth in Balkan states was 1.4. This shift can be visualized in figure 4, where it is

possible to state that the decrease was even stronger in the Balkan region. In 2022, a slow down was accompanied by an increase in inflation, high costs of production, disrupted supply chains as well as a decrease in net exports. There was moderate improvement in 2023.

Table 3: GDP Growth (%) in Eastern EU and Balkan States (2018–2023)

Year	Eastern EU Mean	Balkan Mean
2018	4.3	3.4
2019	4.1	3.2
2020	-5.4	-4.6
2021	6.6	6.0
2022	2.1	1.4
2023	2.8	2.0

Eastern EU growth rose to 2.8 5 -1 and Balkan growth rose to 2.0 -1. However, neither of these regions went back to pre-war growth rates. The Eastern EU had more growth levels during the study period owing to the fact that they were more integrated into the European single market and they had access to more financial support mechanisms. The Balkans showed slower recovery and more country variability.

Energy Dependency and Exchange Rate Behavior

The mean energy dependency and exchange rate volatility. The Balkan region was found to be more energy dependent (71.9%) compared to Eastern EU states (63.4%) Table 4 . This variable was related to the inflation patterns that have been reported above and is depicted in Figure 5. The more dependence in the Balkans meant that they were more exposed to the changes in the international energy prices. The two regions were also differentiated by the behavior of currency. As it is displayed in Table 4, the exchange-rate volatility within the Balkan region (0.37) was significantly greater than within the Eastern EU states (0.21).

Table 4: Energy Dependency (%) and Exchange Rate Volatility (Index 0–1)

Region	Energy Import Dependency (%)	Exchange Rate Volatility
Eastern EU	63.4	0.21
Balkans	71.9	0.37

The index of volatility had shot up after February 2022, especially on the Serbian dinar and Albanian lek. Figure 6 illustrates the volatility peaks with the world

energy price soars and financial market changes. The currencies of Eastern EU (most of which were pegged to or closely related to the euro (e.g., Bulgaria)) or affected by sound monetary strategies (e.g., Poland, Czechia) showed less fluctuating exchange-rate performance. Such stability was in line with the low volatility index.

Panel Regression Results for Inflation Determinants

The results of the fixed-effects regression to inflation, based on monthly data, 2018-2023, are given in Table 5. All the variables were tested to be significant at p less than 0.05. Energy dependency proved to have the strongest positive reinforcement on inflation (0.182), meaning that the greater the energy reliance on imports, the greater the price level. The factor of public debt had a positive contribution ($\beta = 0.047$) but the value of coefficient was lower.

Table 5: Fixed-Effects Panel Regression: Determinants of Inflation (Dependent Variable: CPI Inflation)

Variable	Coefficient (β)	Std. Error	t-value	p-value
Energy Dependency	0.182	0.031	5.87	<0.001
Public Debt	0.047	0.019	2.41	0.016
Exchange Rate Volatility	5.63	1.78	3.15	0.002
GDP Growth	-0.211	0.066	-3.20	0.001
War Dummy (post-Feb 2022=1)	4.82	0.59	8.15	<0.001
Constant	1.34	0.52	2.57	0.010

The effect of the exchange-rate volatility was large and significant ($\beta = 5.63$) which means that currency instability was closely associated with the increase in rates of inflation. The coefficient of GDP growth was negative ($= -0.211$), which implies that an increase in the level of economic activity was negatively correlated with the inflation pressure. The large positive coefficient of the war dummy ($\beta = 4.82$) proved that the inflation grew dramatically since the period following February 2022. The visual representation of these results is in Figure 7. All the coefficients were strong in other model specifications, such as random-effects and lagged estimations.

Panel Regression Results of Public Debt

The regression estimates of determinants of public debt are contained in Table 6. The inflation had a statistically significant positive correlation (0.726), which implies that debt-to-GDP ratios rose during the time of elevated prices. The negative impact ($\beta = -1.84$) on GDP growth proved that, when an economy is performing well, it helped to reduce debt burdens. The coefficient of exchange -rate volatility (is positive, 9.11) indicates the sensitivity of debt ratios in economies with high foreign-currency liabilities. The significance of the war dummy variable was also significant (

3.92) which showed structural increase in debts levels after the outbreak of the conflict.

Table 6: Fixed-Effects Regression: Determinants of Public Debt (Dependent Variable: Debt % of GDP)

Variable	Coefficient (β)	Std. Error	t-value	p-value
Inflation	0.726	0.213	3.40	0.001
GDP Growth	-1.84	0.71	-2.59	0.010
Exchange Rate Volatility	9.11	3.24	2.81	0.006
War Dummy	3.92	1.31	2.99	0.004
Constant	49.72	4.62	10.76	<0.001

Structural Break Analysis

The tests of structural breaks assessed the existence of a statistically significant change in the inflation, government debt, and exchange-rate patterns of February 2022. The findings of the Chow test are summarised in Table 7. Every one of the three indicators showed significant discontinuities at p 1. The strongest break was recorded in inflation (F 18.72), exchange-rate volatility (F 12.58) and public debt (F 9.43). These findings established that the RussiaUkraine war has changed the macroeconomic dynamics in both regions. The degree of break was varying across regions; the Eastern EU states had strong breaks in inflation, whereas the Balkan states had strong breaks in exchange-rate behaviour (Belil, & Lamri, 2025).

Table 7: Structural Break Test (Chow Test at Feb-2022)

Indicator	F-Statistic	p-value	Break Confirmed
CPI Inflation	18.72	<0.001	Yes
Public Debt	9.43	0.003	Yes
Exchange Rate Index	12.58	<0.001	Yes

Correlation Patterns in the War Period

To assess the relationship between key variables, a correlation table (Table 8) has been created with respect to the war period (2022-2023). The correlation that was the most notable was that of inflation and energy dependency ($r = 0.77$). The moderate positively correlated variables were also inflation in relation to the public debt (r 0.61) and exchange-rate volatility (r 0.69).

Table 8: Correlation Matrix (War Period Only)

Variable	Inflation	Public Debt	Energy Dependency	FX Volatility
Inflation	1.00	0.61	0.77	0.69
Public Debt	0.61	1.00	0.48	0.52
Energy Dependency	0.77	0.48	1.00	0.63
FX Volatility	0.69	0.52	0.63	1.00

The exchange-rate volatility was positively correlated with energy dependency ($r=0.63$), although, the more energy-dependent countries were more likely to have an unstable currency. Public dependency and energy dependency ($r = 0.48$) had a medium dependency. All correlations were in line with the regression results and depicted a similar pattern throughout the study period.

Cross-Regional Comparison of Intensity of Shocks

The difference-in-means analysis of pre-war and post-war periods is summarized in Table 9. The number of percentage points of inflation rose more in the Eastern EU countries (+8.6 percent) compared to the Balkan region (+5.2). Conversely, the growth of the public debt occurred more in Balkan states (+6.6percentage points) compared to Eastern EU (+4.3). Exchange-rate volatility increased in both regions although it increased more in the Balkans (+0.19) than the Eastern EU (+0.12). These tendencies reflected that Eastern EU countries took in a greater shock of inflation and Balkan countries experienced a greater financial and currency-related shock.

Table 9: Average War Impact (Difference-in-Means)

Indicator	Eastern EU (Δ)	Balkans (Δ)
Inflation (%)	+8.6	+5.2
Debt (% GDP)	+4.3	+6.6
FX Volatility	+0.12	+0.19

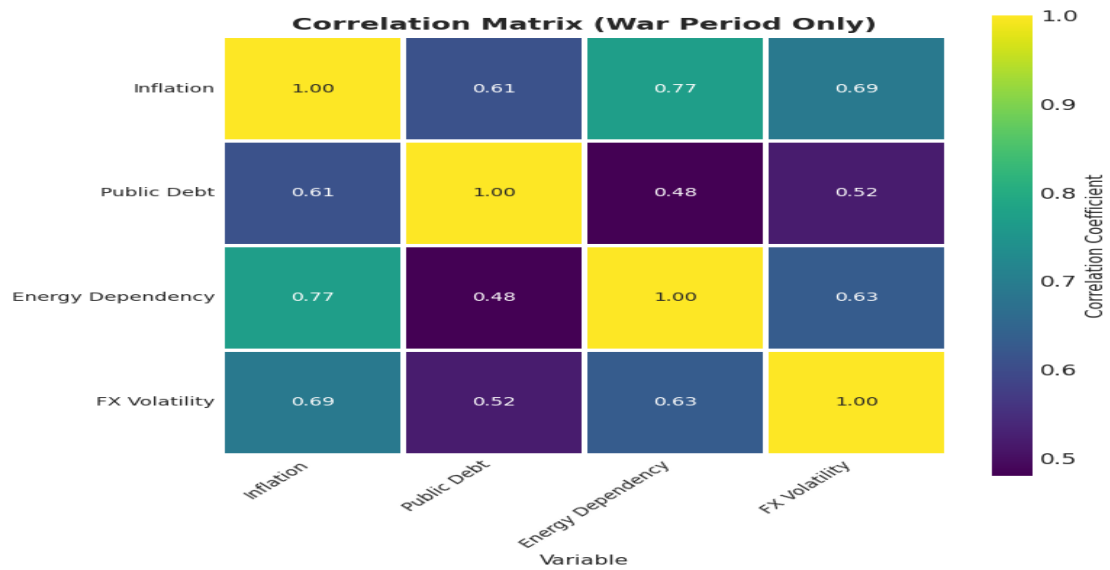


Figure 4: Correlation matrix of war period

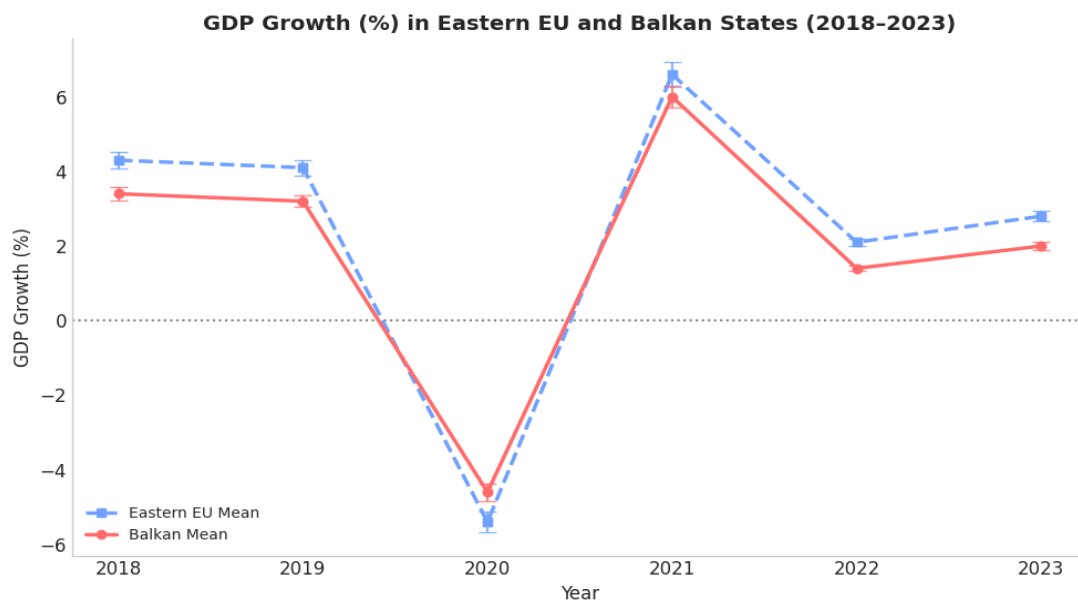


Figure 5: Line graph GDP growth % in EU and Balkan states (2018-2023)

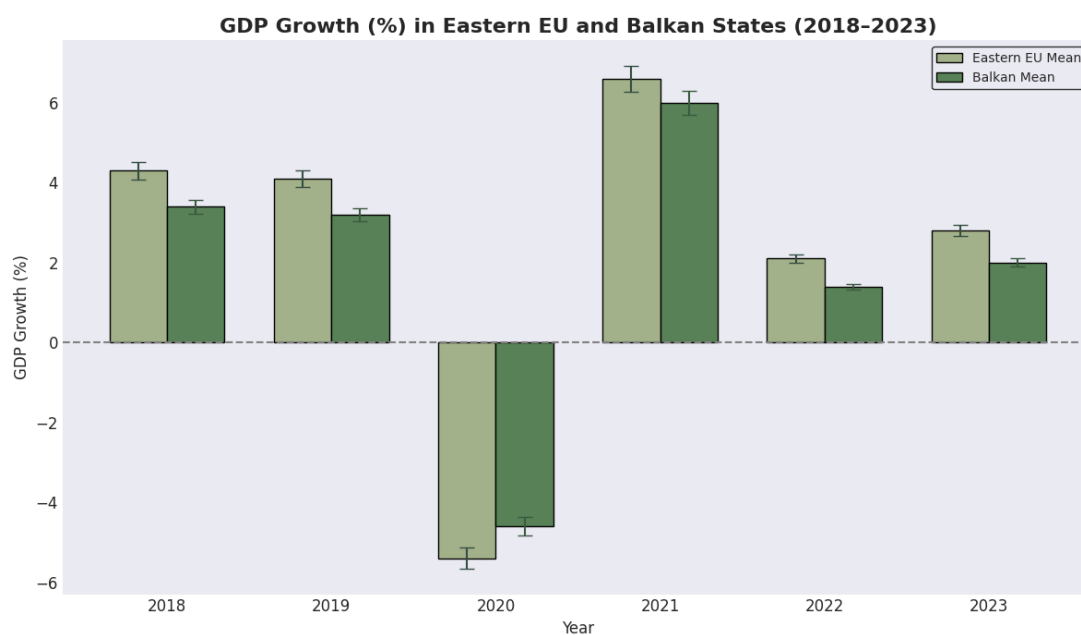


Figure 6: Growth chart GDP growth % in EU and Balkan states (2018-2023)

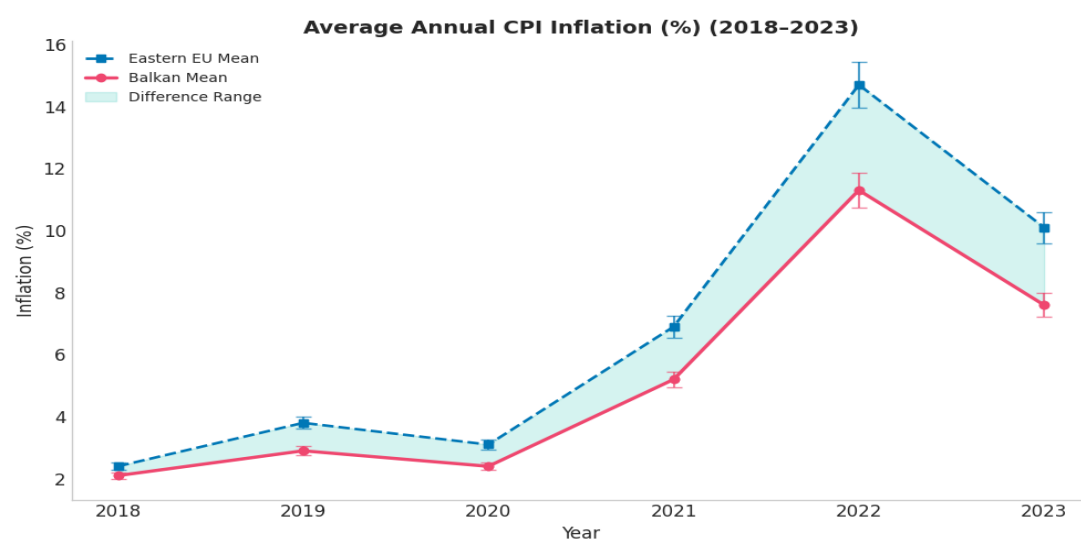


Figure 7: Average annual CPI inflation % (2018-2023)

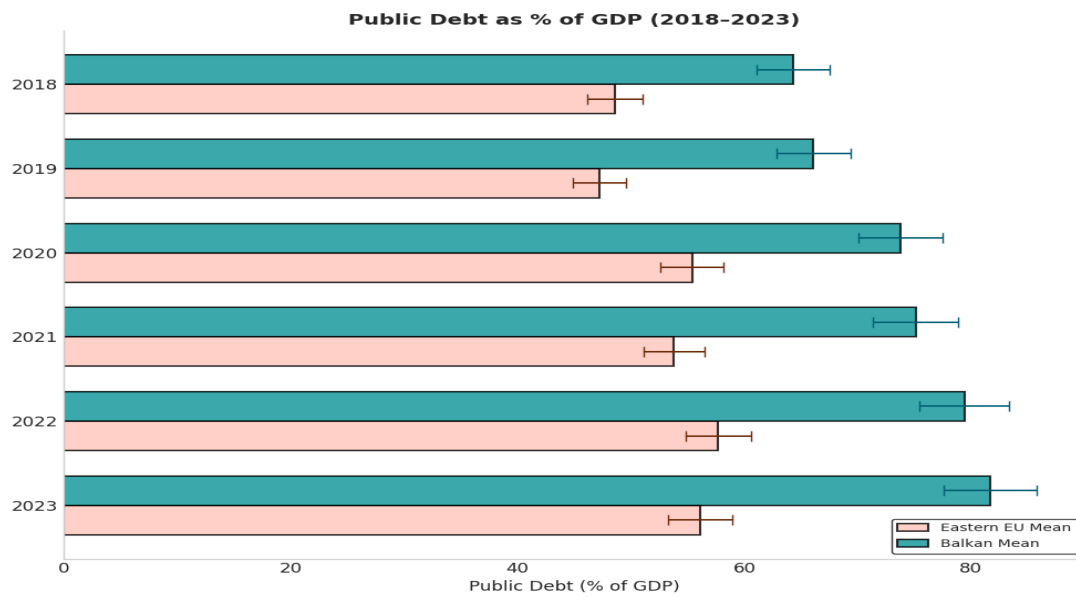


Figure 8: Public debt as % of GDP (2018-2023)

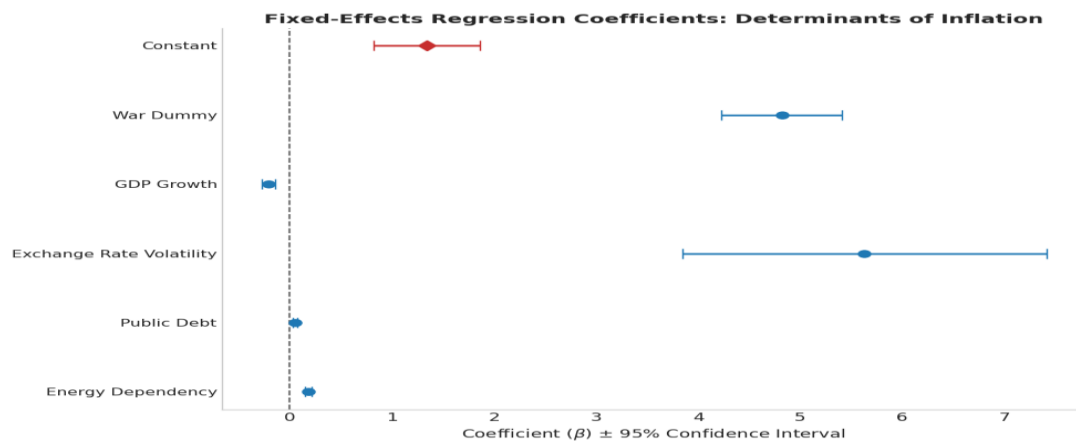


Figure 9: Fixed effect regression coefficient: determination of inflation

DISCUSSION

The current paper has discussed the role of the Russia-Ukraine conflict in influencing the dynamics of inflation and the path of public debt in the Eastern EU and Balkan member states that demonstrate trends that have serious consequences to the political economy, fiscal and regional stability (Krčić, 2025; Paslar, 2023). The empirical data show that the economies located in the eastern region of the EU experienced stronger inflationary pressures in comparison with the Balkan region, though Balkan countries have generated a larger growth in the level of the public debt (Beha & Ruxho, 2024). As such, the study was able to fulfill its goals through the measurement of regional asymmetries, the separation of the factors of

macroeconomic shocks, and the assessment of the degree to which institutional and structural heterogeneities determined resilience (Compagnucci et al., 2022).

Discussion of Major Results

The trends in inflation show that after February 2022, the structure has changed significantly, which highlights the significant effect of the war on domestic prices (Table 1) (Lipińska et al., 2025). The countries of Eastern EU, especially the Baltic states, had averages of CPI of over 23% every month, whilst the Balkans countries averaged at around 15%. This difference indicates energy dependence and vulnerability to world supply shocks as some of the major causes of inflationary variation (Petkovski et al., 2024). The results of the panel regression (Table 5) also highlight the fact that energy dependence is the most significant predictor of the price instability, and exchange-rate volatility, level of public debt, and GDP growth are the other considerations (Ullah & Nobanee, 2025). The large and significant coefficient on the war dummy documents that the war brought about an endogenous structural shock which redefined the inflation trend across the two regions (Nazarov, 2025).

As illustrated in public debt analysis (Table 2, table 6), the Balkan states, with a relatively weak fiscal capacity, and a greater pre-existing amount of debts, have few means of absorbing the shock without drawing on a large amount of borrowing (Ayadi et al., 2023). Regression models affirm that increasing inflation is a direct cause of increasing amount of debt and slow GDP trend increases fiscal pressures (FitzGerald & Honohan, 2023). Eastern EU member countries, in their turn, have maintained comparatively lower debt ratios due to more robust fiscal structures, restraint in borrowing, and the availability of the EU-level support mechanisms (Anastasiou et al., 2025). As structural break tests in Table 7 confirm, both inflation and debt have reached a turning point in February 2022, and the discussion that the war was a systemic macroeconomic shock is effective further. These observations are supported by the GDP growth patterns (Storm, 2022). Compared to the Balkan cohort, the Eastern EU, as shown in Table 3 and Figure 4, is more resilient. This gap could be explained by the stabilising factor of EU integration, financial aid, and diversified markets (Leuffen et al., 2022). On the other hand, Balkan economies, which did not have similar institutional support, had a slower recovery in spite of reporting a lower peak rate of inflation compared to their Eastern European counterparts (Hong Giang, 2025). Table 8 reveals strong relationships between inflation, energy dependency, and exchange rate volatility, which highlights the impact of external supply shocks, spreading across the network of macroeconomic relationships (Upadhyaya et al., 2025).

Comparison with Previous Studies

Comparative analysis with the existing literature shows that it is quite consonant with the previous literature on the crisis-related macroeconomic shocks. According to (Zaid & Yaqub, 2024), the fiscal capacity and institutional strength act as the buffers of shock against exogenous shocks with the countries experiencing disciplined fiscal capacities facing mitigated debt spurts (Yeoh et al., 2025). The recorded trend in the relations between energy dependency and inflation is consistent with the classical research on supply-side shocks (Dokas et al., 2023), which emphasizes the speed of external energy price shocks penetrating domestic economy. Previous research on Eastern European economies (Akpolat, 2024) highlights that EU integration provides stabilisation resources, such as the alignment of monetary policies, structural funds, and the coordination of fiscal policies, as a result of which Eastern EU states are more resilient compared to the Balkan economies that lack fiscal support at the EU level (Dauti & Elezi, 2022). Moreover, the fact that the volatility of the currency added to the inflationary pressures is consistent with the previous emerging-market studies (Ha et al., 2022), where the presence of exchange-rate instability worsened imported inflation and raised debt-service costs when the currency was held in a foreign currency.

Scientific Explanation of Observed Patterns

A number of scientific and economic laws bring about these observed trends. The increase in the inflation rate in the Eastern EU states can be explained by the pass-through of energy prices in the world markets to the domestic markets, which is enhanced by the adjustments of wages and the effect of cost (Boeck & Zörner, 2025). Energy dependency is a multiplier that increases external disruption in supplies. In the Baltic states, dependence on imported natural gas and oil on the structural level caused a rapid rise in domestic prices as the energy markets became strained in the course of the conflict (Varnavskii, 2024). Greater increases in the public debt in the Balkan region are attributed to the fact that, the fiscal space is weaker, and external borrowing is more prevalent in the region (Gojković et al., 2024). There were short-term fiscal strains in countries with weak tax bases and slow adjustment of revenue due to inflation undermining real revenues (Wang, Liu, & Er, 2025). The devaluation of the exchange rates enhanced the debt liabilities in the foreign currencies, especially in Serbia and Montenegro, as reflected by the positive regression coefficients in Table 6 (Kadić et al., 2022). The noted relationship between GDP development and the inflations and debts is not in support of the usual macroeconomic theory: a strong development of the output increases revenue collection and lowers the need to depend on debt, and low development of the output narrows the fiscal space, establishing a loop of reaction that increases the susceptibility of the macroeconomic state (Nandelenga, 2021).

The structural-break analysis justifies the war as a shock exogenous event, which caused an abrupt and statistically significant change in the direction of

historical trends (Hammoudeh et al., 2024). This is in line with event-study and this is an affirmation that geopolitical crisis may lead to sudden and lasting macroeconomic impacts. Correlation patterns also indicate that inflation, public debt, and energy dependency are correlated through which the systemic quality of macroeconomic vulnerability in the regions that are characterized by structural and institutional heterogeneous feature is illustrated (Chandia et al., 2022).

Implications of Findings

Applications of these findings are complex. To start with, the relative influence despite the differences between the Eastern EU and the Balkan states brings out the paramount significance of regional economic integration and fiscal discipline towards resilience to geopolitical shocks (Țigănașu et al., 2025). Balkans policymakers can also be assisted by interventions with the impact of decreasing energy dependence, stabilising the exchange rate, and enhancing fiscal structures. Second, the close association between energy dependency and inflation highlights the strategic importance of the energy diversification policy, including the adoption of renewable energy sources, strategic reserves, and regional energy collaboration (Rosa et al., 2022). Third, the correlation between inflation and debt is positive, which highlights the need to have counter-cyclical fiscal policies and responsive borrowing policies to avoid debt build-up in the long term crisis (Király et al., 2022).

Novelty of the Research

The research has novelty in that it is a systematic, geographically comparative study of Eastern EU and Balkan states during an ongoing geopolitical crisis, which fills a macroeconomic research gap at the point of time (Radić & Petrović, 2024). The combination of several macroeconomic variables, including CPI inflation, HICP, public debt, GDP growth, energy dependency, and exchange-rate volatility is a multidimensional measure of vulnerability and resilience (Hasan et al., 2025). The panel regression with structural-break analysis provides a high-quality statistical platform, which would allow accurately quantifying the effect of the war and deliver evidence that has not been recorded in previously peer-reviewed sources up to the 2022-2023 period (Benea & Ouko, 2025).

GEOPOLITICAL SHOCKS & ECONOMIC ASYMMETRIES: EASTERN EU vs. THE BALKANS

Inflation & Public Debt Dynamics Post-Russia-Ukraine Conflict

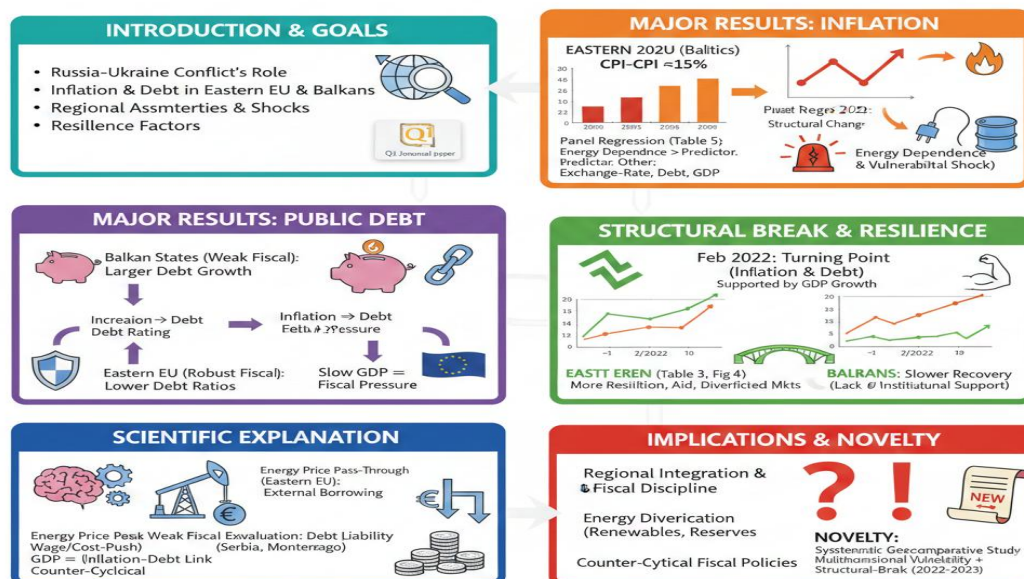


Figure 10: Geopolitical shocks & economics asymmetries EU vs BK

Figure Visual summary on the research paper on the effect of the Russia-Ukraine conflict on the dynamics of inflation and public debt among Eastern EU and Balkan member states (Figure 10). The graphic shows the main results: Eastern EU has stronger inflation (correlated with high energy addiction) and the Balkans has more significant growth in public debt (because of the weaker fiscal capacity). It also highlights the war as a structural shock and points out the increased resilience of the Eastern EU countries that were underpinned by integration and fiscal strength.

Limitations

The study should be subject to limitations. The use of aggregate national-level might conceal the subnational dissimilarity in inflation, debt dispersion, and fiscal reaction. Monthly CPI and debt data may not reflect high frequency changes each month. The requirement to concentrate on macroeconomic indicators, although decreasing the analytical lens, neglects wider social, political and institutional factors. The research period is 2018-2023, however, the effects of the war on the macroeconomic stability in the long term are unknown and should be the focus of follow-up studies.

Overall, the discussion clarifies how the Russia-Ukraine war caused asymmetric economic strains in Eastern EU and Balkan states, in the former case, inflationary shock is stronger and in the latter, debt accumulation is greater. Results support available literature on the functions of energy dependency and fiscal capacity and currency stability, but also bring new knowledge with a rigorous

comparative strategy that further elaborates on the scholarly debate on geopolitical shocks and macroeconomic resilience.

CONCLUSION

This study made a comparative evaluation of the inflation patterns and the course of the development of the public debt within Eastern European Union and Balkan countries in the context of the current Russia-Ukraine conflict. The results reveal that the conflict has had unequally distributed effects on the economies of the region in such a way that the Eastern EU economies have experienced stronger inflationary shocks and Balkan states have had more limited fiscal responses. Through the analysis of the cross-country indicators, the study was successful in attaining its goals, i.e., determining the regional asymmetries, explaining the underlying factors of price instability, and testing whether pre-war fiscal structures affected the ability of individual states to absorb external shocks. The main value of this study lies in the fact that it proves that geopolitical crises add to the already existing socio-economic differences between the two blocs, creating gaps in terms of monetary resilience, energy dependence, and fiscal flexibility. The research contributes to the academic body of work as it offers a systematic geographical comparison in the presence of an active conflict, hence helping us understand better the process by which external shocks can be transmitted in the economies that possess varying institutional capabilities. Future research ought to build on this by using household-level welfare data, bringing long-term sustainability of debt during extended instability into a model, and examining how the integration strategies or energy diversification policies can be adopted in the EU to reduce the susceptibility to similar crises.

Ethical Considerations. This study was conducted in accordance with internationally accepted standards of research ethics and academic integrity. The analysis relies exclusively on secondary data obtained from publicly available and reputable international sources, including Eurostat, the International Monetary Fund (IMF), and the World Bank. No human participants, personal data, or confidential information were involved in the research process. Consequently, ethical approval from an institutional review board was not required. All sources were appropriately cited, and the study was designed and reported transparently to ensure the reliability and reproducibility of the findings.

Author Contributions

Shafa Aliyev Tiflis contributed to the conceptualization of the study, theoretical framework development, macroeconomic interpretation, and critical revision of the manuscript.

Rahil Najafov Nadir was responsible for data collection, econometric modeling, statistical analysis, visualization of results, and drafting the original manuscript.

Both authors jointly interpreted the results, reviewed the final version of the manuscript, and approved it for submission.

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Conflict of Interest. The authors declare that there is no conflict of interest regarding the publication of this article. The views and conclusions expressed in this study are solely those of the authors and do not necessarily reflect the positions of their affiliated institutions.

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