

Globalization of Inflation: Evidence from Balkan, Visegrad and Baltic Countries

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Abstract: Globalization of Inflation (GI) is a recently surged hypothesis that indicate the relatively more importance of foreign dynamics (output slack) in driving the inflation compared to domestic factors. The purpose of this study is to analyze the validity of GI hypothesis for the 16 Eastern European economies over a recent period, 2011-2025. The set of countries include several homogenous groups such as Balkan countries, Visegrad and Baltic countries. The novelty of the paper comes from the fact that GI hypothesis has mostly been unstudied for the transition economies which have experienced a massive liberalization over the last few decades. Also, unlike the existing studies, our dataset represents a very recent period that includes crucial inflationary developments such as Covid-19 outbreak, recent loosening of monetary policy, etc. We take Backward Philips Curve as a theoretical basis and analyze the hypothesis by applying a range of panel methods. We employ domestic and foreign output gaps, lagged inflation, oil prices, Eurozone inflation rate and Covid-19 dummy in terms of regressors. As a result, we find evidence that GI holds for Balkan countries but the evidence on Visegrad and Baltic countries is only partial and weaker. European output gap has been relatively more significant than the domestic output gap in Balkan countries whereas this finding is not true for Visegrad and Baltic countries. This represents a novel finding in the current literature.

Keywords: Globalization of Inflation; Philips Curve; Balkan Economies.

JEL classification: E31; F32.

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1. INTRODUCTION

Globalization of Inflation (GI) is a recently surged hypothesis that indicates the relatively more importance of foreign dynamics in driving the inflation compared to the domestic factors (Borio and Filardo, 2007; Ihrig *et al.*, 2010; Karadam-Yolcu, 2020). Understanding the role played by global components is crucial to shed light onto the change in inflation dynamics and required policies in an extremely open and interdependent environment.

The theoretical literature in this field has put forward several supporting and counter arguments. To start with the supporting ones, increasing trade integration is claimed to bring higher sensitivity of domestic inflation to import prices, not only for consumption goods but also for intermediate and capital goods (Borio and Filardo, 2007; Ihrig *et al.*, 2010; Forbes, 2019; Karadam-Yolcu, 2020). Hence, during the foreign boom periods, elevated import prices are likely to give rise to the domestic prices. Interdependency of Global Value Chains plays a central role in such globalized inflationary movements (Auer *et al.*, 2017; Lovin, 2020). From another perspective, recent increase in the global shocks, such as to energy, food and commodity prices may be regarded as important factors leading to a globalized inflation (Minasyan *et al.*, 2023). Consequently, all these external factors should be taken into account by the monetary policy authorities (Rogoff, 2003; Fisher, 2006; Bernanke, 2007; Ihrig *et al.*, 2010; Karadam-Yolcu, 2020).

On the other side, there exist several counter arguments that still advocate the importance of domestic factors. It is claimed that the even if the import prices increase during the global expansion periods, this will not create additional inflation as long as the domestic currency appreciates under a flexible exchange rate regime (Kohn, 2006; Yellen, 2006; Ihrig *et al.*, 2010; Karadam-Yolcu, 2020). Another view points to the relative importance of other domestic factors such as the success of the domestic monetary/fiscal policy, output smoothing and management of expectations (Buiter, 2000; Ball and Moffitt, 2001; Kamin *et al.*, 2004; Roberts, 2006; Mishkin, 2007, 2009; Zhang, 2015).

Yet, the empirical literature is also far from a clear cut. While some studies provide empirical support of GI Hypothesis for the advanced and emerging economies, there are other controversial findings in the literature. The empirical findings can be found at Tootell (1998); Gamber and Hung (2001); Ball (2006); Helbling *et al.* (2006); Borio and Filardo (2007); Wynne and Kersting (2007); Pain *et al.* (2008); Calza (2009); Ciccarelli and Mojon (2010); Ihrig *et al.* (2010); Milani (2010); Çiçek (2012); Manopimoke (2015); Karadam-Yolcu (2020).

We aim to contribute to the literature in this field in two main directions. First, the existing studies mostly concentrate on advanced countries, while developing countries are relatively ignored. Most importantly, the existing analyses are particularly scarce for the emerging European economies. Indeed, Eastern European Economies (EEE) have experienced a rapid transformation from planned to liberal economy over the last 30 years with increased trade and financial ties with the rest of the world, particularly with the western European economies. Therefore, recent globalization may have significant impact on these economies as well as on the main macroeconomic indicators and policies.

Second, the majority of the studies lack the analysis regarding the most recent period that includes crucial inflationary developments, such as disruptive effect of Covid-19 pandemic on the supply chains, too loose monetary policies after Covid-19 outbreak and a significant tightening afterwards. Hence, providing updated evidence is useful to shed light onto the current status of GI hypothesis and thereby implied new policies.

Thus, the purpose of this study is to analyze the validity of GI hypothesis for the 16 Eastern European (transition economies) for a recent period of 2011-2025. The set of countries include several homogenous groups such as Balkan countries Visegrad and Baltic countries. We provide evidence both for a pool of the countries and for the sub-groups. We adopt a Backward Philips Curve approach as it is a common practice in the literature which we apply on a panel set of countries with an array of empirical (panel) methods.

The paper continues with the literature review (Section 2), data and methods (Section 3), empirical results (Section 4) and conclusion sections (Section 5).

2. LITERATURE REVIEW

2.1. Theoretical literature

The theoretical framework relies on the backward Philips Curve which is conventionally used in the macroeconomics literature, in addition with foreign output gap: (Phillips, 1958; Phelps, 1967; Friedman, 1968; Phelps, 1968; Gordon, 1982; Gordon and Stock, 1998; Ihrig *et al.*, 2010; Karadam-Yolcu, 2020):

$$\pi_t = \tau + \theta\pi_{t-1} + \beta y_t^d + \gamma y_t^f \quad (1)$$

where π denotes the inflation rate, θ represents the degree of inflation persistence (inertia), y_t^d and y_t^f respectively denotes the domestic and foreign (European) output gaps (Phillips, 1958; Phelps, 1967; Friedman, 1968; Phelps, 1968; Gordon, 1982; Gordon and Stock, 1998; Ihrig *et al.*, 2010; Karadam-Yolcu, 2020). β and γ represents the impact of domestic and foreign GDP gap which are theoretically expected as positive. It follows that increasing domestic output gap reflects the elevated aggregate demand which is likely to induce the demand-pull inflation whereas an increase in foreign output gap is possibly translated into domestic prices via increased import prices and other related spillovers (Phillips, 1958; Phelps, 1967; Friedman, 1968; Phelps, 1968; Gordon, 1982; Gordon and Stock, 1998; Borio and Filardo, 2007; Ihrig *et al.*, 2010; Forbes, 2019; Karadam-Yolcu, 2020).

2.2. Empirical Studies

With regard to the empirical literature studies in this field, there exists a number of studies addressing the inflation dynamics but particularly focusing on the Globalization of Inflation hypothesis. However, the findings are far from a clear cut. While some studies provide empirical support of GI Hypothesis for the advanced and emerging economies, there are other controversial findings in the literature.

The early debate has started with the studies on the U.S. For instance, Tootell (1998) finds no evidence of the fact that global capacity has a significant influence on the U.S. inflation for 1973-1996 period whereas Gamber and Hung (2001) finds evidence supporting the role of globalization (and external excess capacity) on the decrease in U.S. inflation. In line with Tootell (1998); Ball (2006) reports little reasons for the significant role of globalization on the U.S. Philips Curve structure and inflation. Finally, Milani (2010) reports the relevance of global slack for the inflation of the US after 1985.

Carrying this debate to the cross-country level, Borio and Filardo (2007) find increasingly supportive evidence of global factors on the inflation for a set of 16 countries

and period between 1980-2005. In support of this finding, [Pain *et al.* \(2008\)](#) find an increasing role of foreign dynamics (i.e. import prices) on the evolution of inflation of countries. In a supportive manner, [Ciccarelli and Mojon \(2010\)](#) show that inflation in 22 OECD countries has largely global component. However, controversially, [Ihrig *et al.* \(2010\)](#), do not report evidence in favor of GI Hypothesis for 11 industrialized countries. Similarly, [Karadam-Yolcu \(2020\)](#) find still the importance of domestic output gap compared to the foreign one for a set of 26 developed countries between 1985-2017.

With regard to the studies on EU, [Calza \(2009\)](#) reports only limited evidence of the role of global capacity constraint on the Eurozone's inflation over the period 1979-2003.

There is a limited number of studies on the Balkan and Eastern European countries in this context. One exceptional study was implemented by [Çiçek \(2012\)](#) on the inflation of Türkiye which reports the fact that the inflation and Philips curve is affected by globalization for a period between 1987-2007. Among the empirical studies on the CEE area, [Hałka and Szafranski \(2015\)](#) finds that inflation in CEE countries is well coupled with the Eurozone, while similarly, [Lovin \(2020\)](#) finds that inflation is highly globalized for CEE countries. In contrast, [Minasyan *et al.* \(2023\)](#) find mostly unsupportive evidence for Western Balkan economies. In a similar vein, [Jasova *et al.* \(2020\)](#) find the relative importance of domestic factors since 2009 for emerging countries.

In summary, the empirical literature is far from a consensus. Although the empirical literature is growing in this field, there is a gap and need for more studies on Eastern European and Balkan economies since these countries have experienced a rapid transition towards liberalization and globalization over the last few decades. Moreover, the countries in this zone have experienced serious inflationary developments in the past.

Globalization should be more focused on as a driver which lacks in the existing empirical literature. Furthermore, the existing study often uses past datasets that are not able to capture the recent developments such as Covid-19 pandemic, digitalization of the economies, recent changes in monetary policies, etc. Indeed, there is a limited number of studies that study the post-covid period in terms of globalization and inflation (some exceptional studies are [Binici *et al.* \(2022\)](#); [Chau *et al.* \(2024\)](#) which we target to focus on. For all these reasons, we find it relevant and novel to pursue our study.

We may hypothesize that the smaller transition economies (i.e. Balkan economies) may have been more exposed to globalized inflation since their input/output markets are yet shallow which may be more heavily affected by the Eurozone's inflation. Moreover, the supply chain of these economies might be more dependent on the Eurozone economies which may ease the transmission of output and inflation. However, all these considerations are subject to an empirical examination which will be carried out in the next section.

3. DATA AND METHODS

The dataset covers a panel of 16 Eastern European emerging economies including Balkan (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia), Visegrad (Czech Republic, Hungary, Poland, Slovakia, Slovenia) and Baltic (Estonia, Latvia, Lithuania) countries.

The empirical model is expressed by the regression model in equation (2) that is based on the theoretical model in equation (1).

$$\pi_{i,t} = \tau + \theta\pi_{i,t-1} + \beta y_{i,t}^d + \gamma y_{i,t}^f + \delta(\pi_{eur,t-1} - \pi_{i,t-1}) + \mu(oil_{t-1} - \pi_{i,t-1}) + \kappa covid_t + e_{i,t} \quad (2)$$

t represents the quarters from 2011Q1-2025Q1. The dependent variable ($\pi_{i,t}$) is the annual inflation rate of seasonally adjusted CPI, in natural logs and differenced over the 4-quarters¹. $y_{i,t}^d$ and $y_{i,t}^f$ denotes the real GDP gap (GDP seasonally adjusted, in natural logs, constant prices, chain linked volume), estimated by using a Hodrick-Prescott filter, assuming smoothing parameter as 1600 (Hodrick and Prescott, 1997). π_{eur} is the annual inflation rate of the Eurozone calculated using the Harmonized Index of Consumer Prices (ln and 4-quarters differenced). oil represents the global energy prices, Brent oil price (in US Dollars, seasonally adjusted, in ln and 4-quarters differenced). Inflation and GDP data (π, y^d, y^f, π_{eur}) has been obtained from IMF (2025b, 2025a) and Eurostat (2025a, 2025b)'s electronic databases whereas the data for oil is obtained from Eurostat (2025a, 2025b); Investing (2025); OECD (2025). We include a set of control variables (oil prices and Eurozone's inflation) that are considered to be effective on domestic prices.

With regard to the parameters in equation (2), τ is the intercept, θ denotes the first-order autoregressive component of inflation, β and γ are the impact coefficients of domestic and foreign output gaps respectively. Finally, δ and μ show respectively the impact of Eurozone's inflation and oil prices, net of domestic inflation. We add also a dummy ($covid_t$) in order to account for the impact of Covid-19 pandemic. This dummy takes value 0 for the quarters prior to 2020Q1 but takes the value of 1 2020Q1 onwards.

We implement a panel unit root test to the variables in the equation (2). We assume individual unit root processes of the variables in the test implementation that are more compatible with the data generating process. The tests include intercept only. Lag length has been determined by Schwarz (1978) criterion, allowing a maximum lag of 16 quarters. We use 3 different types of tests for the sake of robustness such as IPS (Im *et al.*, 2003), ADF-Fisher and PP-Fisher (Fisher, 1932; Phillips, 1958; Dickey and Fuller, 1979; Phillips and Perron, 1988; Maddala and Wu, 1999; Hadri, 2000; Choi, 2001; Fisher, 2006).

Table no. 1 – Panel Unit Root Test Results

Test Type	$\pi_{i,t}$	$y_{i,t}^d$	$y_{i,t}^f$	$(oil_{t-1} - \pi_{i,t-1})$	$(\pi_{eur,t-1} - \pi_{i,t-1})$
IPS	-3,76018***	-12,5907***	-12,8458***	-4,77047***	-3,8664***
ADF - Fisher	74,4728***	217,449***	218,536***	71,2574***	90,9023***
PP - Fisher	46,0472*	204,986***	217,408***	92,8713***	69,7801***
lag length	9	2	0	0	9

The results indicate a strong set of evidence that rejects the null hypothesis of panel unit root. In other words, all variables are shown to follow stationary processes that allow us to proceed with the current form of the variables.

The model in the equation (2) is estimated by using Fixed Effect and Random Effect models that are recognized as successful models in handling the possible unobserved heterogeneity and endogeneity in the data (Wooldridge, 2002; Baltagi, 2005). The White diagonal heteroskedasticity robust errors are used (Huber, 1967; White, 1980; Arellano, 1987; Wooldridge, 2002).

Domestic and foreign output gaps are highly correlated with each other as the pairwise correlation coefficient is about 0.77. Therefore, to avoid possible multicollinearity, these variables are separately included in the estimations. Following this, we provide two different robustness analysis. First, we estimate the model for sub-geographical divisions (Balkan, Visegrad and Baltic Groups) by interacting dummy variables representing each group with the variables in the models. Second, we include a dummy variable in the main model for covid-19 period.

A final analysis complements the test of GI hypothesis that we calculate the mean and SD of the correlations of country-level inflations with the Eurozone's inflation in order to explore the tendency of comovements in the inflation patterns. It has been demonstrated graphically for rolling windows of 25 quarters. In this way, one can observe the evolution of inflation's synchronization with the Eurozone, hence, the tendency of globalization.

The methodology of the paper, however, may be subject to several limitations. First, although Fixed Effect and Random Effect models are known as reliable techniques in handling the endogeneity, a robustness analysis may be necessary such as adoption of estimation techniques with relevant instruments. However, due to the lack of such instrumental data, this may be counted as a limitation. Another limitation may be related to the brevity of time period. It could be more precise to pursue an analysis with a longer past trajectory, such as the period covering 1990s or 1980s. However, the sample starts only by 2011 in order to cover a wide array of countries. Despite these limitations, the methodology of the paper can be referred to as reliable since fixed/random effect estimators are standardized techniques, the period of analysis is adequately recent and sample of countries are well-representative of the transition economies.

In terms of software, the analysis in this paper is implemented by using EViews 4 and EViews 10 software (Quantitative Micro Software LLC, 2002; IHS Markit, 2017).

4. EMPIRICAL RESULTS

To start with the empirical results, we initially plot the evolution of the inflation over the period of analysis in [Figure no. 1](#). At a glance, it provides us a visual evidence of highly synchronous inflation patterns although minor idiosyncratic movements are present. It is clearly seen that before the Covid-19 pandemic, the inflation rates were at reasonable levels but elevated rapidly following the pandemic, reaching to even more than 20 % for some countries. Too loose monetary policies during the Pandemic, the uncertainty, expansionary fiscal policies, stimulus fiscal programs, as well as the rise in commodity and food prices, disruptions in global value chains are likely to have given rise to such an aggressive inflation.

As a focus analysis of GI, the regression results (of Philips Curve) are summarized in [Tables no. 2a](#) and [no. 2b](#). [Table no. 2a](#) shows the estimates of equation (2) for the panel including 16 countries whereas [Table no. 2b](#) provides the same estimates for the geographical sub-groups. The results provide several interesting results. First, it is observed that domestic and foreign output gaps have positively significant coefficient for the full country set. However, foreign output gap has relatively higher coefficient. Other control variables have mostly positive and significant coefficient indicating the validity of standard inflation drivers.

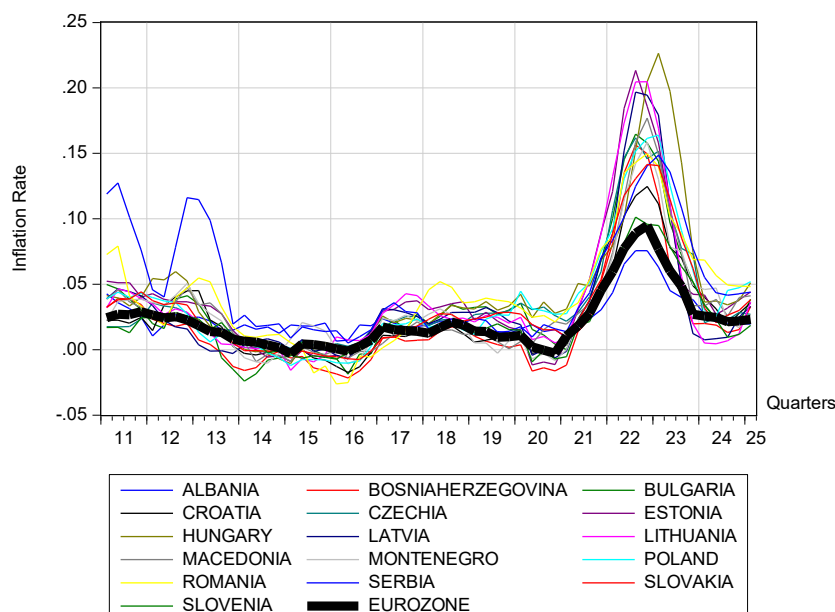


Figure no. 1 – Annual Inflation Rates, In first difference of quarterly CPI Index

In geographical divisions, when we compare the coefficient size of both variables, the estimated parameter of foreign output gap is larger compared to the domestic one for the full sample and Balkan countries. In contrast, for the Visegrad and Baltic group, although both output gaps are significant, the coefficient is higher for the domestic gap. Consequently, we may state that inflation is more sensitive to the foreign (European) output gap particularly for Balkan group.

The variable $(\pi_{eur,t-1} - \pi_{i,t-1})$ that represents the inflation spillovers (net of domestic inflation) from Eurozone has a positive and significant coefficient for most of the regressions (for the full sample, Balkan and Visegrad groups) but not for Baltic economies. It means that the Eurozone's price movements may spread to the Eastern European economies, possibly, via trade, financial and cost linkages. Similarly, oil price inflation (net of domestic inflation) has a positive and significant coefficient consistently for the full sample and geographical sub-divisions. The coefficient is higher for Baltic countries followed by Balkan and Visegrad countries. This seems theoretically plausible since energy is one of the main component of production processes and therefore, critical for the inflationary developments.

The regression results are generally consistent when the Covid-19 dummy has been also added. The dummy variable has a positive and significant coefficient as expected since the inflation has risen rapidly after 2019. Inflation persistence degree (θ) is positive and significant for all regressions. The coefficient is highest for the Baltic group followed by Balkan and Visegrad countries.

In sum, the regression results provide a general empirical support for the Globalization of Inflation which is mostly driven by Balkan countries but only partially supported for Visegrad and Baltic countries. Although there is heterogeneity across the geographical groups, Balkan group seems to fit mostly the globalized inflation as foreign output, eurozone inflation and oil price variables are simultaneously significant.

Table no. 2 – Panel Regression Estimates, N=896, Standard Error Type: White Diagonal Heteroskedasticity Robust Errors

2.a – Full Set of (16) Countries

Panel estimator type	τ (constant)	$\pi_{i,t-1}$	$(\pi_{eur,t-1} - \pi_{i,t-1})$	$(oil_{t-1} - \pi_{i,t-1})$	$y_{i,t}^d$	$y_{i,t}^f$	covid	R2
Fixed Effect	0,002651***	1,011064***	0,228908***	0,017369***	0,041286**			0,9
Random Effect	0,002843***	0,980724***	0,155265***	0,01773***	0,04252**			0,9
Fixed Effect	0,002836***	1,000229***	0,214075***	0,016957***		0,065453***		0,9
Random Effect	0,003032***	0,970044***	0,141225***	0,017293***		0,067698***		0,9
Fixed Effect	0,001804***	0,929072***	0,156647**	0,017868***	0,083147***		0,00734***	0,9
Random Effect	0,002016***	0,898415***	0,080649	0,018239***	0,083881**		0,007248***	0,9
Fixed Effect	0,002007***	0,885424***	0,106543	0,017124***		0,144708***	0,009119***	0,9
Random Effect	0,002215***	0,854952***	0,031836	0,017471***		0,146489***	0,009056***	0,9

2.b – Geographical Divisions

Country group	Panel estimator type	τ (constant)	$\pi_{i,t-1}$	$(\pi_{eur,t-1} - \pi_{i,t-1})$	$(oil_{t-1} - \pi_{i,t-1})$	$y_{i,t}^d$	$y_{i,t}^f$	R2
Balkan	Fixed Effect	0,001138***	1,017698***	0,271779***	0,015748***	-0,00952		0,92
Balkan	Random Effect	0,000757**	1,027531***	0,226597***	0,014934***	-0,01247		0,92
Balkan	Fixed Effect	0,001225***	1,007553***	0,259053***	0,014602***		0,044346**	0,92
Balkan	Random Effect	0,000809**	1,021282***	0,219541***	0,013704***		0,040796**	0,92
Visegrad	Fixed Effect	0,000301	1,155332***	0,478728***	0,010656***	0,075161***		0,94
Visegrad	Random Effect	0,000216	1,1362***	0,400025***	0,010935***	0,077395***		0,94
Visegrad	Fixed Effect	0,000331	1,148872***	0,46881***	0,011375***		0,0492**	0,94
Visegrad	Random Effect	0,000234	1,132079***	0,393622***	0,011548***		0,052676***	0,94

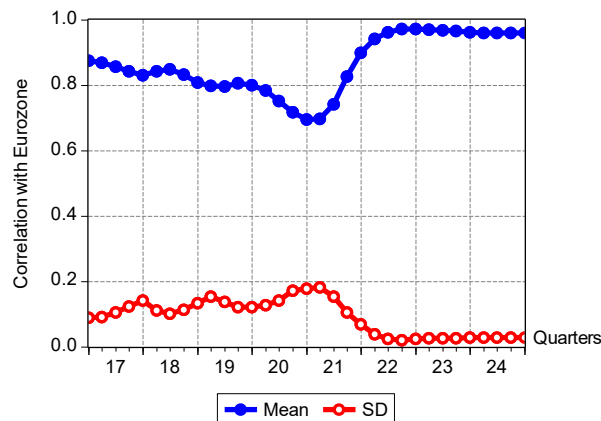


Figure no. 2 – Rolling Windows Correlation between inflations rates of countries and the Eurozone, window length=25 quarters, data points represent the end-point of intervals

As a final complementary analysis, we depict the evolution of correlations (mean and SD) between country level inflations and the Eurozone. It is clearly observed a very high association between domestic inflations and the Eurozone's. The mean correlation coefficient ranges between about 0.7 and 1 which rises rapidly after the Covid-19 pandemic. Consistently, the SD of the correlations tend to fall that indicates the homogeneity of inflation paths.

5. CONCLUSIONS

The current paper reaches to a set of evidence supporting globalized inflation, particularly for Balkan countries but partially for the Visegrad and Baltic countries. European output gap, oil prices and Eurozone inflation is shown to have often positive and significant effects on the domestic inflationary processes.

The obtained results may be argued to differ from the existing findings at two points. First, although the existing studies on CEE (such as [Hałka and Szafranski \(2015\)](#); [Lovin \(2020\)](#) have also found that inflation has a tendency to globalize in Europe and Eastern European economies, we reach to a particular finding that this result is specifically true for Balkan economies rather than for the Visegrad and Baltic countries. The result is theoretically plausible since Balkan economies are relatively small in size and still experience the liberalization and integration process with the EU, which might make their inflation paths more dominated/affected by Europe's business cycle and policies. As a second point, our results represent new and recent evidence from a dataset covering the period 2011-2025. Most of the existing studies fail to include recent inflationary developments in their studies, such as Covid-19 pandemic, the rise in commodity prices, monetary expansionary policies during the pandemic, etc. However, we succeed in incorporating them into our analysis.

The obtained results are also politically important. We argue as a consequence of the analyses that conventional monetary policy rules may not represent the complete dynamics, as the importance of foreign factors may exceed the domestic circumstances from case to case. Global business cycles and common shocks should be followed with a great care in monetary policy conduction as the pass through of these forces to domestic prices are recently strong. One may suggest other preventive policies. For instance, economies small in size should deepen the market size as the shallow market conditions may ease the pronounced fluctuations of the prices. Besides European integration, trade and financial ties with other geographies (Eurasia, etc) should not be neglected in order to provide geographical diversification of trade and other economic relationships. Any other prudential policies are necessary to be developed that will help to mitigate the impact of common shocks.

In sum, globalization of inflation seems as an unignorable phenomenon that is likely to change the conventional paradigm of standard monetary policies. It is necessary to be focused as a further research subject on the mechanisms of how inflation is globalized, determinants and the related forecast of future patterns and policies.

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Notes

¹ Seasonal adjustment of CPI and oil data has been made by using the Ratio to Moving Average Multiplicative method (Persons, 1919); Quantitative Micro Software LLC, 2002).