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ECB monetary policy transmission to unilaterally euroised economies

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Abstract

Leveraging the unique setting of unilateral euroisation, this paper examines the spillover effects of euro area monetary policy on Montenegro and Kosovo. Through the lens of a structural VAR model with block exogeneity, it shows that euro area monetary policy shocks can significantly influence output and inflation in these economies, albeit with a delayed response, while contributing only modestly to their overall business cycle fluctuations.

Keywords: monetary transmission, structural VAR, block exogeneity
JEL: C11, C32, E52

Non-technical summary

This paper examines how monetary policy decisions made by the European Central Bank (ECB) affect Montenegro and Kosovo, two small economies that have unilaterally adopted the euro as their official currency. Unlike euro area member states, these countries do not have a say in ECB policy decisions, making them uniquely dependent on imported monetary policy. This dependency raises important questions about how changes in ECB interest rates influence economic activity and inflation in these euroised economies.

The study uses a statistical model to analyse data spanning nearly two decades, capturing the transmission of euro area monetary policy to Montenegro and Kosovo. The findings reveal that ECB interest rate changes influence output and inflation in both economies, but the impact is delayed and modest in scale. For instance, ECB monetary policy tightening leads to a gradual decline in economic growth and inflation in these countries, with the effects peaking two to four years after the initial shock. However, these monetary policy shocks explain only a small fraction of the overall fluctuations in output and inflation, suggesting that domestic factors and policies play a more significant role in shaping economic outcomes.

These results have important policy implications. While Montenegro and Kosovo are directly exposed to euro area monetary policy, their limited integration into the euro area's financial system and their unique structural characteristics mean that fiscal, structural, and regulatory policies are critical for maintaining economic stability and supporting growth. Furthermore, as these countries continue their path toward deeper EU integration, enhancing financial development and strengthening institutional frameworks could help ensure that monetary policy effects are less likely to contribute to unwarranted volatility.

By adopting the euro without formal membership in the euro area, Montenegro and Kosovo face unique challenges in balancing the benefits of monetary stability with the constraints imposed by a lack of independent monetary policy. Both the ECB and the EU Council consider unilateral euroisation to be incompatible with the provisions of the EU Treaty, which define a structured convergence process and a multilateral framework for adopting the euro. In this context, this paper's quantitative findings provide valuable insights for policymakers, particularly as these countries navigate their economic convergence with the European Union.

1. Introduction

This paper investigates the transmission of euro area monetary policy to activity and prices in Montenegro and Kosovo, two unilaterally euroised economies currently pursuing EU accession. Both countries have adopted the euro as their official currency under unique historical circumstances, which have shaped their monetary policy frameworks. Amid economic instability and hyperinflation, Montenegro transitioned from the Yugoslav dinar to the German Deutsche Mark in 1999, before adopting the euro in 2002. Kosovo similarly adopted the euro in 2002, following its use of the Deutsche Mark after 1999, during its period under United Nations administration.

Euroisation has fundamentally altered the role of central banks in these economies. The central banks of Montenegro (CBM) and Kosovo (CBK) prioritise financial stability, relying on reserve requirements and other limited tools, as their unilateral adoption of the euro precludes the ability to implement independent monetary policy. They essentially import such policy from the ECB, which is tailored to euro area economic conditions (Kapsoli and Ozturk (2025)).

Since Montenegro and Kosovo operate under monetary regimes that render them unable to influence euro area monetary policy, the exogeneity of ECB decisions creates a valuable research opportunity. Policy changes made by the ECB, which target the euro area's economic conditions, effectively act as external shocks for these small economies. This unique setting minimises the role of confounding factors that might otherwise complicate the identification of monetary spillovers in standard empirical analyses. It also provides an opportunity to assess the extent to which imported monetary policy affects domestic macroeconomic conditions in euroised economies.

To analyse these dynamics, this paper employs a structural vector autoregressive model (SVAR) with block exogeneity restrictions to explore how ECB monetary policy decisions influence output and inflation in Montenegro and Kosovo. To the best of my knowledge, this is the first study to systematically document this second leg of monetary transmission in unilaterally euroised economies. The findings reveal that euro area monetary policy shocks have economically meaningful, delayed, and relatively modest effects on activity and inflation in Montenegro and Kosovo. These results suggest that, while imported monetary policy plays a role in shaping macroeconomic fluctuations, its limited influence leaves considerable scope for domestic policies—including fiscal, structural, and macroprudential measures—to address

economic challenges and support convergence.

This research contributes to the broader literature on international monetary spillovers. Willems (2013) exploits the structural setting of fully dollarised economies (Ecuador, El Salvador, and Panama) to isolate the transmission of U.S. monetary policy shocks, while Canova (2005) documents significant U.S. monetary spillovers to Latin America. In the European context, Geis et al. (2020) examine ECB monetary policy spillovers to the economies of central, eastern and south-eastern Europe (CESEE) and Moder (2023) shows that euro area monetary policy is transmitted to euro-denominated retail rates in financially euroised CESEE countries, explicitly excluding those with unilateral euroisation. Relatedly, Ozturk (2025) documents limited ECB policy rate pass-through to bank interest rates in Kosovo during the 2022–23 tightening cycle. The present paper complements this literature by focusing on the second leg of transmission—from ECB policy to real activity and prices—in unilaterally euroised economies. Unlike dollarised economies in the Americas, Montenegro and Kosovo are deeply embedded in the euro area's trade and financial architecture through foreign-owned banking subsidiaries, euro-denominated remittance flows, and the prospect of EU accession.[1] This makes the European euroisation experience institutionally distinct.

2. Empirical model and identification

2.1. Model specification and identification strategy

To examine the transmission of euro area monetary policy to Montenegro and Kosovo I employ a SVARX, a structural vector autoregressive model with block exogeneity (see Lütkepohl (2005)). The methodology is described in Lastrapes (2005) and applied for instance by Willems (2013) to investigate monetary spillovers from the US to small dollarised economies like Ecuador, El Salvador and Panama, as well as by Gossé and Guillaumin (2013) and

[1]Compared with the dollarised cases in Willems (2013), where trade openness is below 90% of GDP and the banking sector is heavily driven by domestic and regional Latin American banks, Montenegro and Kosovo feature overall higher trade openness around 110–114% of GDP and elevated remittances around 10–17% of GDP (World Bank WDI, 2024), typically from the European diaspora. Moreover, their banking sectors are dominated by foreign-owned groups many of which with parent banks domiciled in euro area countries such as Austria (Raiffeisen, Erste, Addiko), Germany (ProCredit) and Slovenia (NLB Group), supporting distinct structural linkages with implications for monetary transmission, particularly through the bank lending channel.

by Allegret et al. (2012) to explore the effects of external shocks on East Asian economies. This framework is well-suited for analysing the interactions between euro area monetary policy and small, open economies that have unilaterally adopted the euro.

The block exogeneity assumption is central to the analysis, as it reflects the lack of reciprocal influence: euro area economic conditions shape monetary policy decisions by the ECB, but developments in Montenegro and Kosovo do not affect the euro area economy or ECB rate-setting decisions. This assumption boils down to treating the subset of euro area variables in the model as independent from the euroised economies' domestic variables, thereby allowing causality to run from the euro area to the domestic block but not vice-versa. Modelling the euro area as block-exogenous to the domestic economy follows the seminal work of Cushman and Zha (1997), which is standard in spillover SVARs from large to small economies and helps identify external monetary shocks from the domestic perspective.

The SVARX is specified as follows:

$$\mathbf{A}_0 X_t = \sum_{i=1}^{p} \mathbf{A}_i X_{t-i} + \varepsilon_t \tag{1}$$

where X contains five variables: $[Y^{EA}, P^{EA}, R^{EA}, Y^D, P^D]'$. The endogenous variables include output Y and inflation P, measured by the log of real GDP and the annual rate of change in the GDP deflator[2], respectively, for both the euro area EA, and for either Montenegro or Kosovo as the domestic economy D. The euro area interest rate R is proxied by the three-month Euribor. Block exogeneity is imposed by restricting the structure of the A matrices, ensuring no feedback from domestic variables in Montenegro and Kosovo to euro area variables. The exclusion restriction effectively prevents feedback from the lagged endogenous variables to the exogeneous variables in the system of reduced form equations, allowing to restrict these lag coefficients to zero (Kilian and Lütkepohl (2018)).

Monetary policy shocks are identified using a recursive Cholesky factorisation strategy, which assumes that ECB monetary policy reacts contemporaneously to euro area output and inflation, while other macroeconomic

[2]I use the GDP deflator to capture domestic production-price dynamics; compared with CPI, it is less directly affected by imported consumption-price movements in highly open economies, making it better aligned with the output measure and identification objective.

aggregates respond to interest rate changes only with a lag. This approach is consistent with established literature on monetary policy shock identification (see Bernanke and Blinder (1992); Leeper et al. (1996); Christiano et al. (1999); Clarida et al. (2000)).

Within the domestic block, prices are assumed to affect output only with a lag, while output and inflation similarly react to euro area monetary policy shocks with delays (see Jannsen and Klein (2011)). By combining recursive ordering with block exogeneity restrictions and specifying four lags (see next section), the SVARX takes the following form

$$\begin{bmatrix} . & 0 & 0 & 0 & 0 \\ . & . & 0 & 0 & 0 \\ . & . & . & 0 & 0 \\ . & . & 0 & . & 0 \\ . & . & 0 & . & . \end{bmatrix} \begin{pmatrix} Y_t^{EA} \\ P_t^{EA} \\ R_t^{EA} \\ Y_t^{D} \\ P_t^{D} \end{pmatrix} = \sum_{j=1}^{4} \begin{bmatrix} . & . & . & 0 & 0 \\ . & . & . & 0 & 0 \\ . & . & . & 0 & 0 \\ . & . & . & . & . \\ . & . & . & . & . \end{bmatrix} \begin{pmatrix} Y_{t-j}^{EA} \\ P_{t-j}^{EA} \\ R_{t-j}^{EA} \\ Y_{t-j}^{D} \\ P_{t-j}^{D} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{pmatrix} \tag{2}$$

2.2. Data and estimation

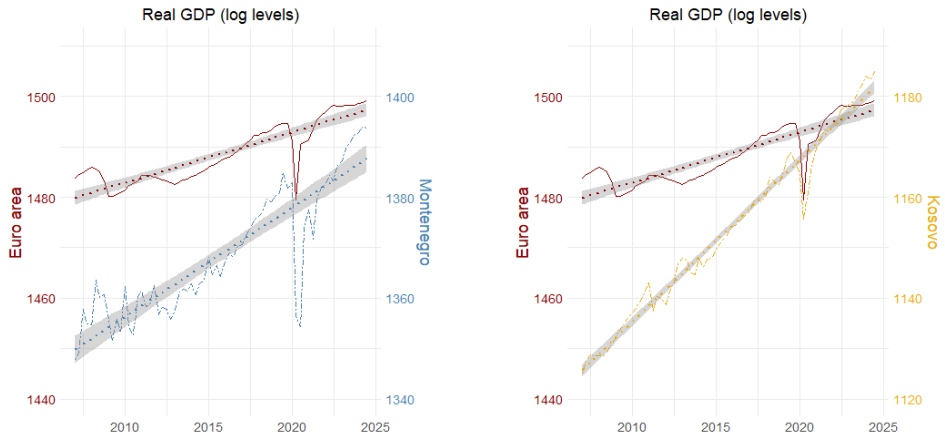
The analysis draws on quarterly data covering the period from 2006Q1 to 2024Q3. Output and inflation are measured using real GDP and the GDP deflator for the euro area, Montenegro, and Kosovo. Euro area data are sourced from Eurostat, while data for Montenegro and Kosovo are obtained from MONSTAT and the Kosovo Agency of Statistics, respectively.[3] Since Kosovo's quarterly National Accounts data begins only in 2011Q1, the time series for real GDP and the GDP deflator are extended back to 2006 using linearly interpolated annual data from the IMF World Economic Outlook database.

A preliminary inspection of the data in Figure 1 reveals key features of economic convergence and volatility in Montenegro and Kosovo. Real convergence is evident from the steeper growth trends of real GDP in these economies compared to the euro area, reflecting their catch-up phase in economic development. Inflation in Montenegro and Kosovo has been consistently higher than in the euro area, while activity and price dynamics exhibit greater volatility, underscoring the challenges of maintaining macroeconomic stability in these small, euroised economies.

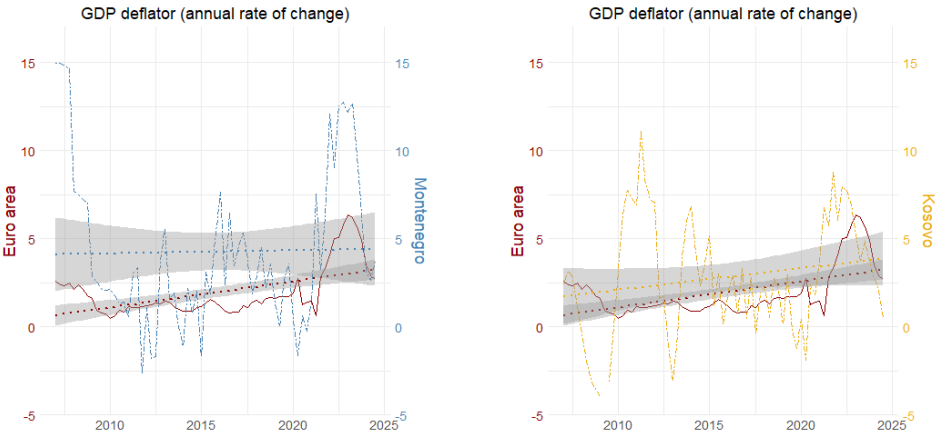
[3]All variables are seasonally adjusted, either by Eurostat (euro area), or by Haver Analytics (Montenegro and Kosovo) from where the data for these two countries are sourced.

Figure 1: Data used in the estimation

(a) Activity



(b) Inflation



Sources: Eurostat, MONSTAT, Kosovo Agency of Statistics, IMF WEO and author calculations.

The SVARX model is estimated using Bayesian techniques.[45] Four lags

[4]The Bayesian SVARX model includes a constant and employs an independent Normal-Wishart prior, with hyperparameters calibrated to ensure tightness and stability in the estimates. The autoregressive coefficient is set at 0.8, the overall tightness parameter (λ_1)

were selected based on the Akaike information criterion, allowing to better capture the inherently dynamic nature of monetary policy transmission, while more parsimonious specifications were also explored as robustness checks.[6]

3. Results

3.1. Impact of euro area monetary policy shocks on output and inflation

Impulse response functions (IRFs) in Figure 2 illustrate the transmission of euro area monetary policy shocks to Montenegro and Kosovo. A contractionary one standard deviation shock in the ECB policy rate (corresponding to a 30 basis points increase) leads to declines in output and inflation in both economies. At its peak, output falls by approximately 0.5 percentage points, while inflation decreases by around 0.2 to 0.3 percentage points after 2 years. These effects are consistent with theoretical expectations and display persistence, with the full impact taking 2 to 4 years to unfold.[7] Results are also qualitatively robust to alternative recursive orderings, including placing euro area inflation before output and reversing the domestic output-inflation ordering.

The IRFs also highlight similarities in the transmission mechanisms between the euro area and the euroised economies, suggesting that the latter respond to ECB monetary policy in ways analogous to euro area member

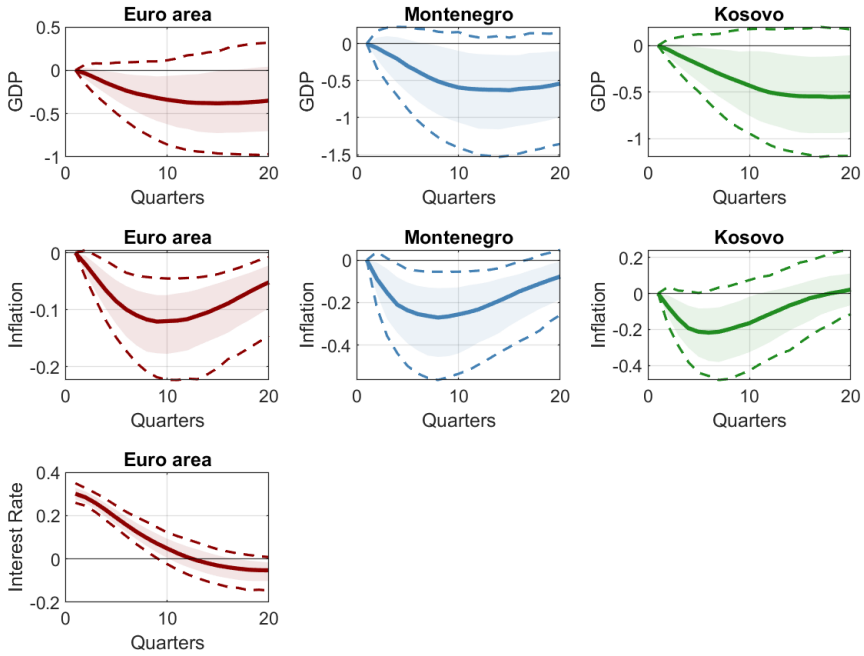
at 0.1, the cross-variable weighting (λ_2) at 0.65, and the lag decay (λ_3) at 1.5. Estimation is carried out with the BEAR Toolbox which facilitates the imposition of block exogeneity by constraining the posterior distribution of relevant coefficients, see Dieppe et al. (2016).

[5]To investigate data properties, Augmented Dickey-Fuller (ADF) and KPSS tests were performed. The results indicate a mixed pattern across series, including variables that are close to unit-root behavior and others that are stationary or trend-stationary. Following standard Bayesian VAR literature (Sims (1988); Sims and Uhlig (1991)), variables are kept in their economically meaningful specification, including inflation measured as the annual change in the GDP deflator rather than its level. The Normal-Wishart prior regularises the posterior and is robust to this mixed order of integration.

[6]Results reported in the next section are robust to alternative lag choices using VAR(1) – as selected by the Schwartz information criterion – as well as VAR(2) and VAR(3).

[7]One concern is that in the case of Kosovo, interpolated data might introduce artificial smoothness and bias the results towards slower, more persistent IRFs. Robustness checks using a shorter sample from 2011Q1 and avoiding the use of quarterly interpolated data reveal qualitatively similar results, strengthening confidence in the baseline results of delayed and persistent effects from monetary policy shocks. While in that case IRFs still show persistence, the effects are estimated less precisely given the shorter sample.

Figure 2: Impulse response functions to euro area monetary policy shock



Note: The figure displays impulse response functions (IRFs) of the endogenous variables for each economic area in response to a one-standard-deviation contractionary monetary policy shock in the euro area. Shaded regions and dashed lines denote 68% and 90% credibility bands, respectively.

states. However, the delayed nature of these effects indicates that monetary policy changes in the euro area take time to fully permeate the smaller economies, reflecting their structural characteristics and limited integration into the euro area's financial system.

3.2. Forecast error variance decomposition

While euro area monetary policy shocks have measurable effects, they account for a relatively small proportion of output and inflation variability in Montenegro and Kosovo. Table 1 presents the forecast error variance decomposition for these variables over different horizons. At shorter horizons (1–2 years), euro area monetary policy contributes minimally to domestic fluctuations, with its share increasing slightly at medium-term horizons. At a five-year horizon, euro area monetary shocks explain no more than 7% of the forecast error variance for output and inflation in either economy. Additional FEVD and historical decomposition evidence indicates that foreign macro

spillovers increasingly drive output at longer horizons, while inflation remains mostly domestic, consistent with strong euro-area real integration and with the GDP-deflator measure being less directly exposed than CPI to imported-price pass-through (see the footnote on inflation measurement in Section 2).

These findings are consistent with evidence from dollarised economies, such as Panama and El Salvador, where U.S. monetary policy shocks also have limited influence on domestic macroeconomic variability, see Willems (2013). The modest contribution of euro area monetary policy to the variance of domestic variables suggests that other factors, including domestic policies and structural characteristics, play a larger role in shaping economic outcomes in Montenegro and Kosovo.

Table 1: Forecast error variance decomposition

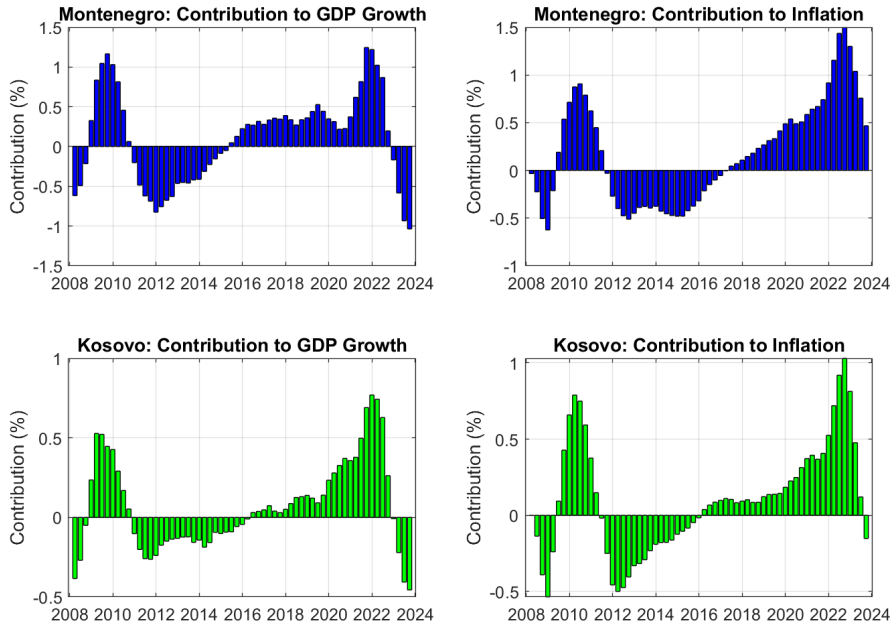
Horizon (quarters)		4	8	12	16	20
Montenegro	Y^{ME}	0.2	1.1	2.6	3.7	4.2
	P^{ME}	0.8	3.1	5.2	6.4	6.9
Kosovo	Y^{XK}	0.2	1.1	2.5	3.9	4.9
	P^{XK}	0.7	2.4	3.1	3.4	3.5

Note: The table shows the share of forecast error variance for each variable at different horizons that is explained by euro area monetary policy shocks.

3.3. Historical contributions of the monetary shocks to output and inflation in Montenegro and Kosovo

The delayed transmission of euro area monetary policy implies that the effects of the 2022-23 ECB tightening cycle might have only begun to show up in Montenegro and Kosovo towards the end of the sample ending 2024Q3. Figure 3 illustrates the historical contributions of euro area monetary shocks to output growth and inflation in these economies. The forceful interest rate hikes implemented by the ECB from mid-2022 until late 2023 have started to exert a dampening effect on domestic activity and inflation in 2024. While the impact on Montenegro's inflation remains modestly positive as of 2024Q3, the overall drag from euro area monetary tightening is evident in both economies, highlighting the protracted nature of monetary spillovers.

Figure 3: Contributions of euro area monetary policy shocks to output and inflation



Note: The figure shows the estimated historical contribution to real GDP annual growth and annual change in the GDP deflator from euro area monetary policy shocks.

4. Conclusions

The findings of this paper reveal that euro area monetary policy shocks transmit to Montenegro and Kosovo with meaningful but delayed effects. While these shocks have a discernible impact on output and inflation, their overall contribution to domestic macroeconomic fluctuations remains limited. This highlights the importance of developing effective domestic policies—spanning fiscal, structural, and macroprudential measures—to promote economic stability, foster real convergence, and mitigate volatility in these euroised economies. Over time, deeper financial development and continued EU integration may further strengthen monetary policy transmission. As more data become available, this research design can be reapplied to refine the precision of these estimates and deepen the understanding of monetary transmission in unilaterally euroised economies.

References

Allegret, J.-P., C. Couharde, and C. Guillaumin (2012). The impact of external shocks in East Asia: Lessons from a structural VAR model with block exogeneity. *International Economics* (132), 35–89.

Bernanke, B. S. and A. S. Blinder (1992). The federal funds rate and the channels of monetary transmission. *American Economic Review 82*(4), 901–921.

Canova, F. (2005). The transmission of US shocks to Latin America. *Journal of Applied Econometrics 20*(2), 229–251.

Christiano, L. J., M. Eichenbaum, and C. L. Evans (1999). Monetary policy shocks: What have we learned and to what end? In J. B. Taylor and M. Woodford (Eds.), *Handbook of Macroeconomics*, Volume 1, pp. 65–148. Elsevier.

Clarida, R., J. Galí, and M. Gertler (2000). Monetary policy rules and macroeconomic stability: Evidence and some theory. *Quarterly Journal of Economics 115*(1), 147–180.

Cushman, D. O. and T. Zha (1997). Identifying monetary policy in a small open economy under flexible exchange rates. *Journal of Monetary Economics 39*(3), 433–448.

Dieppe, A., B. van Roye, and R. Legrand (2016). The BEAR toolbox. Working Paper Series 1934, European Central Bank.

Geis, A., I. Moder, and T. Schuler (2020). Who's afraid of euro area monetary tightening? CESEE shouldn't. Working Paper Series 2416, European Central Bank.

Gossé, J.-B. and C. Guillaumin (2013). Can external shocks explain the Asian side of global imbalances? Lessons from a structural VAR model with block exogeneity. *Review of International Economics 21*(1), 85–102.

Jannsen, N. and M. Klein (2011). The international transmission of euro area monetary policy shocks. Kiel Working Papers 1718.

Kapsoli, J. and E. Ozturk (2025). Financial Buffers in a Euroized Economy: Republic of Kosovo. IMF Selected Issues Paper SIP/2025/003, International Monetary Fund.

Kilian, L. and H. Lütkepohl (2018). *Structural Vector Autoregressive Analysis*. Cambridge University Press.

Lastrapes, W. D. (2005). Estimating and identifying vector autoregressions under diagonality and block exogeneity restrictions. *Economics Letters 87*(1), 75–81.

Leeper, E. M., C. A. Sims, and T. Zha (1996). What does monetary policy do? *Brookings Papers on Economic Activity 1996*(2), 1–63.

Lütkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*. Springer.

Moder, I. (2023). The transmission of euro area monetary policy to financially euroized countries. *Economics and Politics 35*(3), 718–751.

Ozturk, E. (2025). ECB Monetary Policy Passthrough to Bank Interest Rates During Tightening, Republic of Kosovo. IMF Selected Issues Paper SIP/2025/004, International Monetary Fund.

Sims, C. A. (1988). Bayesian skepticism on unit root econometrics. *Journal of Economic Dynamics and Control 12*(2-3), 463–474.

Sims, C. A. and H. Uhlig (1991). Understanding unit rooters: A helicopter tour. *Econometrica 59*(6), 1591–1599.

Willems, T. (2013). Analyzing the effects of US monetary policy shocks in dollarized countries. *European Economic Review 61*(C), 101–115.

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