• FINANSE I PRAWO FINANSOWE •

• JOURNAL OF FINANCE AND FINANCIAL LAW •

grudzień / december 2025 • vol. 4(48): 177–206
https://doi.org/10.18778/2391-6478.4.48.08

COPE Member since 2021 JM15102

Carolyne C. Soper https://orcid.org/0000-0001-9037-138X
Department of Economics, Central Connecticut State University New Britain
e-mail: mailto:soperc@ccsu.edu

EURO ADOPTION AND INFLATION STABILITY: EARLY EVIDENCE FROM CROATIA AND THE CZECH REPUBLIC

ABSTRACT

The purpose of the article is to explore the link between monetary policy regimes and inflation dynamics in small open economies. Croatia and the Czech Republic provide a natural experiment for examining how small open economies with different monetary frameworks respond to global and regional shocks, including euro adoption and other external disturbances. The analysis sheds light on how institutional arrangements affect the stability of inflation rates in the presence of global shocks.

Methodology includes a Vector Autoregression (VAR) approach with monthly data covering the period from 2000 to 2024 and is complemented by Granger causality tests, as well as a structural break analysis to account for major events such as the global financial crisis in 2008, the COVID-19 pandemic in 2020, the 2022 European energy shock, and Croatia's euro adoption.

The results of the empirical analysis reveal that euro adoption is associated with reduced short-term inflation volatility but weaker responsiveness to external shocks, while monetary independence allows greater policy flexibility at the cost of heightened inflation variability. These findings provide early evidence on the inflation-stabilizing role of euro adoption and contribute to ongoing policy debates on monetary integration within the European Union.

Keywords: Euro Adoption, Inflation Stability, Monetary Policy, Structural Breaks

JEL Class: C32 E31 E42 E52 F41 F45

Received: 18.09.2025. Accepted: 19.11.2025.

Funding information: Not applicable. **Conflicts of interests:** None. **Ethical considerations:** The Author assure of no violations of publication ethics and take full responsibility for the content of the publication.

Introduction

Monetary policy is a crucial tool to maintain price stability and support economic growth in any country, but it plays an even more important role in small open economies that are highly exposed to global market conditions. The European Union (EU) provides a unique and interesting case for comparing the effects and performance of different monetary policy regimes. EU member states face a trade-off between adopting the euro as a common currency and giving up control over monetary policy to the European Central Bank (ECB) or maintaining their national currency and full independence in terms of domestic monetary policy decisions. This institutional design has a significant impact on the ability of countries to control inflation, adjust interest rates, and react to economic shocks, with implications for their overall macroeconomic performance.

Croatia and the Czech Republic are two EU countries that have taken different paths in terms of their monetary policy framework. Croatia joined the euro area in 2023, replacing its national currency, the kuna, with the euro and ceding its monetary authority to the ECB. As a result, Croatia is now part of a centralized monetary regime that aims to maintain price stability in the euro area as a whole, and that does not necessarily reflect or react to the specific conditions of the Croatian economy. On the other hand, the Czech Republic has retained the Czech koruna (CZK) as its national currency and full control over its monetary policy through the Czech National Bank (ČNB). The Czech monetary authorities have more freedom and flexibility to respond to domestic inflationary pressures and external shocks by adjusting interest rates, exchange rate interventions, or other policy tools as they see fit.

Euro adoption is associated with several potential benefits, including eliminating currency risk and transaction costs, improving transparency, and facilitating financial integration with the rest of the EU. However, it also implies

giving up a key policy instrument that could be used to cushion against region-specific economic disturbances and maintain macroeconomic stability. On the other hand, an independent currency allows for more fine-tuning and adjustment of inflation and interest rates in response to changing economic conditions, but it also exposes the country to greater risks of exchange rate volatility, speculative capital flows, and inflationary spillovers from external shocks.

The purpose of this research is to examine whether euro adoption has been associated with greater stability of inflation in Croatia relative to the Czech Republic, which has maintained full monetary independence. The analysis is based on monthly data from 2000 to 2024 and incorporates several major global disruptions, including the 2008 financial crisis, the 2020 COVID-19 pandemic, and the 2022 European energy crisis, that provide a critical context for assessing inflation dynamics under different monetary regimes.

The central hypothesis of this study is that monetary regimes shape how small open economies respond to shocks and maintain inflation stability. Euro adoption is expected to contribute to reduced short-term inflation volatility through credibility and expectation-anchoring effects, whereas an independent monetary policy allows for more flexible responses to global and regional shocks but may result in greater variability. Because Croatia's post-euro experience is still limited, the findings are preliminary and should be interpreted as evidence of early transitional effects rather than definitive long-run outcomes. Accordingly, the study asks how Croatia and the Czech Republic differ in their inflation responses to global and regional shocks under distinct monetary frameworks, and whether these differences support the view that monetary regimes condition the stability and transmission of inflation dynamics. To answer this question, the analysis employs a Vector Autoregression (VAR) model, supported by Granger causality tests and structural break analysis, to evaluate the

relationships among inflation, monetary policy instruments, and exchange rate movements in both economies.

The paper is organized as follows: the next section provides a literature review on the relevant topics, while the second section describes the data. The third section discusses the methodology used in the research, while the fourth section presents the empirical results and their interpretation. The study concludes with research limitations, and potential policy implications.

1. Literature review

Inflation behavior across Central and Eastern European (CEE) economies is driven by institutional variations in the design of monetary policy frameworks, exchange rate regimes and central bank credibility. In this respect the region offers a natural experiment for comparative research, as it CEE member states have followed significantly different paths since the early 1990s. On the one hand some have given up their monetary sovereignty and adopted the euro, while on the other hand a set of countries opted to keep their own currency, backed by an inflation-targeting regime. This creates scope for studying the consequences of institutional design on the behavior of inflation in small open economies, which are typically more exposed to external forces.

A significant portion of the literature has emphasized that CEE economies cannot be analyzed in isolation from international factors. Jiménez Rodríguez, Morales Zumaquero and Égert (2010) is one of the first studies that present some stylized facts of how inflation in the region is very responsive to external shocks such as changes in commodity prices, euro area and US developments. The authors show the dilemma that these small open economies face in that they need to address the problem of domestic price stability, but at the same time they need to accommodate some shocks that they cannot influence. Their contribution, which also contains important information on import-

ed inflation, has become particularly relevant during times of global uncertainty, such as the COVID-19 pandemic or the 2022 European energy crisis. The study lays the groundwork for understanding the interaction between international factors and the domestic monetary policy framework in determining inflation in the region.

Croatia's journey to euro adoption provides a compelling illustration of how structural changes influence inflation behavior. Prior to accession, Perović (2015) explored Croatia's pre-euro inflation patterns, emphasizing the role of the kuna as a nominal anchor and assessing its impact on expectations. He argued that credibility was anchored in exchange rate stability and that the supranational shift would alter monetary policy transmission dynamics. This observation proved prophetic. At the time of euro adoption in January 2023, Croatia experienced an initial inflation uptick linked to rounding and adjustment effects. Sorić (2024) documents that these effects were transient, driven by technical adjustments rather than underlying demand. Falagiarda et al. (2023) corroborate this finding, confirming the temporary nature of rounding effects and highlighting a subsequent decline in volatility. Supporting evidence from Šokčević, Mišević, and Milisavić (2024) reveals that inflation expectations and investor confidence improved under ECB-led monetary policy, reinforcing the stabilizing impact of supranational credibility.

The institutional basis for such results is strongly established in the existing literature. Clarida, Galí and Gertler (2000) underline the significance of predictability and transparency of frameworks as prerequisites for anchoring expectations. By acceding to the ECB's rule-based system, Croatia adopted an institutional framework specifically engineered to promote stability and minimize uncertainty. Andrieș, Nistor and Sprincean (2020) further argue that transparency itself is a key determinant of resilience, demonstrating that credible

communication can reduce systemic risk and strengthen policy effectiveness. Therefore, Croatia's accession has contributed to improved macroeconomic stability, even in the absence of national policy instruments.

However, euro adoption does come with trade-offs. Berend and Prüser (2024) caution that while membership synchronizes inflation cycles with the rest of the euro area, it decreases the ability to tailor policy responses to domestic conditions. In similar vein, De Grauwe (2018) warns that monetary unification can exacerbate divergence when structural reforms do not keep pace with integration. These insights shed light on why Croatia, while benefiting from enhanced credibility and lower volatility, may now need to rely more on fiscal and structural policies to absorb idiosyncratic shocks.

The Czech Republic is in some sense the opposite case. There, full monetary independence has been maintained (through the Czech National Bank, or CNB). This has entailed a floating exchange rate and an inflation-targeting regime, which can be used to respond more directly to domestic economic conditions. Lesuisse (2019) notes both advantages and disadvantages of this approach. On the one hand, the CNB is able to adjust its interest rates quickly, which it did, for example, in 2021–2022 to counter pandemic-induced supply shocks and higher energy prices. On the other hand, the openness of the economy to trade and capital flows implies that spillovers from ECB policy will remain an important consideration.

The cost of this independence has been questioned by scholars. Wawrosz and Křížek (2025) point out that, while autonomy allows for timely interventions, it also heightens exposure to volatility through exchange rate pass-through. Ábel and Siklos (2023) argue that flexible regimes permit short-term stabilization but do not ensure sustained price stability. Taylor (2000) offers a theoretical foundation for these arguments, demonstrating that the pass-

through effect is mitigated in low-volatility environments but is significantly stronger during high-volatility periods. The Czech Republic's experience post-pandemic exemplifies this mechanism: external shocks, transmitted via the koruna, exacerbated inflation variability despite CNB interventions.

The research conducted by Baxa, Horváth, and Vašíček in 2013 demonstrates that inflation expectations within inflation-targeting countries react strongly to central bank announcements. The CNB's credibility has been enhanced by transparent signaling, enabling markets to anticipate policy moves more effectively. Pokorný (2023) offers an in-depth analysis of how communication strategies bolstered public trust and policy effectiveness, even during global disruptions. These studies imply that independence needs not just flexible instruments but also credibility and transparency to maintain stability.

The comparative literature also brings out the trade-offs involved in both countries' choices. Croatia's euro adoption has brought credibility and stability benefits (Falagiarda et al., 2023; Sorić, 2024; Šokčević et al., 2024), but at the cost of national discretion (De Grauwe, 2018; Berend & Prüser, 2024). The Czech Republic, on the other hand, has retained flexibility (Ábel & Siklos, 2023; Wawrosz & Křížek, 2025) but has faced higher volatility stemming from exchange rate pass-through (Taylor, 2000; Jiménez Rodríguez et al., 2010). Aksman (2005) argues that inflation convergence often lags behind monetary convergence when fiscal and structural reforms are lacking, a reminder that both cases depend on the broader institutional environment.

These debates have also been connected to methodological issues. Bai and Perron (2003) have shown how the structural break methodology can be employed to determine turning points in the inflation dynamics. Petrevski (2023), on the other hand, discusses the usefulness of VAR modelling and causality testing under uncertainty. These and other similar tools have by now be-

come part of a standard toolkit for analysis of how exogenous shocks and institutional arrangements are intertwined.

Before turning to the empirical findings, it is useful to recall the main structural differences between the two economies that shape how monetary policy operates. El-Shagi and Tochkov (2022) describe the Czech Republic as a highly open, manufacturing-oriented economy closely linked to European value chains, particularly with Germany, making it more sensitive to euro-area spillovers. Grabowski and Stawasz-Grabowska (2021) further demonstrate that European Central Bank policy measures exert measurable effects on financial markets in Central and Eastern Europe, reinforcing the Czech Republic's exposure to cross-border monetary dynamics. In contrast, Srdelić and Dávila-Fernández (2024) highlight that Croatia is a services-based economy heavily dependent on tourism, where seasonal demand patterns and exchange-rate management have historically influenced inflation dynamics. Radvan (2024) notes that the Czech National Bank's independent inflation-targeting regime has preserved domestic policy flexibility but also exposure to external shocks, whereas Szapáry and Vonnák (2024) find that Croatia's shift from a managed exchange-rate regime to full euro adoption in 2023 reduced monetary autonomy but enhanced credibility and financial stability. These contrasts clarify the rationale for comparing the two countries in the empirical analysis that follows.

The next section contains the empirical analysis which is based on comparing Croatia and the Czech Republic in the period 2000–2024 with a view to evaluate how euro adoption as opposed to monetary independence affected inflation stabilization.

2. Data

The dataset analyzed in this study consists of monthly observations from January 2000 through December 2024. This frequency offers a balanced approach: it captures medium-term inflationary dynamics and policy responses while filtering out short-term noise that might distort the identification of structural changes or monetary policy impacts. The 24-year window allows for an assessment of pre- and post-crisis periods, euro adoption effects, and recent inflation surges related to global shocks.

Data was sourced from reliable and publicly available institutions:

- **Federal Reserve Economic Data (FRED)**: Provided consumer price index (CPI) data for both Croatia and the Czech Republic, 3-month interbank lending rates, real GDP growth, and unemployment rates. The CPI data are harmonized (HICP) to ensure comparability across EU member states.
- **European Central Bank (ECB)**: Supplied the Deposit Facility Rate, which is used in this study as the primary policy rate proxy, as well as official exchange rates for the Croatian kuna (HRK/EUR) and Czech koruna (CZK/EUR). These series allow for consistent measurement of currency effects and monetary alignment.

The data was cleaned and transformed as necessary. The inflation and interest rate series were converted to percentage changes where appropriate. Log transformations were applied to the exchange rate and GDP series to improve stationarity. All time series were tested for unit roots using ADF tests prior to VAR estimation.

Preliminary inspection reveals that both Croatia and the Czech Republic experienced significant economic disruptions during the 2008–2009 finan-

cial crisis and the 2020–2021 COVID-19 period, with strong rebounds afterward. Despite recent inflationary spikes in 2022–2023, both countries have returned to moderate inflation levels by 2024, although volatility remains higher in the Czech Republic. These descriptive trends underscore the importance of evaluating not only inflation levels, but also the transmission of monetary policy across different regimes.

3. Methodology

To evaluate whether different monetary regimes are associated with differences in inflation stability, this study employs a Vector Autoregression (VAR) framework to analyze the dynamic relationships among inflation, exchange rates, interest rates, and GDP in Croatia and the Czech Republic. This approach is well suited to capturing the feedback loops and interdependencies that characterize small open economies.

The VAR model is complemented by two additional tools that directly support the research question. First, Granger causality tests are used to assess whether policy rates or exchange rate movements help predict inflation outcomes, shedding light on the strength of monetary transmission channels under each regime. Second, structural break analysis (Bai-Perron methodology) is applied to identify major shifts in inflation dynamics around global shocks (2008 financial crisis, COVID-19 pandemic, 2022 energy crisis) and institutional change (Croatia's euro adoption). Together, these methods provide a basis for assessing whether Croatia's transition into the euro area coincided with a change in inflation volatility, and how its experience compares with the Czech Republic's independent policy framework.

$$HR\_Inflation_t = c_1 + a_{11} \times HR\_Inflation_{t-1} + a_{12} \times CZ\_Inflation_{t-1} + a_{13} \times ECB\_Rate_{t-1} + a_{14} \times Exchange\_Rate\_HR_{t-1} + a_{15} \times Exchange\_Rate\_CZ_{t-1} + E_{1,t} \quad (1)$$

The 5-variable VAR(1) model includes one equation for each endogenous variable, with each specified as a linear function of its own lag, the lags of the other variables in the system, a constant term, and an error term. The remaining equations follow the same structure, with each endogenous variable appearing on the left-hand side. Variable definitions are provided in Appendix A: Variable Definitions. Each equation shows how the current value of a variable (for example, Croatia's inflation) is determined by its own value from the previous month, the previous month's values of the other four variables, a constant, and a random error term. This structure allows us to capture the dynamic interplay between inflation, interest rates, and exchange rates for both Croatia and the Czech Republic, as well as the influence of the ECB's policy rate.

The Vector Autoregression (VAR) model with a lag order of two, is selected based on the information criteria. This stands as a suitable methodology because of the macroeconomic variables' interconnected dynamics. The two-period lag structure shows that economic outcomes appear within two cycles in these economies while representing both direct and follow-up effects from policy adjustments and external disturbances. Multiple analytical techniques work together within this methodology to enable a thorough investigation of how monetary policies transmit through various currency systems. Granger Causality Tests evaluate how monetary policy and exchange

rate fluctuations influence inflation trends by uncovering causal links between these variables and the timing of policy transmission effects. The analysis also examines whether the ECB rate decisions and exchange rate movements can predict inflation developments in both economies with statistical significance. Two-sample t-tests combined with the Bai-Perron methodology detect substantial breaks in inflation time series related to significant economic events such as the 2008 global financial crisis and the COVID-19 pandemic in 2020 through to Croatia's euro adoption in 2023 and the 2022 energy crisis. This methodology allows researchers to detect inflation regime shifts and assess the statistical significance of structural changes within both monetary systems. Impulse Response Functions (IRFs) model the time-based impact of monetary policy and exchange rate shocks on inflation to demonstrate how individual economies react to such external disturbances along multiple timeframes. IRFs help visualize the magnitude and persistence of inflation responses to standardized shocks while showing their direction which enables direct comparisons between Croatia's euro-based monetary system and the Czech Republic's independent monetary policy framework.

In advance of VAR model estimation, a view of the basic relationships among the variables considered, as well as a preliminary check on multicollinearity, was obtained by examining pairwise correlations. Table 1 shows the descriptive correlation matrix for the five principal variables used in the model: inflation rates in Croatia and the Czech Republic, the ECB deposit facility rate and bilateral exchange rates. Correlations are in general quite low, offering no immediate hint of multicollinearity and permitting inclusion of all five variables in the VAR specification

Table 1.

Descriptive Statistics of VAR Model Variables

	HR_Inflation	CZ_Inflation	ECB_Rate	Exchange_ _Rate_HR	Exchange_ _Rate_CZ
HR_Inflation	1	−0.166	−0.033	−0.216	−0.054
CZ_Inflation	−0.166	1	−0.032	−0.001	−0.032
ECB_Rate	−0.033	−0.032	1	0.09	0.036
Exchange_Rate_HR	−0.216	−0.001	0.09	1	0.038
Exchange_Rate_CZ	−0.054	−0.032	0.036	0.038	1

*n = 288 observations

Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

4. Results

The study shows that Croatia achieved inflation stability through euro adoption while the Czech Republic faced increased inflation fluctuations because of its independent monetary policy. The analysis discovered distinct variations in monetary transmission mechanisms and structural breaks. To assess the performance and robustness of the estimated VAR models, several key statistics and diagnostic tests were conducted.

Table 2 summarizes the main results for Croatia and the Czech Republic, comparing key model diagnostics, correlation metrics, Granger causality tests, impulse response observations, and structural break tests.

Table 2.

Summary of Results: Croatia vs Czech Republic

Statistics / Test	Croatia (HR)	Czech Republic (CZ)	Notes
Final Prediction Error (FPE)	1.21e-32	1.21e-32	VAR model fit (both countries)
Inflation Correlation (r)	0.970 (with CZ)	0.970 (with HR)	Very strong correlation
Exchange Rate vs. Inflation (correlation)	Significant negative	Significant negative	Exchange rate pass-through effects
Granger causality: ECB Rate → Inflation (lag 1)	$p > 0.45$ (not significant)	$p = 0.0836$ (marginally significant)	CZ sensitive to ECB decisions
Granger causality: Exchange Rate → Inflation	$p > 0.40$ (not significant)	$p > 0.10$ (not significant)	Limited pass-through in both
Impulse Response to ECB Rate Shock	Muted response	Pronounced response	CZ shows stronger, cyclical adjustment
Impulse Response to Exchange Rate Shock	Stable, muted	Initial negative, cyclical adjustment	
Structural Break: Financial Crisis (9/2008)	1.2 ($p = 0.15$, not significant)	1.5 ($p = 0.12$, not significant)	No major inflation regime shift
Structural Break: COVID-19 (3/2020)	3.04 ($p = 0.0159$, significant)	5.18 ($p = 0.0014$, significant)	Strong inflation surge in both
Structural Break: Energy Crisis (1/2022)	5.65 ($p = 0.0000$, significant)	7.68 ($p = 0.0000$, significant)	Major inflation surge
Structural Break: HR Euro Adoption (1/2023)	3.77 ($p = 0.0462$, significant)	4.61 ($p = 0.0741$, marginally significant)	Inflation jump at euro adoption

Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

4.1. Inflation Co-Movement and Baseline Fit (VAR results)

The VAR model exhibited an excellent overall fit through its extremely low Final Prediction Error (FPE) value of 1.21e-32 which demonstrated its strong explanatory power for the specified relationships and its effective capture of the underlying economic dynamics. There was a powerful link between Czech and Croatian inflation rates with a 0.970 correlation coefficient indicating similar inflation patterns which persisted despite their distinct monetary policy approaches. The strong correlation between the economies demonstrates that both respond similarly to external factors including global commodity prices and supply chain disruptions regardless of their distinct monetary policies which challenges the idea that different monetary regimes produce different inflation outcomes. The analysis showed significant negative correlations between exchange rates and inflation in both countries which points to exchange rate pass-through effects that cause currency depreciation to heighten inflation via increased import costs, yet these effects vary in strength between the two examined economies.

4.2. Transmission Channels: Policy Rates and Exchange Rates (Granger causality)

The Granger Causality tests identified complex variations in the way monetary policy affected each country differently (Table 2). The ECB rate showed limited but statistically significant influence on Czech inflation in the short term (p-value = 0.0836 at lag 1) which demonstrates the Czech economy's sensitivity to eurozone monetary policy despite having its independent currency. The Czech Republic's significant trade and financial connections with the eurozone indicate that monetary policy impacts transmit across different currency systems. The Czech Republic (p-values > 0.10) showed no significant link between exchange rate changes and inflation trends which contradicts common

expectations about flexible exchange rate systems transmitting external shocks to domestic pricing. Research results demonstrate that neither the ECB rate nor exchange rate alterations have a statistically significant impact on Croatian inflation because both indicators show p-values above 0.45 and 0.40 respectively which implies Croatian inflation operates independently from eurozone monetary influences even after adopting the euro. The unexpected result may be attributed to underlying economic structures or the recent euro adoption which necessitates extended adjustment times before monetary policy mechanisms fully establish their effectiveness.

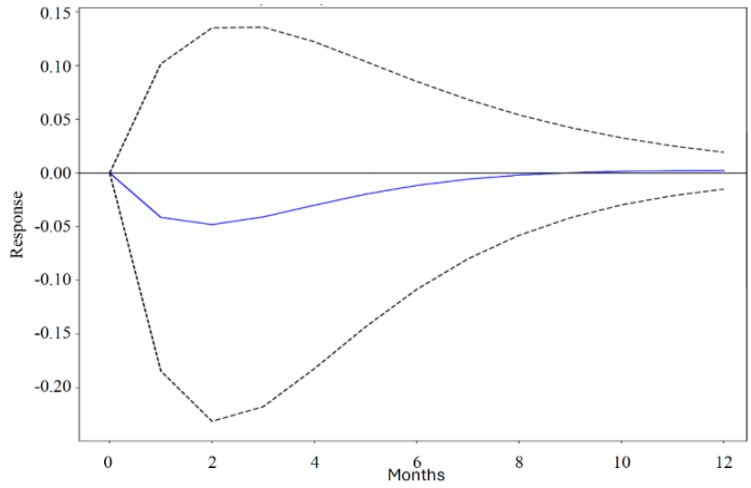
4.3. Adjustment to Shocks – Impulse Response Functions (IRFs)

Impulse response functions illustrate how inflation in Croatia and the Czech Republic reacts over time to monetary and exchange rate shocks. This comparison highlights differences in stability versus flexibility between the two regimes. Through the analysis of Impulse Response Functions (IRF) the data depicted key findings about the temporal responses of different economies to monetary and exchange rate disturbances.

Figure 1 indicates that a one standard deviation increase in the ECB deposit facility rate causes a significant and immediate drop in Croatia's consumer price inflation. The impact is largest in the first 3 months and starts to fade away by month 6. This rapid response pattern is consistent with the efficient transmission of euro area monetary policy shocks to Croatia. It aligns with the country's financial integration and its adoption of the euro in 2023. The tight confidence bands around the response support the statistical significance of the initial impact.

Figure 1.

Impulse Response – ECB Deposit Facility Rate Shock on Croatia Inflation

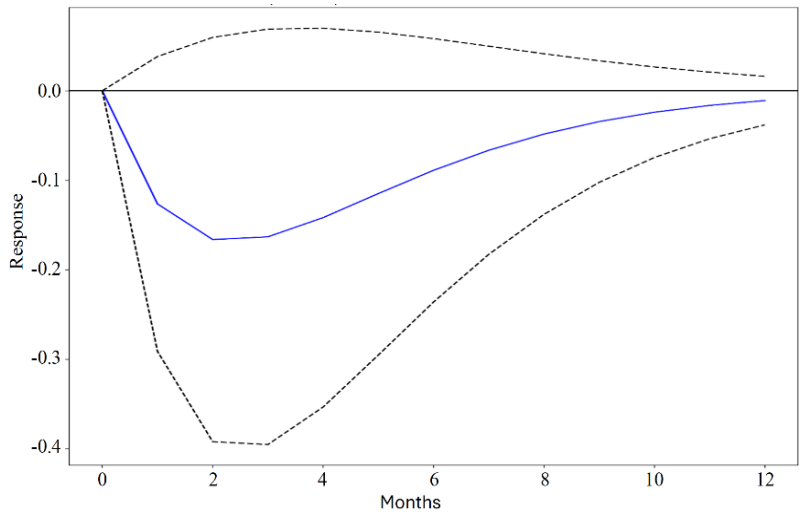


Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

In the Czech Republic, the estimated response of inflation to the same ECB deposit facility rate shock is distinctly different from the one in Croatia (Figure 2). First, the effect appears with a delay of about month 2 and then it gradually fades over time. The response is also much weaker, which is another indication of the Czech Republic's monetary independence and the more closed nature of inflation dynamics in this country, which features its own central bank and a flexible exchange rate regime. Also, note wider confidence bands surrounding this effect, which indicate greater uncertainty about the size of this effect.

Figure 2.

Impulse Response – ECB Deposit Facility Rate Shock on Czech Inflation

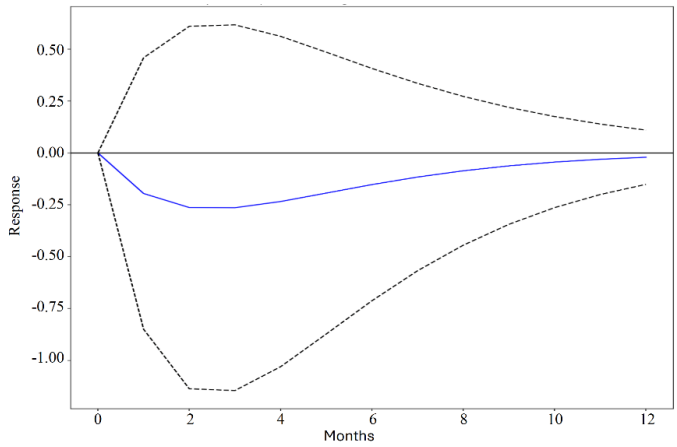


Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

Figure 3 reveals a brief and modest negative response of Croatia's inflation to an exchange rate shock. The response peaks negatively within two months and then converges toward zero. Given Croatia's euro adoption and the resulting limited role of the exchange rate in monetary transmission, the muted response is expected. The relatively tight confidence bands indicate that the observed reaction, though small, is statistically reliable.

Figure 3.

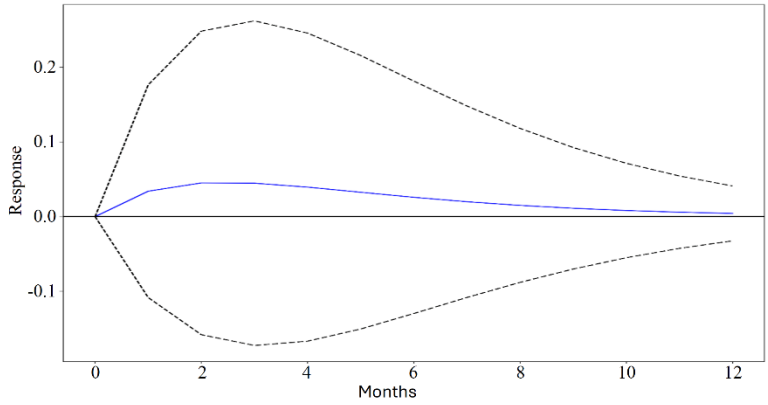
Impulse Response – Exchange Rate Shock on Croatia Inflation



Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

Figure 4.

Impulse Response – Exchange Rate Shock on Czech Inflation



*Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

The Czech Republic experiences a larger and more persistent response of inflation to an exchange rate shock, with significant effects observed for as long as 8–10 months (Figure 4). This finding reflects the central importance of exchange rate dynamics in the Czech Republic's inflation process, in line with its history of managed floating and the importance of currency fluctuations for import prices. The response is statistically significant in the short run and supports the argument that exchange rate shocks represent a primary channel of inflation volatility in the Czech context.

To further examine the relative importance of each structural shock over the forecast horizon, Table 3 presents the Forecast Error Variance Decomposition (FEVD) results for Croatia and the Czech Republic.

Table 3.

Forecast Error Variance Decomposition (FEVD) Results for Croatia and Czech Republic

Variable	Horizon (Months)	Own Shock (%)	Exchange Rate Shock (%)	Other Shocks (%)
Croatian Inflation	1	98.2	1.6	0.2
Czech Inflation	1	98.7	1.2	0.1
ECB Rate	1	99.7	0.3	0
Croatian Exchange Rate	1	99.6	0.2	0.2
Czech Exchange Rate	1	99.8	0.1	0.1
Croatian Inflation	6	87.1	11.2	1.7
Czech Inflation	6	92.1	6.8	1.1
ECB Rate	6	96.7	2.9	0.4
Croatian Exchange Rate	6	97.3	1.1	1.6
Czech Exchange Rate	6	98.2	0.7	0.7

Variable	Horizon (Months)	Own Shock (%)	Exchange Rate Shock (%)	Other Shocks (%)
Croatian Inflation	12	81.2	16	2.8
Czech Inflation	12	88.7	9.7	1.6
ECB Rate	12	95.1	4.3	0.6
Croatian Exchange Rate	12	96	1.6	2.4
Czech Exchange Rate	12	97.4	1	1.6

Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

The forecast error variance decomposition (FEVD) in Table 3 indicates that, at a 1-month horizon, the variance in each variable is explained almost entirely by its own shocks. Over time, we observe an increasing role for exchange rate shocks, particularly for inflation. At 12 months, exchange rate shocks explain 16% of the variance in Croatian inflation and close to 10% in Czech inflation. This finding implies that exchange rate dynamics become more significant in explaining inflation, especially in the Croatian context. This result complements our IRF results above: the IRF shows the direction and timing of the response of inflation, while the FEVD tells us about the relative importance of the shocks, which also change over time.

4.4. Inflation Regime Shifts During Crises and Euro Adoption (Structural break analysis)

Research into the structural breaks found essential disruptions in inflation trends during important economic events that demonstrated how these shocks impacted price stability throughout different monetary systems as depicted in Table 4.

Table 4.

Summary Statistics: Structural Break Analysis at Key Events

Event	Break Date	HR_Mean_ _Change	HR_pValue	CZ_Mean_ _Change	CZ_pValue
Financial Crisis	9/1/2008	1.2	0.15	1.5	0.12
COVID-19	3/1/2020	3.04	0.0159	5.18	0.0014
Energy Crisis	1/1/2022	5.65	0	7.68	0
HR Euro Adoption	1/1/2023	3.77	0.0462	4.61	0.0741

Source: Author's own calculations based on data from January 1, 2000, to December 1, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), accessed February 2, 2025.

The 2008 Financial Crisis did not result in statistically significant shifts in inflation means or variances for either nation (p-values exceeded 0.05) yet both countries faced major structural breaks during the COVID-19 pandemic in 2020. Croatia experienced a significant inflation increase averaging 3.04 percentage points which was statistically significant with a p-value of 0.0159 while the Czech Republic faced an even more pronounced inflation jump averaging 5.18 percentage points that reached statistical significance at a p-value of 0.0014. This research reveals how global supply chain shocks and fiscal responses during the pandemic impacted price stability in various monetary systems and demonstrates that independent monetary policy in the Czech Republic failed to shield its economy from these pressures despite having theoretical monetary independence benefits.

The severe consequences of Russia's invasion of Ukraine on European energy markets triggered the most significant structural inflation changes during the 2022 Energy Crisis while destabilizing broader economic conditions. The

mean inflation rate in Croatia rose dramatically by approximately 5.65 percentage points and the Czech Republic saw a more significant increase of about 7.68 percentage points both with extremely low p-values (0.0000) showing undeniable statistical significance. The Czech Republic's significant supply shock impact results from its high energy intensity and substantial energy import dependence while independent monetary policy fails to shield core economic inputs from such severe disruptions. Croatia became the 20th member of the Eurozone in 2023 as it faced a statistically significant break in inflation trends which resulted in an average increase of 3.77 percentage points (p-value = 0.0462). This evidence supports the theory that changes in currency regimes lead to modifications in how prices are set by businesses due to rounding practices, menu cost changes, as well as altered inflation expectations among market participants. The Czech Republic underwent heightened inflation averaging approximately 4.61 percentage points during the same time frame but presented a less definite statistical significance shown by a p-value of 0.0741 which indicates that external European inflation factors as well as Croatia's monetary transition affected inflation dynamics.

4.5. Policy Implications and Comparative Insights

Taken together, the results reveal three central insights: (1) euro adoption coincided with modest reductions in inflation volatility, (2) independence allowed more immediate interventions but heightened exposure to external shocks, and (3) both regimes faced limitations during global crises. The Czech Republic shows greater synchronization with ECB monetary policy while keeping its currency, but Croatia's inflation rates show limited response to ECB decisions even after joining the euro. This indicates monetary policy transmission mechanisms require consideration beyond currency arrangements to include structural economic factors as well as financial system maturity and past policy credibility. Exchange rate movements transmit to inflation differently between both countries according to dynamics

analysis that reveals limited direct pass-through effects in both cases but reveals slightly stronger influence on Czech inflation compared to Croatian inflation. Croatia and its trading partner managed exchange rate pressures effectively through Croatia's currency board system which provided stability comparable to that of euro adoption. The different ways the ECB policy affects the Czech Republic and Croatia demonstrate that monetary policy cannot be uniformly applied to all nations because Czech economic conditions are more influenced by external money policy changes while Croatia's inflation remains mainly influenced by domestic factors which shows that individual national fiscal policies and structural reforms are necessary to manage each country's specific economic conditions and vulnerabilities. The empirical results provide essential data for discussions concerning optimal currency areas and European Union monetary integration tradeoffs while informing EU states considering monetary transitions about the complicated interaction between formal monetary setups and economic structures that shape macroeconomic results.

Overall, the findings support the central hypothesis that monetary regimes condition how small open economies respond to shocks and maintain inflation stability. Euro adoption appears to reduce short-term inflation volatility in economies like Croatia through greater credibility, but at the cost of limited responsiveness to external disturbances. In contrast, the Czech Republic's monetary independence allows for more flexible interventions, yet exposes the economy to heightened inflation variability.

Conclusion

This research reveals that Croatia and the Czech Republic, while having broadly similar inflation dynamics, differ significantly in the transmission of monetary policy and the response to exchange rate movements. Both countries have undergone changes in inflation regimes during the recent global crises, highlighting

the vulnerability of small open economies to external shocks. Croatia's adoption of the euro in 2023 brought about a structural break characterized by initial rounding and adjustment effects, followed by a decrease in volatility and an increase in credibility in expectation management. However, this transition also entailed a loss of flexibility, as monetary policy became the responsibility of the European Central Bank. The Czech Republic, by maintaining its national currency, has preserved its policy autonomy, allowing for rapid responses to domestic shocks through the Czech National Bank. Yet, this independence has come with increased inflation variability, as evidenced by the pass-through of exchange rate fluctuations.

The comparative analysis reveals the trade-offs inherent in these two monetary regimes: euro adoption can lead to stability and credibility gains, but at the expense of flexibility; independence can provide policy autonomy, but expose the economy to external volatility. For Croatia, the challenge going forward will be to use fiscal and structural policy tools more effectively to manage external imbalances, while the Czech Republic will need to continue building credibility and improving communication to contain volatility risks. While these findings offer early insight, they are constrained by the relatively short post-accession period following Croatia's euro adoption in 2023. The limited data horizon makes it difficult to fully capture longer-term adjustment dynamics. Future research will extend the analysis to include additional euro adopters such as Slovakia and other Central and Eastern European economies as more post-adoption data become available, enabling a broader assessment of inflation stability and convergence within the euro area. Beyond institutional contrasts, the key insight of this analysis lies in how each economy absorbs and transmits external shocks, illustrating that structural openness and policy flexibility are central to inflation resilience

In light of these limitations, future research could focus on several areas to build upon the findings of this paper. Empirically, it would be desirable to extend the data horizon as more post-accession data become available, and to apply time-varying and nonlinear econometric techniques to better capture the evolving nature of monetary and exchange rate regimes. The inclusion of fiscal and institutional variables in the model could also help to more fully capture the policy environment and its interaction with monetary regimes. Policy-oriented work could also explore how better coordination between supranational monetary policy and national fiscal tools could help mitigate vulnerabilities for new euro area members, and how independent regimes can most effectively communicate and anchor expectations in volatile and uncertain environments.

Bibliography

Ábel, I., & Siklos, P. L. (2023). Macroeconomic risks and monetary policy in Central European countries: Parallels in the Czech Republic, Hungary, and Poland. *Risks*, 11*(11), 200. https://doi.org/10.3390/risks11110200

Andrieș, A. M., Nistor, S., & Sprincean, N. (2020). The impact of central bank transparency on systemic risk – Evidence from Central and Eastern Europe. *Research in International Business and Finance*, 51. https://doi.org/10.1016/j.ribaf.2018.06.002

Bai, J., & Perron, P. (2003). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics*, 18(1), 1–22. https://doi.org/10.1002/jae.659

Baxa, J., Horváth, R., & Vašíček, B. (2013). Time-varying monetary-policy rules and financial stress: Does financial instability matter for monetary policy?. *Journal of Financial Stability*, *9*(1), 117–138. https://doi.org/10.1016/j.jfs.2011.10.002

Berend, L., & Prüser, J. (2024). The transmission of monetary policy via common cycles in the Euro Area. **arXiv preprint* arXiv:2410.05741*. https://arxiv.org/abs/2410.05741

Clarida, R., Galí, J., & Gertler, M. (2000). Monetary policy rules and macroeconomic stability: Evidence and some theory. *The Quarterly Journal of Economics*, 115(1), 147–180. https://doi.org/10.1162/003355300554692

De Grauwe, P. (2018). Economics of Monetary Union (12th ed.). Oxford University Press.

El-Shagi, M., & Tochkov, K. (2022). Shadow of the colossus: Euro area spillovers and monetary policy in Central and Eastern Europe. *Journal of International Money and Finance*, *120*, 102501. https://doi.org/10.1016/j.jimonfin.2021.102501

European Central Bank. (2024). *Statistical Data Warehouse*. Retrieved from https://sdw.ecb.europa.eu

Falagiarda, M., Gartner, C., Mužic, I., & Pufnik, A. (2023). Has the euro changeover really caused extra inflation in Croatia? SUERF Policy Brief, (571). www.suerf.org/wp-content/uploads/2023/11/f_2c6fdae440c3a3534ab4ed02312bfee3_65707_suerf.pdf

Federal Reserve Bank of St. Louis. (2024). *Economic Data Series*. Retrieved from. https://fred.stlouisfed.org

Grabowski, W., & Stawasz-Grabowska, E. (2021). How have the European central bank's monetary policies been affecting financial markets in CEE-3 countries? *Eurasian Economic Review*, *11*(1), 43–83. https://doi.org/10.1007/s40822-020-00160-3

Jiménez-Rodriguez, R., Morales-Zumaquero, A., & Égert, B. (2010). The effect of foreign shocks in Central and Eastern Europe. *Journal of Policy Modeling*, 32(4), 461–477. https://doi.org/10.1016/j.jpolmod.2010.05.009

Lesuisse, P. (2019). External monetary shocks to Central and Eastern European countries. *HAL Open Science.* https://shs.hal.science/halshs-01467330v2

Perović, L. M. (2015). Investigating Croatian inflation through the cointegration with structural break approach. *Journal of Economic & Social Studies (JECOSS)*, 5(1), 47–63. https://doi.org/10.14706/JECOSS11517

Petrevski, G. (2023). *Macroeconomic effects of inflation targeting: A survey of the empirical literature*. "arXiv:2305.17474". https://arxiv.org/abs/2305.17474

Pokorný, Tomáš, Chytilová, Helena (2023). Changes in monetary policy responses in the Czech Republic, Hungary, and Poland. *Ekonomický časopis / Journal of Economics,* 71*(6–7), 577–595. doi:10.31577/ekoncas.2023.06-07.01

Radvan, E. T. M. (2024). Czech Republic: Czech National Bank's Role in the Monetary Policy. *Economic Governance*, 695. https://ssrn.com/abstract=5030896

Šokčević, S., Mišević, P., & Milisavić, M. (2024). Analysis of the impact of monetary policy on economic growth in the Republic of Croatia. *International Review Belgrade,* (3–4), 131–140. www.ceeol.com/search/article-detail?id=1296008

Sorić, P. (2024). The euro and inflation in Croatia: Much ado about nothing? *Public Sector Economics*, 48(1), 1–37. https://doi.org/10.3326/pse.48.1.1

Srdelić, L., & Dávila-Fernández, M. J. (2024). International trade and economic growth in Croatia. *Structural change and economic dynamics*, *68*, 240–258. https://doi.org/10.1016/j.strueco.2023.10.018

Szapáry, G., & Vonnák, B. (2024). The Impact of Monetary Policy Institutional Decisions on Convergence in Central and Eastern European Countries. *Financial and Economic Review*, *23*(4), 120–152. https://doi.org/10.33893/FER.23.4.120

Taylor, J. B. (2000). Low inflation, pass-through, and the pricing power of firms. *European Economic Review,* 44(7), 1389–1408. https://doi.org/10.1016/S0014-2921(00)00037-4

Wawrosz, P., & Křížek, D. (2025). The Czech National Bank's monetary policy since 2008 and its (un) intended consequences in the long run. *Argumenta Oeconomica, 54*(1). https://doi.org/10.15611/aoe.2025.1.13

Appendix A: Variable Definitions

Variable Name	Description
• HR_Inflation_t	Croatia's inflation rate at time t
• CZ_Inflation_t	Czech Republic's inflation rate at time t
• ECB_Rate_t	European Central Bank Deposit Facility Rate at time t
• Exchange_Rate_HR_t	Croatia's exchange rate at time t
• Exchange_Rate_CZ_t	Czech Republic's exchange rate at time t
• c_i	Constant terms for each equation
• a_ij	Coefficient parameters measuring the effect of variable j on variable i
• ε_i,t	Error terms (innovations) for each equation
• t-1	One-period lag (previous month)