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High Inflation in the Baltics

Disentangling Inflation Dynamics and Its Impact on Competitiveness

Alice Fan, Bingjie Hu, Sadhna Naik, Neree Noumon, and Keyra Primus

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High Inflation in the Baltics: Disentangling Inflation Dynamics and Its Impact on Competitiveness

Prepared by Alice Fan, Bingjie Hu, Sadhna Naik, Neree Noumon, and Keyra Primus*

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ABSTRACT: This paper identifies and quantifies the drivers of inflation dynamics in the three Baltic economies and assesses the effectiveness of fiscal policy in fighting inflation. It also analyzes the macroeconomic impact of inflation on competitiveness by focusing on the relationship between wages and productivity in the tradeable sector. The results reveal that inflation in the Baltics is largely driven by global factors, but domestic demand matters as well, suggesting that fiscal policy can play a role in containing inflation. Also, there is robust evidence of a long-run (cointegration) relationship between (real) wages in the tradeable (manufacturing) sector and productivity in the Baltics with short-term deviations self-correcting in Estonia and Lithuania only.

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WORKING PAPERS

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Contents

Executive Summary

The three Baltic countries are small open economies. As such, global factors have a large influence on domestic economic dynamics and competitiveness is key for economic development. In this context, 'imported' inflation can present a significant challenge. First, it can have a large impact on domestic inflation dynamics and, with significant second round effects, can instill a potentially large degree of persistency. Second, high and persistent inflation may result in high nominal and real wage growth delinked from productivity that, if sustained over time, will erode competitiveness and growth. Finally, the challenge that high inflation poses is compounded by the available policy tools to fight it: as part of the euro area, monetary policy is in the hands of the European Central Bank (ECB) that sets policy for the area as a whole and does not respond to country-specific needs, particularly if country-specific developments are weakly correlated to developments of the euro area as a whole; and economic theory suggests that the effectiveness of the only macro-policy tool available for stabilization purposes—fiscal policy—may be limited given the openness of these economies.

Inflation in the Baltics is largely driven by global factors, but domestic demand matters as well, suggesting that fiscal policy can play a role in containing inflation. At the same time and given the small size of the Baltic region relative to the rest of the euro area, monetary policy is, effectively, exogenous to specific regional macroeconomic factors including the stance of fiscal policy. This is particularly important given the different inflation dynamics of the Baltic region relative to the rest of the eurozone. Over the past few years, including the period before COVID-19, the cyclical position of the Baltic countries was more advanced than the euro area average. Thus, the stance of the ECB, while appropriate for the euro area as a whole was too loose for Estonia, Latvia, and Lithuania specifically. This leaves fiscal policy as the main policy tool available for macroeconomic stabilization. In fact, through its impact on domestic demand, fiscal policy has a statistically significant impact on inflation rates across the three Baltic countries.

A risk to competitiveness from high and persistent inflation is that it would lead to high and persistent wage growth in non-tradables and result in above-productivity wage growth in the exporting sector. The concern that persistent wage growth pressures—significantly above the euro area—could outpace productivity and affect competitiveness and convergence have not yet materialized. However, if the current shock turns out to be more persistent-than-anticipated, it could lead to larger and persistent second-round effects, potentially affecting inflation expectations and wage negotiations in the future. The tight labor market across the Baltics further exacerbated these risks. However, during the last few years inflation expectations remained anchored in the Baltics, resulting in significant negative real wage growth while inflation was elevated.

Productivity growth has been closely linked to wage growth in the Baltics over 2000-22 with Lithuania's productivity in the manufacturing sector above wage growth on average, slightly below in the case of Latvia and similar for Estonia. Furthermore, there is robust evidence of a long-run (cointegration) relationship between (real) wages in the tradeable (manufacturing) sector and productivity in the Baltics. On the other hand, statistical evidence of a short-run relationship--underpinning a reversion to the long-run relationship—was only conclusive for Lithuania and Estonia. This suggests that, if past patterns hold, while short-term deviations of wages from productivity are self-correcting in Estonia and Lithuania (at a faster rate in the former), in the case of Latvia these deviations may prove more persistent highlighting a greater risk to competitiveness and, therefore to convergence. These outcomes are correlated to the degree of flexibility in each of the country's labor market, with Latvia being the least flexible of the three.

I. Introduction

The three Baltic countries are small open economies. As such, global factors have a large influence on domestic economic dynamics and competitiveness is key for economic development. In this context, 'imported' inflation presents a significant challenge. First, it can have a large impact on domestic inflation dynamics and, with significant second round effects, can instill a potentially large degree of persistency. Second, high and persistent inflation may result in high nominal and real wage growth delinked from productivity that, if sustained over time, will erode competitiveness and growth. Finally, the challenge that high inflation poses is compounded by the available policy tools to fight it: as part of the euro area, monetary policy is in the hands of the ECB that sets policy for the area as a whole and does not respond to country-specific needs, particularly if country-specific developments are weakly correlated to developments of the euro area as a whole; and economic theory suggests that the effectiveness of the only macro-policy tool available for stabilization purposes—fiscal policy—may be limited given the openness of these economies.

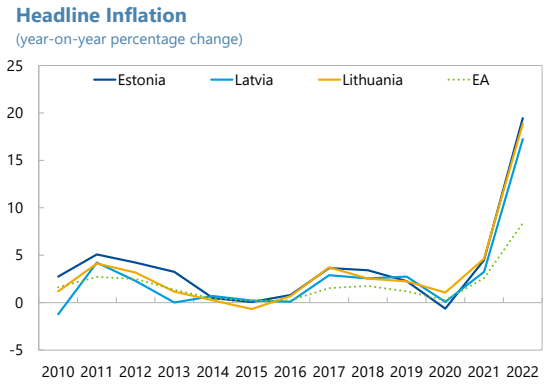
This paper tries to shed light on these questions by identifying and quantifying the drivers of inflation dynamics in the three Baltic economies and assessing the effectiveness of fiscal policy in fighting inflation (chapter II).[1] Finally, the paper analyzes the macroeconomic impact of inflation on competitiveness by focusing on the relationship between wages and productivity in the tradeable sector (chapter III).

II. Inflation Dynamics in the Baltic Countries and the Effectiveness of Policies

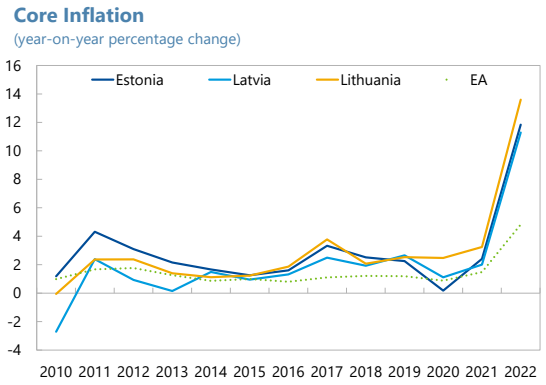
Although inflation has been cooling down rapidly in the second half of 2023, headline inflation surged over the last few years in the Baltic countries, doubling the euro area average and even quadrupling the rate in the lowest-inflation euro area members at some point (Figure 1). In 2022, average headline inflation accelerated to 17.2 percent in Latvia, 19.4 percent in Estonia, and 18.9 percent in Lithuania, whereas the overall euro area average for the same period was 8.4 percent. The surge in headline inflation could potentially lead to: (i) higher inflation expectations, (ii) disruptions to investment planning, and (iii) a reduction in purchasing power, which hurt low-income earners more. Core inflation also increased as second-round effects of energy prices were broad-based in the context of tight labor markets.

[1] This paper does not focus on the potentially different impact of fiscal and monetary policy on inflation depending on the nature of the shock which could be part of future research.

Figure 1. Inflation in the Baltics and Euro Area

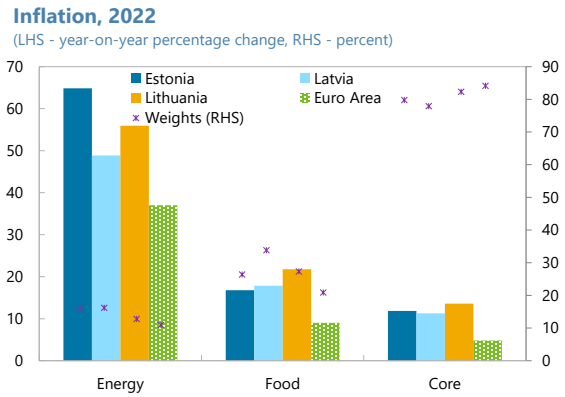


Sources: Eurostat; and Haver Analytics.



Sources: Eurostat; and Haver Analytics.

In the Baltic countries, much of the rise in inflation can be linked to the large increase in energy and food prices.[2] The responsiveness of domestic inflation to energy and food price increases can be attributed to the high share of both items in the consumer price index baskets (16.4 and 29.3 for energy and food on average, respectively, versus 10.2 and 20 for the euro area average).[3, 4] In 2022, energy accounted for almost one-half of the overall inflation in the Baltics on average (8.5 percent) and about one-half in the euro area (4.1 percent) (Figure 2). The increase in food prices has also had a significant contribution to the overall rise in inflation. The food price component in the HICP accounted for about 5.5 percent on average in the Baltics, compared to 1.9 percent in the euro area (Figure 3).



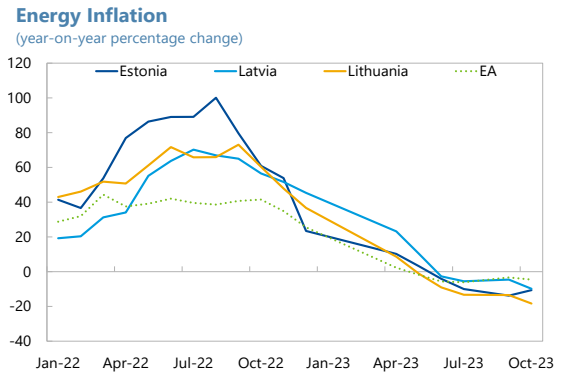
Source: Eurostat; Haver Analytics; and IMF staff calculations.

[2] IMF (2022) estimates that rising commodity prices explain around two thirds, while the cross-country heterogeneity in inflation dynamics can be explained by differences in food and energy weights in CPI baskets, among other factors. Given the large dependency on energy of the three Baltic countries, commodity prices tend to have a significant impact on inflation dynamics.

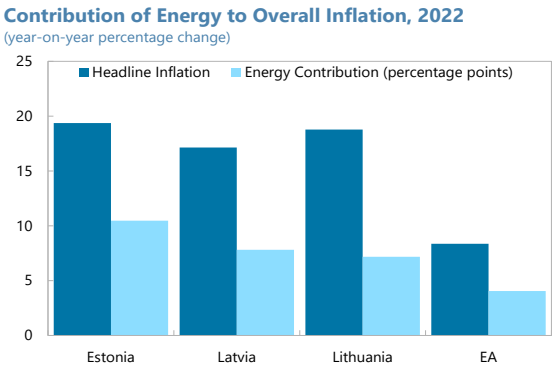
[3] As pointed out by Gelos and Ustyugova (2012), economies with higher food shares in CPI baskets, fuel intensities, and pre-existing inflation levels are more prone to experience inflationary effects from commodity price shocks.

[4] Among all three Baltic countries, Latvia has the higher share of energy and food in its consumer price index basket.

Figure 2. Energy Inflation in the Baltics and Euro Area

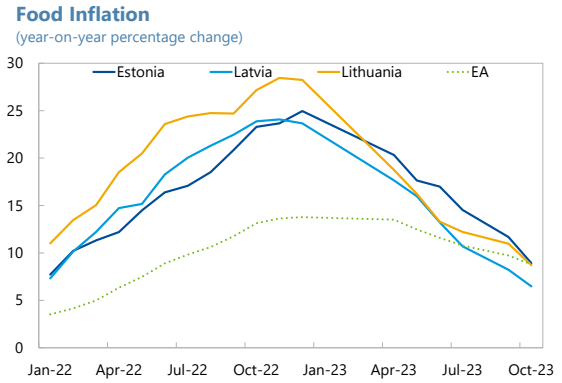


Sources: Eurostat; Haver Analytics; and IMF staff calculations.

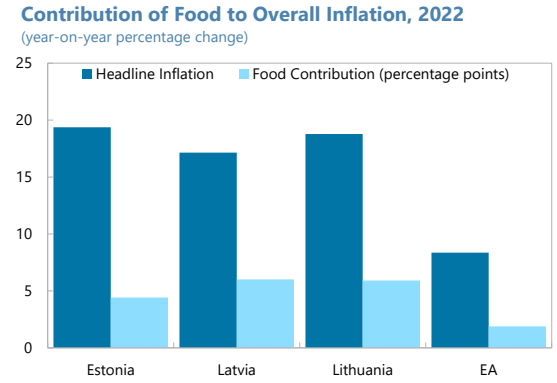


Sources: Haver Analytics; and IMF staff calculations.

Figure 3. Food Inflation in the Baltics and Euro Area



Sources: Eurostat; and Haver Analytics.

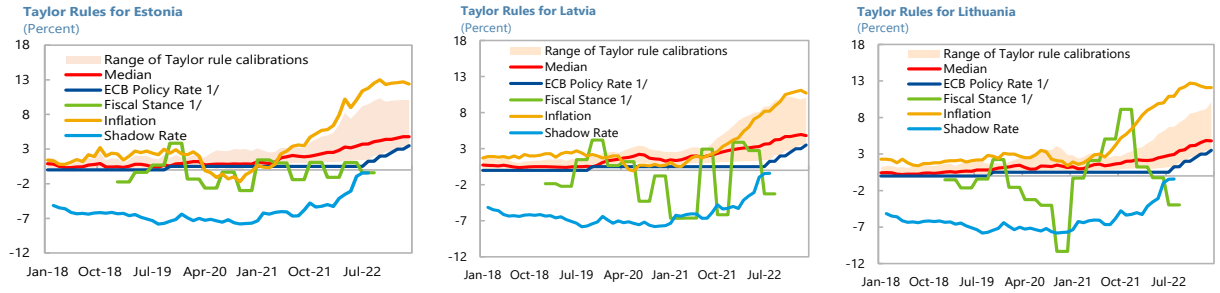


Sources: Haver Analytics; and IMF staff calculations.

Apart from the higher weight of energy and food in the consumption basket, global factors also have an important impact on inflation in small open economies. The small size and high level of economic openness in the Baltic countries expose them to a greater extent to external developments. Thus, identifying the key drivers of inflation is critical to understand its evolution and determine the appropriate policy response.

But the policy response critically depends on the effectiveness of policies—monetary and fiscal—on inflation. Given the small size of the Baltic region relative to the rest of the euro area, monetary policy is, effectively, exogenous to specific regional macroeconomic factors including the stance of fiscal policy. This is particularly important given the different inflation dynamics of the Baltic region relative to the rest of the eurozone and given that their business cycles are not fully synchronized with the rest of the eurozone. Over the past few years, including the period before COVID-19, the cyclical position of the Baltic countries was more advanced than the euro area average. Thus, the stance of the ECB, while appropriate for the euro area as a whole was too loose for Estonia, Latvia, and Lithuania specifically. This leaves fiscal policy as the main policy tool available for macroeconomic stabilization. But the question is then, how effective is fiscal policy in these countries to affect inflation.

Figure 4. Baltics: Monetary and Fiscal Policy Stance



Sources: European Central Bank; Haver Analytics; and IMF staff calculations.
1/ ECB policy rate is the main refinancing operation rate and fiscal stance is calculated as the year-on-year difference in cyclically adjusted primary balance in percent of potential GDP.
Note: The range of Taylor rates includes calibrated interest rates obtained from an adjusted Taylor rule of the type $i = r^*+\pi^* + a(\pi-\pi^*) + b(y-y^*)$ with different values for the parameters a and b, and inertial rules with smoothing, where the calibrated rate in the current period depends on the policy rate in the previous period, i.e.: $i = c*i(-1)+(1-c)*[r^*+\pi^* + a(\pi-\pi^*) + b(y-y^*)]$. Core HICP inflation is used in all calibrations while economic slack is measured using detrended unemployment (the unemployment gap).

This chapter will first disentangle the quantitative importance of different contributory factors to inflation in the Baltics, with a particular focus on the role of global vs domestic drivers. Subsequently, an assessment will be conducted to evaluate the impact of both fiscal and monetary policies on inflation. The next section presents an overview of the literature. This is followed by two sections looking at inflation dynamic and its drivers and the impact of fiscal policy on inflation. Each section provides a description of the data followed by a discussion of the empirical methodology and the results. The final section provides concluding remarks.

A. Literature Review

Several empirical studies find global variables as the main determinants of inflation. Forbes (2019) found that global factors are significant drivers of CPI inflation in a cross-section of countries, and their role has increased over the last decade, particularly the role of nonfuel commodity prices. Finck and Tillman (2022) found that global shocks explain large parts of inflation and output dynamics. The small size and high degree of openness of the Baltic countries expose them heavily to global factors that could determine inflation dynamics (Benkovskis et al., 2009). Mikolajun and Lodge (2016) explore the role of global factors in OECD economies in the context of an open economy Phillips curve. Their results suggest that global inflation clearly plays an important role in explaining domestic inflation, particularly when prices are high. Other studies highlight too the importance of global factors including Masso and Staehr (2005); Ciccarelli and Mojon (2010), Corsetti et al. (2014); Auer et al., (2017); Conti et al. (2017); Berganza et al., (2018); Auer et al., (2019); and Bobeica and Jarocinski (2019).

At the same time, some studies have found that domestic factors play a major, or equally important role compared to global factors, in determining inflation. Bems et al., (2018), in a New Keynesian Phillips curve with global variables, show that domestic factors are the most important drivers of inflation. Kamber et al. (2020) found that both domestic and foreign factors are important drivers of inflation, albeit with very heterogeneous effects across different advanced and emerging market economies. Binici et al. (2022) found that inflation in Europe has become more responsive to both domestic and global shocks in the post-pandemic period. Gohar et al. (2023) also found that domestic shocks are associated with a large fraction of inflation in

the Western Balkans. In particular, their findings show that the current surge in inflation cannot be fully attributed to external price shocks and that strong domestic demand affected inflation.

Regarding the impact of monetary and fiscal policy on inflation, the evidence is mixed. Friedman (1963) argues that inflation is a monetary phenomenon, at least in the medium- to long-term. Fischer et al (2002) show that inflation is strongly correlated with the growth rate of the money supply both in the short- and the long-run. Afonso et al., (2019) show that inflation has a significant impact on fiscal policy and that governments raise their primary balances when facing increases in debt levels. Reichlin et al., (2022) found that monetary policy shocks are accompanied by a small but persistent rise in inflation and a fiscal easing in the aggregate. From a fiscal perspective, Sargent and Wallace (1981) discuss theoretically the monetary dominance and fiscal dominance regimes, where fiscal deficit can affect inflation through money creation. However, the Fiscal theory of the price level (Sims 1994) suggests that fiscal policy can have equally important influence on price levels. Catao and Terrones (2005) provide empirical evidence on the positive correlation between fiscal deficits and inflation. In another study, Nguyen (2019) finds a long-run positive relationship between government spending as a share of GDP and inflation in the cases of China, India, and Indonesia. However, the study finds mixed evidence on the short-term relationship between government spending and inflation. Szymanska (2022) analyzes the effects of fiscal policy shocks in the Baltic economies under a single monetary policy of the ECB, with country-specific fiscal policy. The results show that the increase in government spending has a positive impact on inflation in all three Baltic economies, but the effect dissipates faster in Latvia than the rest of Baltics. More recent empirical work using cross-country panel data by the IMF (2023) suggests that fiscal deficits have a positive impact on inflation.

B. Inflation Dynamics in the Baltics

1. Data

We use data on the Baltic countries and the euro area as a whole from the World Economic Outlook (WEO) database and Eurostat. Domestic variables include real GDP growth, inflation, nominal wage growth, and economic slack.[5] Global variables are included to account for the impact of changes in the global economy on domestic prices. These are captured by oil prices[6], global food prices, world real GDP growth, and the real effective exchange rate. All variables other than the real effective exchange rate are expressed as year-on-year growth rates in percentage points. The real effective exchange rate is included in logs. An increase in the real effective exchange rate corresponds to a real appreciation of the domestic currency. The sample covers quarterly data from the first quarter of 2000 to the last quarter of 2022.

2. Empirical Methodology

To analyze inflation dynamics, this chapter will estimate a series of SVAR models separately for the three Baltic countries and the euro area. The structural representation of the model is given by:

$$A_0 y_t = \mu + A_1 y_{t-1} + \cdots + A_\rho y_{t-\rho} + \varepsilon_t$$

where: y_t is a $n * 1$ vector of endogenous variables, which includes oil price growth, inflation, food price growth, domestic real GDP growth, domestic economic slack, nominal wage growth, the real effective

[5] In line with IMF (2022), the domestic economic slack is measured by the unemployment gap (deviation from the Hodrick-Prescott —HP— filtered unemployment rate).

[6] We use the oil price as an indicator of energy price shocks. Although recently electricity price changes have pushed prices up more than other energy sources in the Baltics, there is a very high positive correlation (about 0.9 between 2019-2023) between oil prices and electricity prices.

exchange rate, the world real GDP growth; $A_0, \dots, A_p$ represent a matrix of coefficients; and ε_t is a vector of structural shocks.

Sign restrictions are imposed to identify supply and demand factors. The identification strategy broadly follows Corsetti et al. (2014) and Finc and Tillman (2022), by imposing a mixture of sign and zero restrictions. The identified SVAR model will also allow us to apply several structural analyses to address the role of structural shocks in inflation and output growth. Overall, five shocks are identified: global (supply) shocks (oil and food prices); global (demand) shock (world real GDP growth); domestic (demand) shock (real GDP growth); and domestic (supply) shock (domestic CPI). For the analysis, we focus on the global supply shock to oil prices and the domestic demand shock to real GDP growth.[7]

Table 1. Identification of Structural Shocks 1/

Variable\Shock	Oil price	Food price	Inflation	Wage growth	Real GDP growth	REER	Unemp. gap	World Real GDP growth
Oil price	+	.	.	.	.	.	.	.
Food price	.	+	.	.	.	.	.	.
Inflation	+	+	+	.	+	.	.	+
Wage growth	.	.	.	.	.	.	.	.
Real GDP growth	-	-	-	.	+	.	.	+
REER	.	.	.	.	.	.	.	.
Unemployment gap	.	.	.	.	.	.	.	.
World Real GDP growth	-	-	.	.	.	.	.	+

1/ The columns represent shocks and the variables impacted are displayed in the rows.

3. Empirical Results

The results suggest that global shocks are the main driver of inflation in the Baltics. Oil price shocks have an instantaneous positive and significant effect on consumer price inflation, which dissipates after a few quarters. In particular, a 5 percentage point increase in oil prices increases inflation in the Baltics by around 0.3–0.4 percentage points (significantly above the euro area, 0.1 percentage points). The shock also leads to a 0.7–0.8 percentage point contraction in output in the Baltics (0.5 percentage points in the euro area). Notably, the oil price shock leads to a 1 percentage point decline in nominal wage growth in Lithuania after the third quarter (whereas the impact on wage growth is not statistically significant in Estonia and Latvia).[8] These results indicate that global shocks have a significant impact on the Baltic economies, well above that of the euro area.[9]

[7] The results of the other shocks are presented in the appendix.

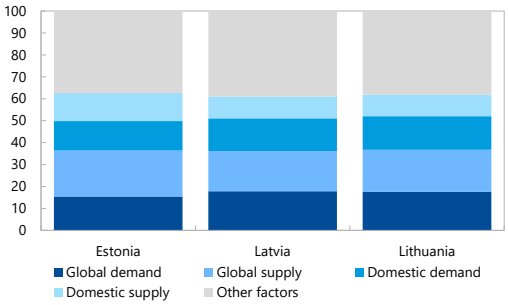
[8] In the euro area, the oil price shock leads to a decline in nominal wage growth. This impact, which is marginally significant, possibly reflects the dominant role of the downward pressure of the real wage channel compared to the upward pressure in the price channel.

[9] Robustness checks on a shorter sample for the post GFC period (2011-2020) show similar results.

Notwithstanding the importance of global shocks, domestic shocks also matter for the Baltics. A one standard deviation shock to domestic real GDP—around 0.7–0.8 percentage points of growth in the Baltics and 0.6 percentage points in the euro area—, increases inflation by around 0.3–0.4 percentage points in the Baltics, well above the 0.1 percentage point impact in the euro area.[10] Notably, the increase in output raises wage growth in Estonia by around 1 percentage point and leads to a transitory rise in euro area wage growth (the impact is statistically insignificant for Latvia and Lithuania).

Global factors account for a larger share of the variation in inflation, when compared to domestic factors. The results from the variance decomposition analysis show that about 37 percent of the variance of inflation is explained by global factors (oil price growth, food price growth, and world real GDP growth). The impact of domestic factors (domestic real GDP growth and domestic prices) while smaller is still significant accounting for about 25 percent of the variance of inflation.

Variance Decomposition for Inflation
(Shares)



Source: IMF staff calculations.

Table 2. The Impact of Global Supply and Domestic Demand Shocks

	Global Supply Shock			Domestic Demand Shock		
	At t=1	Peak 1/	Long-Term	At t=1	Peak 1/	Long-Term
Estonia	0.36*	0.36* (t=1)	0.02	0.36*	0.36* (t=1)	-0.02
Latvia	0.29*	0.29* (t=1)	0.00	0.36*	0.26* (t=1)	-0.01
Lithuania	0.28*	0.28* (t=1)	0.01	0.29*	0.29* (t=1)	-0.01
Euro Area	0.12*	0.12* (t=1)	0.01	0.15*	0.15* (t=1)	0.00

Note: *** p<0.01, ** p<0.05, * p<0.1

1/ Time period in parenthesis shows peak period.

[10] The direction of the impact is similar across the Baltic countries and the euro area, but the precision is higher for the latter.

Figure 5. IRFs to a One-Standard Deviation Shock to Oil Prices (Global Supply Shock)

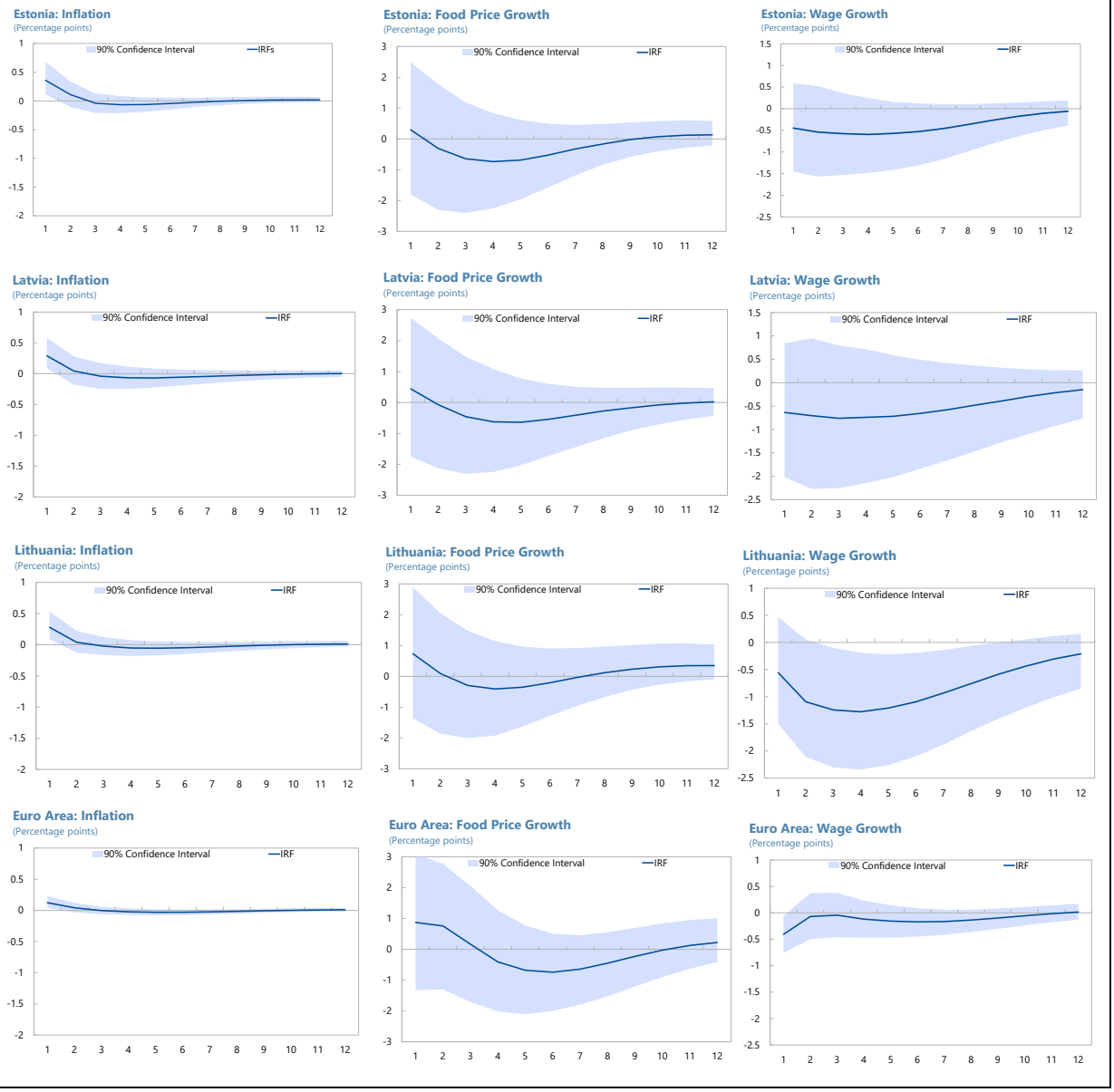
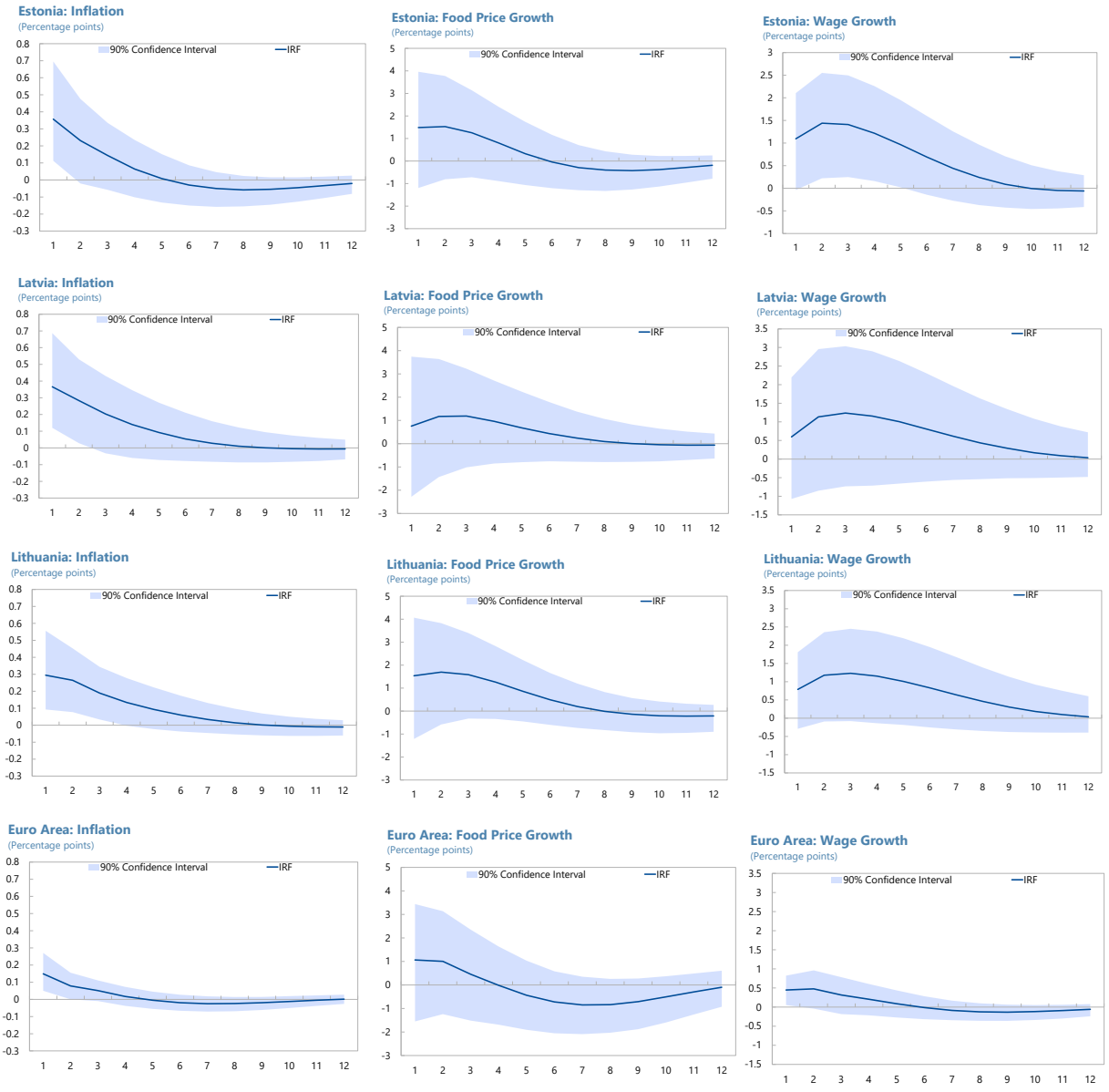


Figure 6. IRFs to a One-Standard Deviation Shock to Real GDP (Domestic Demand Shock)



C. The Impact of Fiscal Policy on Inflation

1. Data

We use quarterly data on the three Baltic economies with cyclically adjusted primary fiscal balance, real GDP, and shadow policy interest rate for the period 1999Q1 to 2022Q3 for Latvia and Lithuania, and 2002Q1 to 2022Q3 for Estonia. The endogenous variables are: real GDP growth, measured as log difference of real

GDP; effective interest rates, measured using the Wu-Xia shadow rate[11]; change in inflation[12] measured as the difference in core or headline inflation; and the growth of the primary balance as percentage of (potential) GDP[13]. Lag selection is based on the AIC information criteria, with the baseline model including four lags. Notably, the results remain consistent across various lag structures.

2. Empirical Methodology

We employ a vector autoregression model with sign restriction to identify fiscal shocks (Uhlig 2005). In particular, we use the standard VAR model used in Ngyuen et al., (2023) as follows:

$$A_0 X_t = B_0 + \sum_{l=1}^{q} C_l X_{t-l} + u_t$$

Where X_t is a vector of endogenous variables,

$$X_t = C_0 + \sum_{l=1}^{q} C_l X_{t-l} + u_t$$

where $C_0 = A_0^{-1} B_0$ and $C_l = A_0^{-1} B_l$ and $u_t = A_0^{-1} \epsilon_t$.

We estimate the model for each country using headline and core inflation rates. Table 3 summarizes the sign restrictions imposed. In particular, we assume that a contractionary fiscal policy (i.e., an increase in primary balance) would lower GDP growth, as well as decrease inflation; and a positive aggregate demand shock (i.e., higher GDP growth) is associated with higher inflation. Note that the sign restrictions only applied to the contemporaneous effects with no restriction on sizes or any other restrictions.

Table 3. Identification of Structural Shocks 1/

Variable\Shock	Interest Rate	Primary Balance Change	Real GDP Growth	Inflation Rate
Interest Rate	+	.	.	.
Primary Balance Change	.	+	.	.
Real GDP Growth	-	-	+	.
Inflation Rate	-	-	+	+

1/ The columns represent shocks and the variables impacted are displayed in the rows.

3. Empirical Results

Table 4 illustrates the impact of a positive one-standard deviation shock to the primary balance, indicating a tightening of fiscal policy of 2.4, 3.2 and 2.9 percentage points of (potential GDP) for Estonia, Lithuania, and Latvia respectively, on both headline and core inflation rates. A fiscal tightening has an immediate negative impact on both headline and core inflation rates. The impact on headline inflation is about twice that on core inflation: 0.4-0.7percentage points for headline and 0.2 to 0.4 percentage points for core. This seems to be driven by the impact of fiscal policy on domestic demand through a negative and significant impact on GDP

[11] The same exercise also is conducted using the Krippner shadow interest rate. The results remain similar to the results discussed here.

[12] We also used both core inflation and headline inflation – the results are qualitatively similar.

[13] An alternative version of model including oil price as an additional endogenous variable is also conducted yielding similar results. Results are available upon request.

two quarters after the shock in Lithuania and Latvia (the impact on Estonia is not statistically significant). Expressed in percentage points, Table 4 also shows that a 1 percentage point increase in the primary balance as a percentage of potential GDP is linked to a reduction in headline and core inflation rates by 0.5 to 1.4 percentage points and 0.6 to 1.5 percentage points, respectively.

The impact on inflation gradually dissipates over the following quarters. As shown in Figure 7, the impulse response function of inflation to a primary balance shock becomes statistically insignificant after 7 to 8 quarters in Estonia and Latvia, while this disinflationary effect only lasts 2 quarters in Lithuania. This suggests that fiscal policy has a longer-lasting impact on headline inflation in Estonia and Latvia than in Lithuania. The impact of fiscal policy on core inflation is short-lived in all three countries—lasting for only 1-2 quarters. Overall, fiscal policy shocks have no long-term impact on inflation rates as the impulse responses in headline inflation rates are not statistically different from zero after 8 quarters (2 quarters for core inflation). As expected, the tightening in fiscal policy have significant negative impact on growth. Regarding interest rates, the shadow rate decreases by about 0.3 percentage points in the few quarters following the fiscal contraction with the decrease slowly fading away[14].

Table 4. The Impact of Fiscal Shock on Inflation

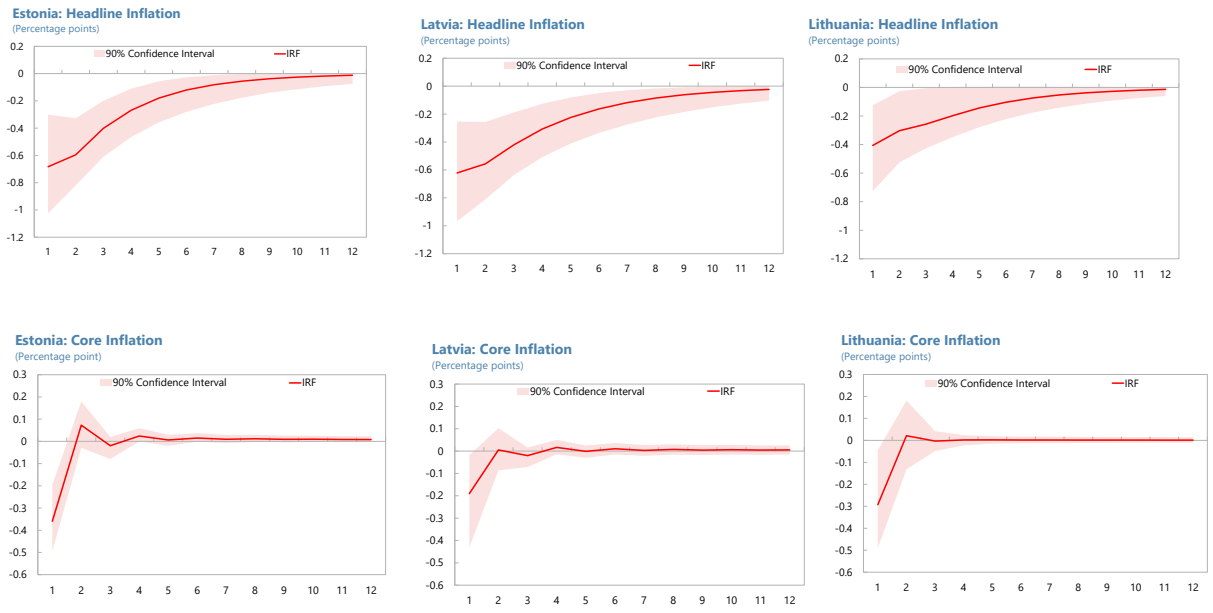
	Headline				Core			
	At t=0	Peak 1/	Long Term	Elasticity	At t=0	Peak 1/	Long Term	Elasticity
Estonia	-0.68*	-0.68* (t=0)	-0.01	-1.41	-0.36*	-0.36* (t=0)	0.01	-1.52
Latvia	-0.62*	-0.62* (t=0)	-0.02*	-0.83	-0.19*	-0.19* (t=0)	0.01	-0.54
Lithuania	-0.41*	-0.41* (t=0)	-0.01	-0.48	-0.29*	-0.29* (t=0)	0.00	-0.71

Note: *** p<0.01, ** p<0.05, * p<0.1

1/ Time period in parenthesis shows peak period.

[14] Robustness checks on the post GFC period (2011-2022) sample show similar results.

Figure 7. IRFs to a One-Standard Deviation Shock to Primary Balance Growth



D. Conclusion

Inflation in the Baltics is mainly driven by global factors, but domestic demand matters as well, suggesting that fiscal policy can play a role in containing inflation. Global supply shocks to oil prices have an instantaneous positive and significant effect on consumer price inflation in all the Baltic countries. Notably, global supply shocks do not seem to have an immediate significant impact on wage growth in the Baltics (except for Lithuania which only records a significant increase in wage growth after the third quarter, following a shock to oil prices). Meanwhile, a domestic demand shock (domestic real GDP) increases inflation in the Baltics (above the increase in the euro area). Also, a domestic demand shock seems to have an impact on wage growth in Estonia and the euro area.

Overall, the results from the variance decomposition analysis confirm that global factors account for a larger share of the variation in inflation, when compared to domestic shocks. About 37 percent of the variance of inflation is explained by global factors (demand and supply). While domestic factors (demand and supply) explain about 25 percent of the variance of inflation.

Being part of the euro zone, the Baltic countries lack monetary autonomy to fight inflationary pressures and depend on the monetary policy stance set by the ECB for the euro area as a whole. Inflation in the Baltics was larger and increased earlier compared to the average euro area, suggesting that the ECB's contractionary stance came late and not strong enough for their economic circumstances. However, monetary policy is effective in fighting inflation and, therefore, the tightening cycle started by the ECB in 2022 has helped to reduce inflationary pressures in the Baltics. In any case, fiscal policy is the main domestic macroeconomic stabilization policy tool left to address inflationary pressures. Through its impact on domestic demand, fiscal policy has a statistically significant impact on inflation rates across the three Baltic countries.

III. Inflation, Competitiveness, and the Wage-Productivity Nexus in the Baltics

Hard fought competitiveness gains during the global financial crisis led to a very sharp but short-lived recession in the Baltic countries and set the basis for a fast recovery fueled by an export boom. These gains have been largely preserved without the reemergence of imbalances. Thus, competitiveness has supported a steady convergence toward Western Europe's living standards in a way consistent with economic theory (Balassa-Samuelson). However, the higher inflation, particularly core, experienced in the Baltics (vis-a-vis euro area trading partners) could erode relative (price) competitiveness as measured by the real effective exchange rate (REER) and slow down convergence.

A further risk to competitiveness going forward is that high inflation would lead to high and persistent wage growth in nontradables and result in above-productivity wage growth in the exporting sector. The concern that persistent wage growth pressures—significantly above the euro area—could outpace productivity and affect competitiveness and convergence have not yet materialized with moderate, even negative, real increases in minimum wages and public and private sectors wages in the Baltics.[15] However, if the current shock turns out to be more persistent-than-anticipated, it could lead to larger and persistent second-round effects, potentially affecting wage negotiations in the future. The tight labor market across the Baltics further exacerbated these risks. However, during the last few years inflation expectations remained anchored in the Baltics, resulting in significant negative real wage.

This chapter explores the wage-productivity nexus and assesses the extent to which buffers accumulated or potential self-correcting dynamics have been at play in recent years. The characteristics of the Baltics' labor markets, including their performance and flexibility are discussed, highlighting how those have affected wage dynamics, and laying the ground for the policy recommendations.

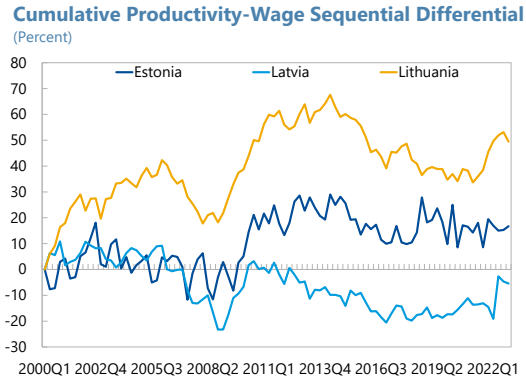
A. Literature Review and Stylized Facts

The literature on the effects of higher inflation and wage growth on competitiveness in the Baltics is scarce. In recent years, the wage and productivity dynamics in this region have been broadly consistent with the Balassa-Samuelson effects (Berka et al., 2018; Devereux, 2014). Most studies have generally found that wage and competitiveness remain well-anchored to productivity over boom-bust cycles (IMF, 2015). Conversely, empirical evidence suggests that discretionary wage increases could be detrimental to competitiveness. In the context of Lithuania, IMF (2015) documents that ad-hoc increases in wages could boost employment in the short-run, but lower output, real export, and employment rate over the medium term, likely reflecting weak competitiveness. Molendowski et al., (2020) found that, while the Baltics' international competitiveness has steadily improved over the years, there is scope for enhancing goods and labor market efficiency, as well as business sophistication and innovation to boost productivity. The economic theory predicting that real wages and labor productivity (at least in the exporting sector) should comove (e.g., Akerlof 1982), was empirically established for many advanced economies (e.g., Klein, 2012; IMF, 2015). This part follows a methodology and model specification similar to IMF

[15] The Baltics main trading partners are the European countries, which account for about 75 percent of their imports and exports.

(2015), which involved estimating a co-integration and error correction model of the relationship between wages and productivity.

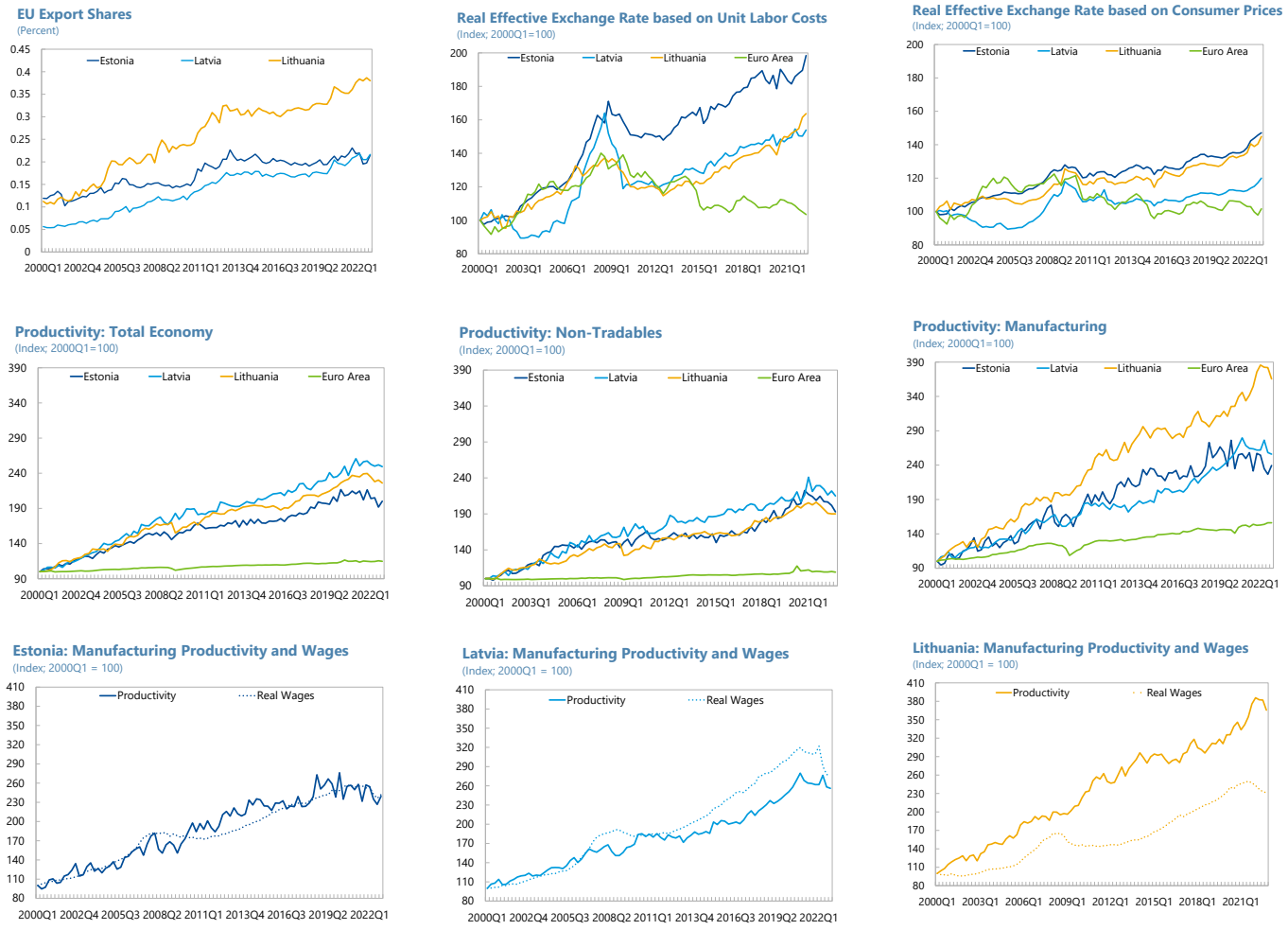
The Baltics' export share gains since 2000 have been underpinned by competitiveness performance. Accordingly, real wage and productivity dynamics in the Baltics have revealed a close relationship to varying degrees. Lithuania has by far posted the most impressive increase in productivity gains since 2000, which has consistently outpaced wage growth. In the post-GFC period, productivity recovered quickly, while wages reverted to their trend growth more slowly following a structural break. In Latvia, productivity and wage growth have moved in tandem tough wage growth consistently outpaced productivity growth after 2012Q2. The wage-productivity movements were more synchronized in Estonia, throughout 2000Q1-2022Q2, though productivity growth has stagnated in recent years. While Lithuania's rapid productivity growth outpacing wage growth post-GFC provides some comfort that short-term deviations of wages from productivity can be absorb, Estonia has less room to do so. In Latvia with wage growth consistently outpacing productivity growth post-GFC, further short-term deviations could have significant permanent effects.



B. Data Overview

Data are from Eurostat, OECD, and the IMF's World Economic Outlook (WEO) databases. The sample covers quarterly data from 2000Q1 to 2022Q4. Real wage is defined as compensation per thousand employees (or wages and salaries) deflated by HICP or GDP deflator, while labor productivity is computed as real value added per hours worked. The cointegration and error correction analysis below is based on wage and productivity in the manufacturing sector. The analysis also relies on a crisis dummy variable (dum_crisis) for the GFC and energy shock to account for possible structural breaks. Data on the employment protection legislations (EPL) are from the 2020 OECD Employment Protection Legislation Database. Labor shortage indicator in manufacturing is from the Business and Consumer Survey European Commission Database.

Figure 8. Exports Share, Competitiveness, and Labor Productivity Wage-Productivity Nexus



Sources: Eurostat; IFS; Haver Analytics and IMF staff calculations.

C. Revisiting the Wage – Productivity Nexus in the Baltics

Econometric Strategy

We empirically revisit the economic theory prediction that suggests that real wages and labor productivity should comove. Everything else being equal, there should be a positive association between wages and labor productivity movements. Indeed, a lower wage than productivity, would make it profitable for firms to hire more workers. In turn, a higher labor demand will (over time) put pressure on wages and downward pressure on productivity in line with diminishing the marginal return on labor. Economic theory (e.g., Akerlof 1982) predicts higher output per worker tends to increase the demand for workers and hence, increases labor compensation, so that in equilibrium (marginal) wages and productivity are in line. The existence of such relationship in the long-term could be expressed as a co-integration relationship between wages and labor productivity. Many studies have established such relationship in advanced economies (e.g., Klein, 2012) and in at least one Baltic country, Lithuania (IMF 2015). Our baseline empirical strategy estimates a simple error correction model with various specifications. The

bulk of our finding can be summarized in the specifications with and without a dummy below, focusing on the tradable sector (proxied by the manufacturing sector).

Model without a dummy

Long-run (LR) model: $log(wage)_t = a_1 log(prod)_t + a_2 + \varepsilon_t$

Short-run (SR) model: $\Delta log(wage)_t = b_1 \Delta log(prod)_t + b_2 EC_{t-1} + b_3 + u_t$

Error-correction (EC) term: $EC_{t-1} = log(wage)_{t-1} - a_1 log(prod)_{t-1} - a_2$

Model with a dummy

LR model: $log(wage)_t = a_1 log(prod)_t + a_2\, crisisdum_t + a_3 + \varepsilon_t$

SR model : $\Delta log(wage)_t = b_1 \Delta log(prod)_t + b_2 EC_{t-1} + b_3 + u_t$

Error correction term: $EC_{t-1} = log(wage)_{t-1} - a_1 log(prod)_{t-1} - a_2\, crisisdum_{t-1} - a_3$

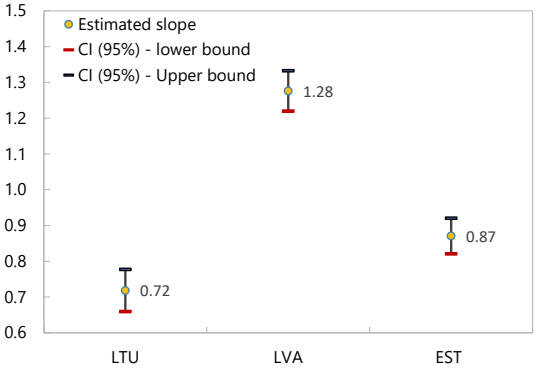
The variables ***wage,*** and ***prod*** denote wage and productivity in the manufacturing sector; ***log (X)*** represents the logarithm of variable X and ***Δlog (X)*** represents the change in the ***log(X)*** or the growth rate in variable X.

Empirical Results

As expected, and for all the Baltics, wage and productivity are nonstationary but are stationary in first difference I(1), as suggested by the Augmented Dickey–Fuller tests which reject the presence of a unit root in the error term of the long-run (LR) regression (Table 5).

The co-movement between real wages and labor productivity is detected for the three Baltics, based on co-integration tests to statistically identify co-movement over the longer horizon. The tests amount to testing whether a linear combination of two series is stationary over that time horizon (2000Q1-2022Q4) using the Engel-Granger two-step approach. For robustness, we examine a variety of specifications: HICP and the GDP deflator, adding a crisis dummy, and using two different wage proxies. The augmented Dickey-Fuller (ADF) test confirms that over 2000Q1-2022Q4, labor productivity and wage co-move (co-integration relationship) for the three Baltics, irrespective of: (i) the measure of wages (compensation per employee or salaries); and (ii) whether we add a crisis dummy to capture structural break in the LR relationship. The estimated LR relationships also suggest that wages tend to increase less proportionally to productivity growth for Estonia and Lithuania, as opposed to Latvia (models with and without crisis dummy). Indeed, the coefficients of the LR relationship for Estonia and Lithuania are below one in a statistically significant way—0.87 and 0.72 respectively—while for Latvia it is above one in a statistically significant way with an estimated lower bound of 1.2.

Slope of the Long-Run Wage Productivity Relationship
(Coefficients estimates of the LR relationship)



Sources: IMF staff estimates and calculations.

Table 5. Dickey Fuller Unit Root Tests for the Presence of a Wage-Productivity Long-run Relationship in Manufacturing

Augmented Dickey–Fuller test for unit root
Period: 2000Q1-2022Q4 ; Without crisis dummy
Wage measured as compensation of employees

	Test statistics	Critical values 1%	5%	10%
Lithuania**	-2.16			
Latvia**	-2.30	-2.60	-1.95	-1.61
Estonia***	-2.85			

Augmented Dickey–Fuller test for unit root
Period: 2000Q1-2022Q4 ; With crisis dummy
Wage measured as compensation of employees

	Test statistics	Critical values 1%	5%	10%
Lithuania**	-2.20			
Latvia**	-2.29	-2.60	-1.95	-1.61
Estonia***	-2.89			

Augmented Dickey–Fuller test for unit root
Period: 2000Q1-2022Q4 ; Without crisis dummy
Wage measured as wages and salaries

	Test statistics	Critical values 1%	5%	10%
Lithuania*	-1.86			
Latvia***	-3.06	-2.60	-1.95	-1.61
Estonia***	-3.07			

Augmented Dickey–Fuller test for unit root
Period: 2000Q1-2022Q4 ; With crisis dummy
Wage measured as wages and salaries

	Test statistics	Critical values 1%	5%	10%
Lithuania**	-2.08			
Latvia***	-3.08	-2.60	-1.95	-1.61
Estonia***	-3.41			

Sources: IMF staff Calculations.

The estimation of the error correction model (ECM) suggests that short-run deviations from the long-term relationship have tended to be self-correcting for Estonia and Lithuania (Table 6). The ECM model with dummy seems to explain better the short-run (SR) dynamic for Lithuania, while the model without crisis dummy was sufficient to capture short-run wage-productivity dynamics in Estonia over this period. This is consistent with the fact that for Lithuania, the GFC has induced a more pronounced structural break characterized by a temporary deviation of the long-term co-integration relationship. Speed of reversion to the long-term equilibrium is estimated at about 3 quarters for Estonia and 6 quarters for Lithuania. Latvia short-run dynamics are more inconclusive, as the parameters of the SR models are not (all) significant in the specifications considered, which could be indicative of a more muted short-term reversion to the long-run dynamics. These results do not exclude the possibility that short-term deviations from the long-term relationship in Latvia may be permanent without a self-correcting mechanism.

Table 6. Cointegration Analysis of the Wage-Productivity Growth Nexus in the Manufacturing Sector

Model 1: Model without a crisis dummy

LR model: $log(wage)_t = a_1 log(prod)_t + a_2 + \varepsilon_t$

SR model : $\Delta log(wage)_t = b_1 \Delta log(prod)_t + b_2 EC_{t-1} + b_3 + u_t$

Error correction term: $EC_{t-1} = log(wage)_{t-1} - a_1 log(prod)_{t-1} - a_2$

Wage measured as *compensation per employee*

	a1	a2	b1	b2	b3
LTU	0.63***	0.17	0.89***	-0.12**	0
LVA	0.63***	0.15	0.17	-0.09**	0
EST	0.63***	0.68**	0.2	-0.32***	0.01

Wage measured as *wages and salaries*

	a1	a2	b1	b2	b3
LTU	0.75***	-2.72***	0.23**	-0.03	0.01***
LVA	1.27***	-7.38***	-0.05	-0.02	0.01***
EST	0.9***	-3.98***	0.16***	-0.05**	0.01***

Model 2: Model with a crisis dummy

LR model: $log(wage)_t = a_1 log(prod)_t + a_2\, crisisdum_t + a_3 + \varepsilon_t$

SR model : $\Delta log(wage)_t = b_1 \Delta log(prod)_t + b_2 EC_{t-1} + b_3 + u_t$

Error correction term: $EC_{t-1} = log(wage)_{t-1} - a_1 log(prod)_{t-1} - a_2\, crisisdum_{t-1} - a_3$

Model with a dummy

Wage measured as *compensation per employee*

	a1	a2	a3	b1	b2	b3
LTU	0.82***	-0.17***	-1.46**	0.86***	-0.14***	0
LVA	0.83***	-0.15***	-1.59***	0.16	-0.12**	0
EST	0.64***	-0.01	0.56	0.2	-0.32***	0.01

Wage measured as *wages and salaries*

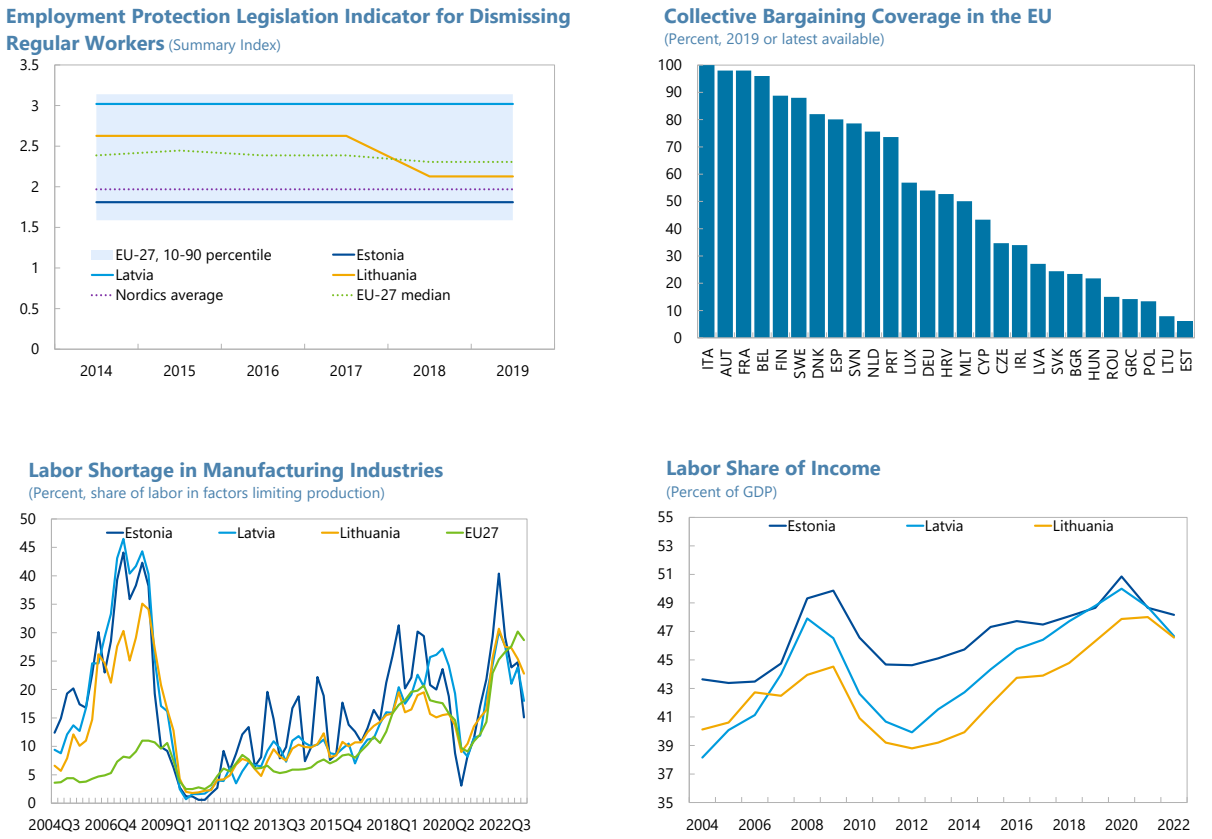
	a1	a2	a3	b1	b2	b3
LTU	0.71***	0.05	-2.29***	0.23**	-0.02	0.01***
LVA	1.1***	0.13***	-5.86***	-0.06	0.01	0.01***
EST	0.78***	0.09***	-2.92***	0.16**	-0.03	0.01***

Sources: IMF staff calculations.
Note: The variables ***wage,*** and ***prod*** denote wage and productivity in the manufacturing sector; ***log (X)*** represents the logarithm of variable X and ***Δlog (X)*** represents the change in the ***log(X)*** or the growth rate in variable X.

D. Labor market flexibility

The different relationship between wages and productivity across the Baltics seems to mirror their respective labor markets flexibility. Estonia's faster wage adjustment to productivity could be associated with its relatively more flexible market, as proxied by employment protection legislations (EPL), in particular the ease to dismiss regular workers. Estonia's labor market was underpinned by early reforms (2009-2010). Lithuania has also progressed in recent years, introducing key labor market reforms in 2017-18. Latvia appears to have the least flexible market, with EPLs among the most stringent in Europe and limited recent progress with reforms (over 2014-2019).[16] Wages are also generally more flexible in the Baltics since they are mostly determined at the firm-level rather than the industry level, with only a small share workers covered by collective bargaining which suggests a closer relationship between wage and firm-level productivity than in other economies of the eurozone. Flexibility to adjust to the economic cycle is also evident in the employer's perceived labor market shortage (EC survey), which tends to be lower than the EU average during downturn and higher in boom periods. The current labor market tightness is unprecedented in the Baltic countries, at least since the GFC, traditionally characterized with high structural unemployment and could add to wage pressures complicating the wage dynamics going forward.

Figure 9. Labor Market Institutions, Labor Shortages in Manufacturing, Labor Share of Income



Sources: OECD; European Commission; Eurostat; Haver Analytics; and IMF staff calculations.

[16] Findings in the literature on the interaction between EPL and labor market performance are mixed. Arguments against a strong relationship include the coverage of EPLs and the degree of regulations enforcement (e.g., Masso and Eamets, 2004).

E. Concluding remarks

Productivity growth has been closely linked to wage growth in the Baltics over 2000-22. While Lithuania was able to maintain high productivity in the manufacturing sector, above wage growth on average, wage growth in Latvia has on average slightly outpaced productivity growth. In Estonia's manufacturing sector wage and productivity have move in close tandem. Thus, if past patterns hold, at the onset of the energy crisis, Lithuania was best place to being able to, temporarily, absorb wages above productivity without a long-term impact on competitiveness while Latvia had significantly less capacity to do so.

There is robust evidence of a long-run (cointegration) relationship between (real) wages in the tradeable (manufacturing) sector and productivity in the Baltics. On the other hand, statistical evidence of a short-run relationship--underpinning a reversion to the long-run relationship—was only conclusive for Lithuania and Estonia. This suggests that while short-term deviations of wages from productivity have been self-correcting in Estonia and Lithuania (at a faster rate in the former), in the case of Latvia these deviations may prove more persistent highlighting a greater risk to competitiveness and, therefore to convergence. These outcomes are correlated to the degree of flexibility in each of the country's labor market, with Latvia being the least flexible of the three.

IV. Closing Remarks and Policy Implications

Inflation in the Baltics is largely driven by global factors, but domestic demand matters as well, suggesting that fiscal policy can play a role in containing inflation. Monetary conditions have tightened over the last year and a half in response to rising inflation, but fiscal policy—the only macroeconomic stabilization tool available in the Baltics—has not done enough. Given the small share of the Baltic economies in the euro area GDP, ECB's monetary policy cannot fully respond to specific conditions in these small open economies. As a consequence, over the last few years, monetary tightening came late from the perspective of the Baltic region—starting more than a year after inflation began to pick up—leaving the monetary policy stance too loose relative to domestic economic conditions.

High and persistent inflation, above the euro area average, is one of the risks faced by the Baltic economies during the recent episode of high inflation and fiscal policy can proactively help to reduce this risk. Supply shocks present a difficult tradeoff to policy makers that are called to opt between containing inflation or supporting activity. Given the balance of risks and the impact of fiscal policy on inflation through its effect on domestic demand, a tighter fiscal stance would actively contribute to lower inflation in the current context. Structural policies such as setting moderate minimum and public sector wages can also help to mitigate the risk of higher wage growth. This is the case given their important role as a reference in private sector wage negotiations. It also makes inflation expectations less backwards looking.

Persistently high inflation and wage growth in the Baltics bring risks to competitiveness and income convergence. Although real wages have increased significantly since 2013, large productively gains supported the competitiveness of the tradeable sector. Thus, while the real effective exchange rate has steadily appreciated since the global financial crisis, current accounts have remained strong over the same period. However, persistently higher inflation than in the euro area above what would be justified by productivity gains, could make inflation expectations adjust upwards, perpetuating large increases in prices and wages.

If past patterns hold, short-term deviations of wages from productivity can be absorbed in Estonia and Lithuania provided they are temporary but not in Latvia where risks are higher. With wage growth in tradables

below productivity growth in equilibrium and with short-term deviations self-correcting over time, the long-term impact of deviations of wages from productivity in the current high inflationary environment should be limited for Estonia and Lithuania. With wage growth already above productivity growth in equilibrium and no significant self-correcting mechanism to rectify short-term deviations for Latvia, the long-term impact of the current environment can be long-lasting, especially if further inflation risks materialized. This reinforces the role of fiscal policy in containing inflationary risks.

The lack of macroeconomic imbalances, flexible labor markets, and the strong competitive position provide some comfort that these economies will be able to absorb the current shock. This is in sharp contrast to the situation in 2008 when large imbalances triggered increasingly unsustainable macro dynamics. On the other hand, the lower labor market flexibility in Latvia may have an impact on the economy's competitiveness and its capacity to absorb shocks compared to the other Baltic economies.

Appendix

Figure I. IRFs to a One-Standard Deviation Shock to Oil Prices (Global Supply Shock)

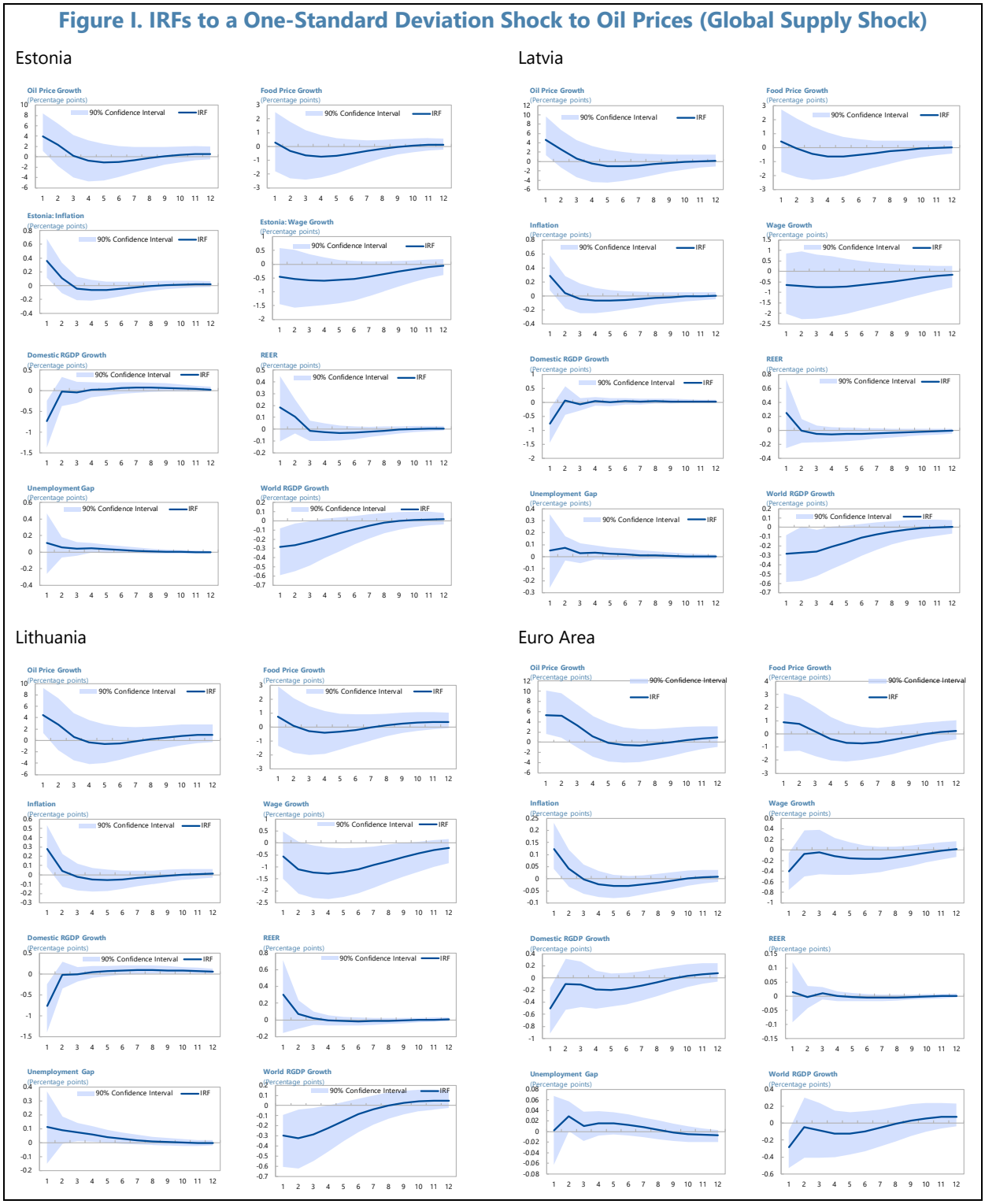
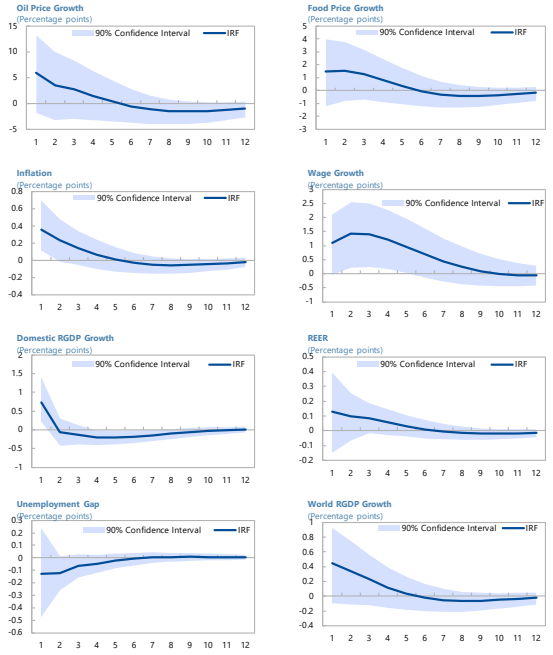
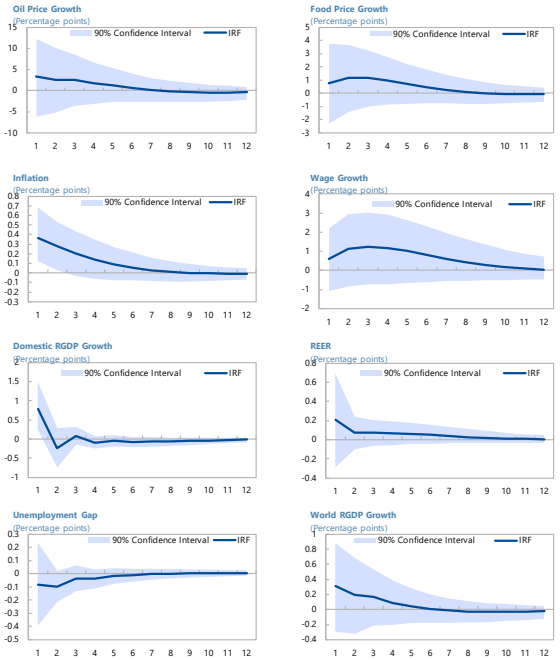


Figure II. IRFs to a One-Standard Deviation Shock to Real GDP (Domestic Demand Shock)

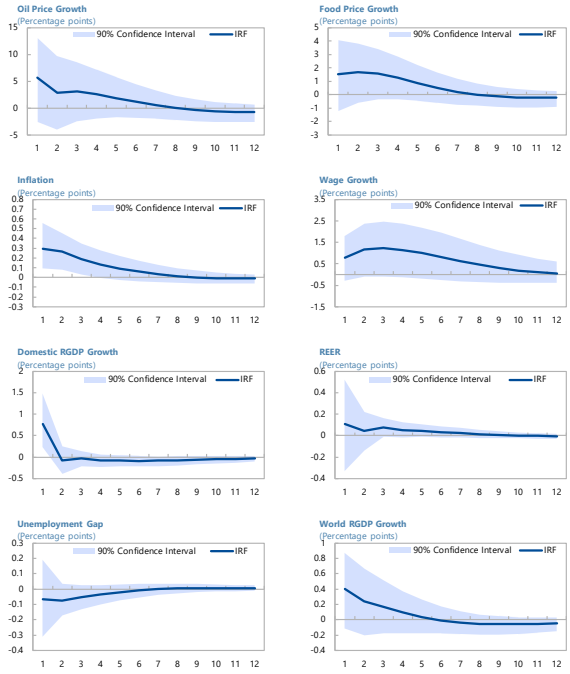
Estonia



Latvia



Lithuania



Euro Area

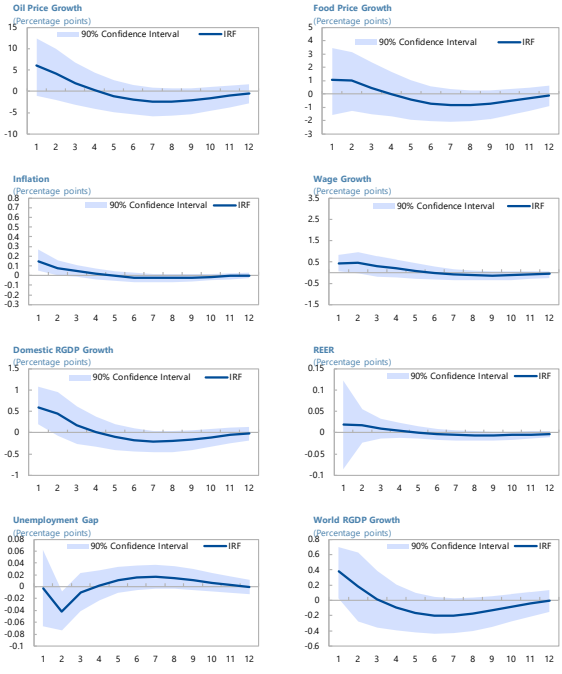
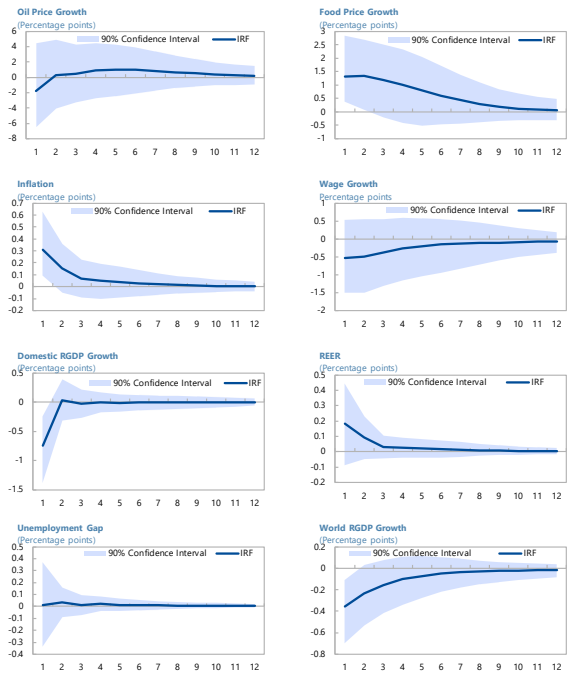
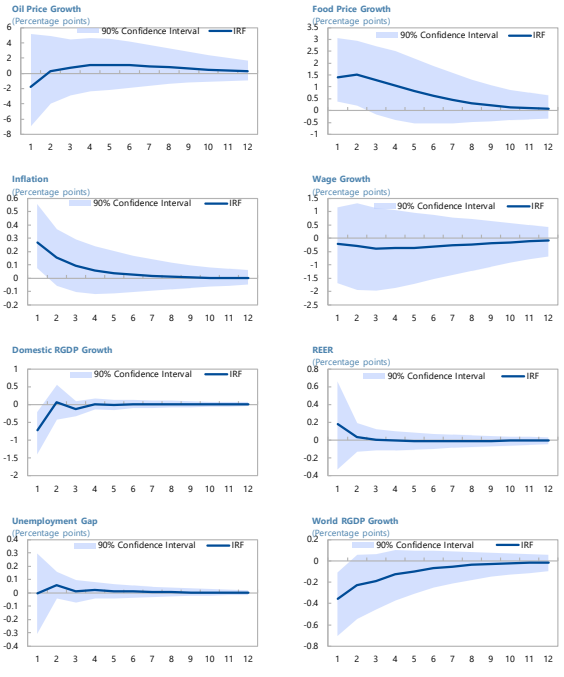


Figure III. IRFs to a One-Standard Deviation Shock to Food Prices (Global Supply Shock)

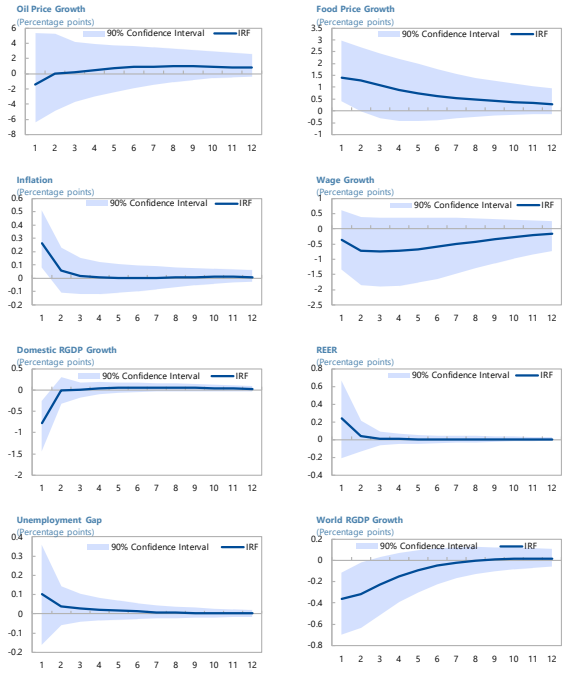
Estonia



Latvia



Lithuania



Euro Area

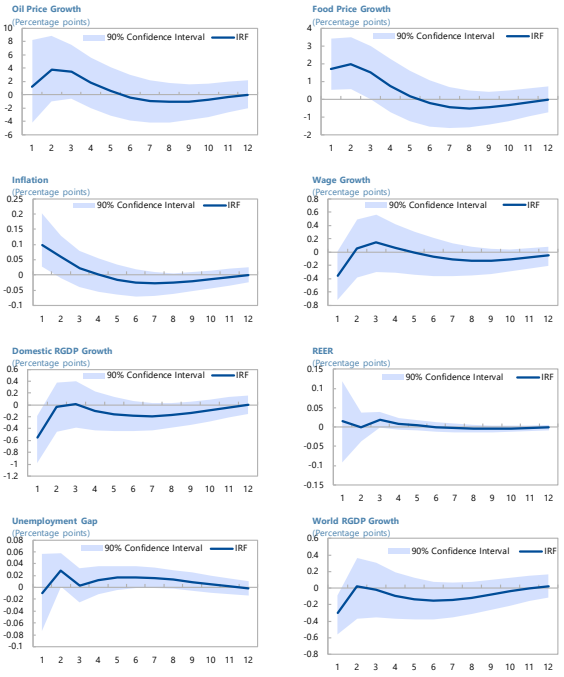
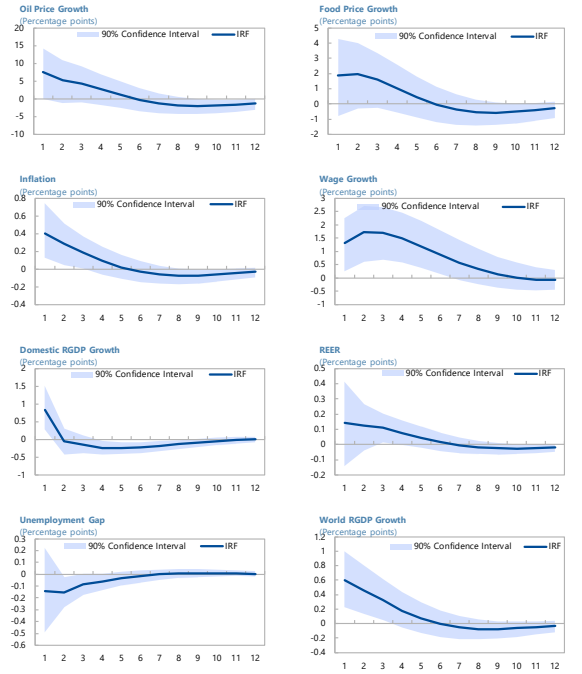
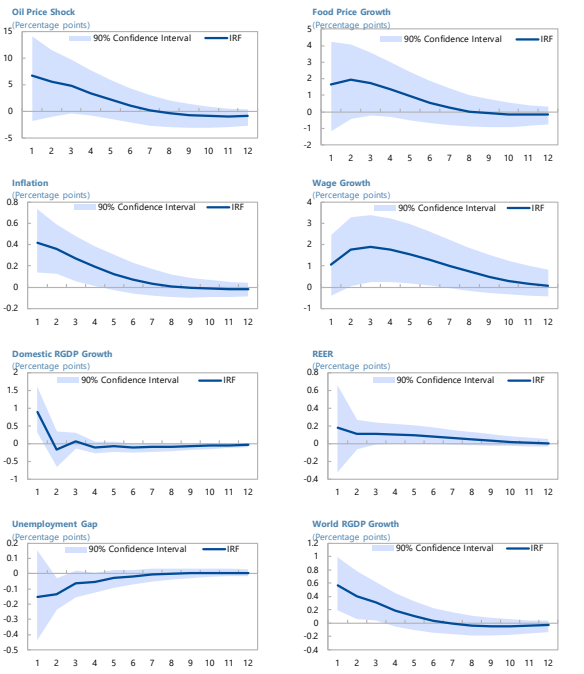


Figure IV. IRFs to a One-Standard Deviation Shock to World Real GDP (Global Demand Shock)

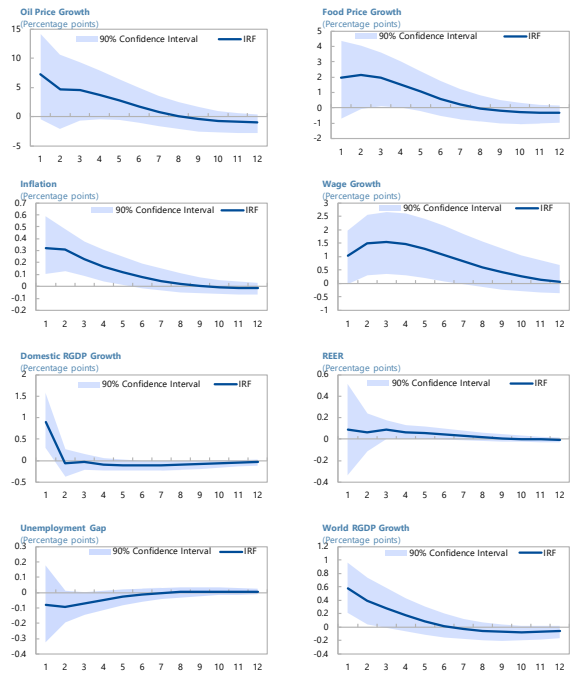
Estonia



Latvia



Lithuania



Euro Area

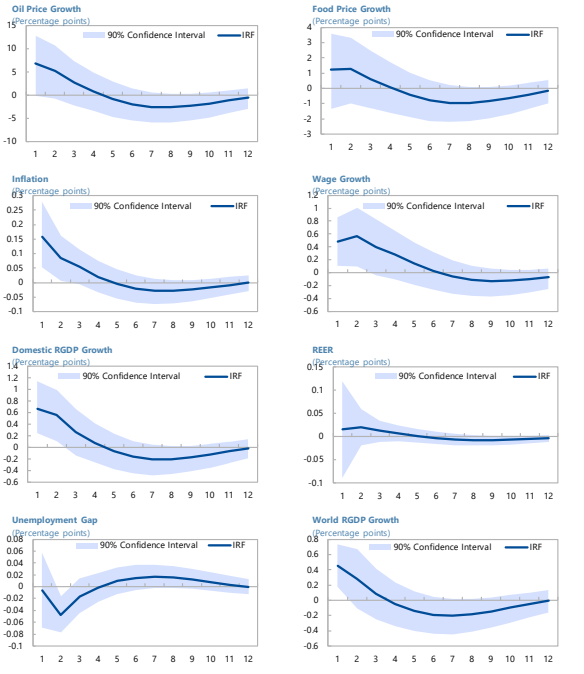
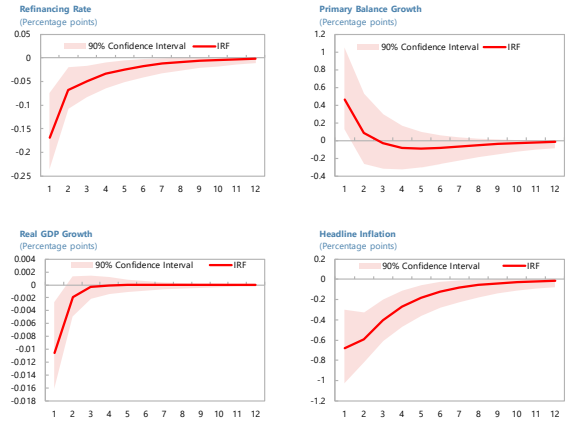
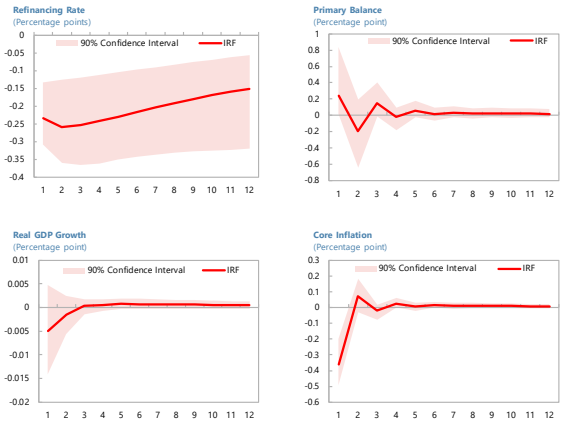


Figure V. IRFs to a One-Standard Deviation Shock to Primary Balance Growth

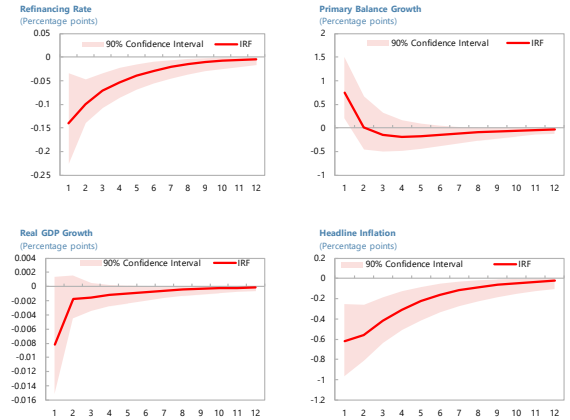
Estonia: Headline Inflation



Estonia: Core Inflation

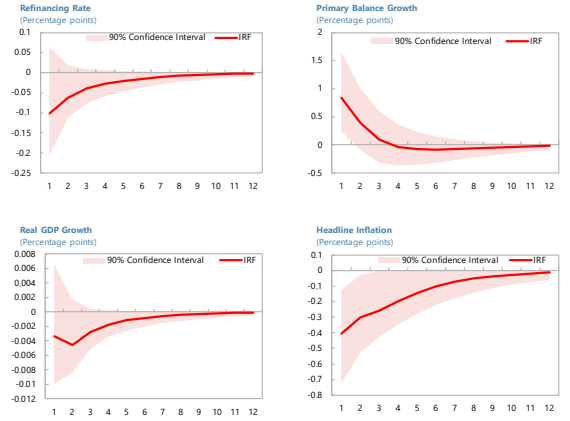


Latvia: Headline Inflation



Latvia: Core Inflation

Lithuania: Headline Inflation



Lithuania: Core Inflation

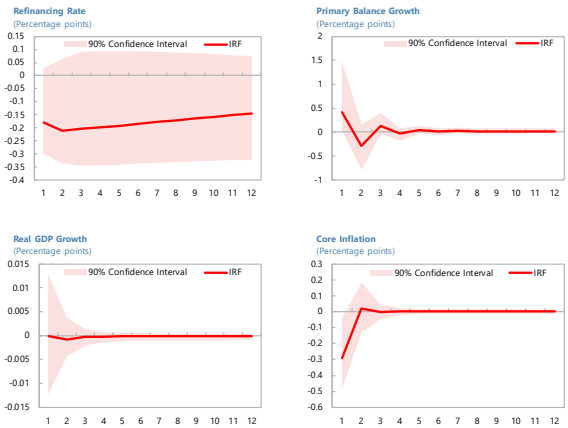
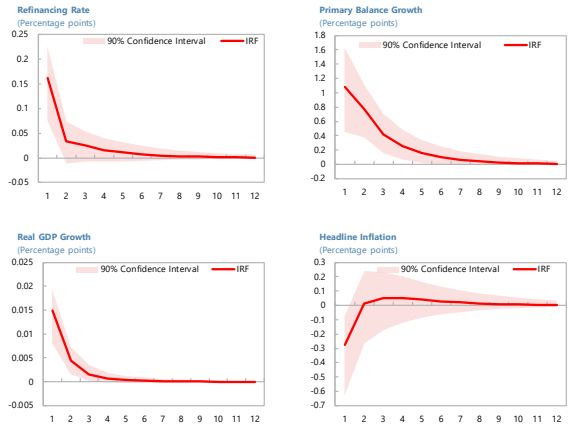
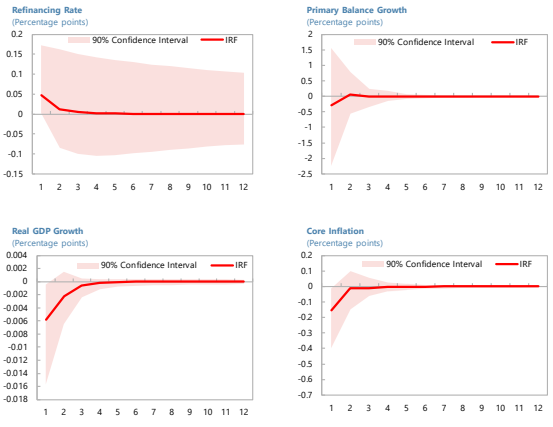


Figure VI. IRFs to a One Standard Deviation Shock to Refinancing Rate

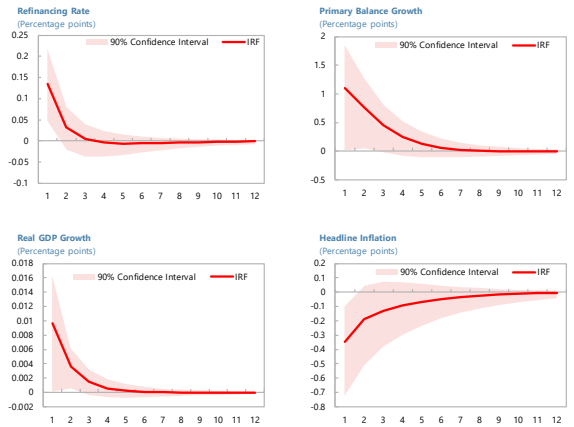
Estonia: Headline Inflation



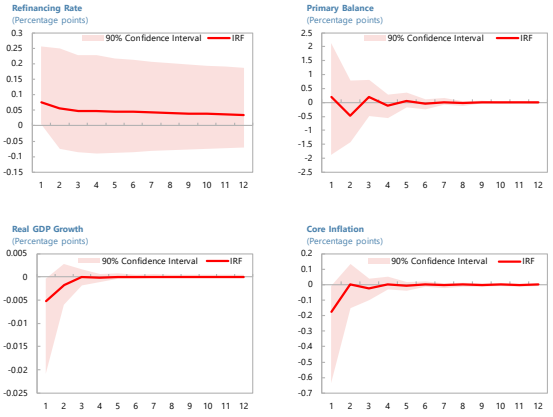
Estonia: Core Inflation



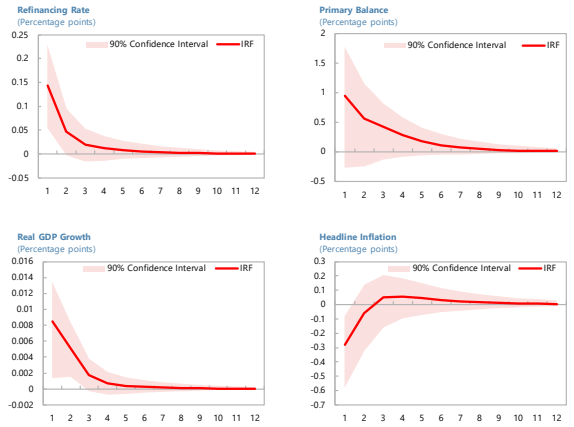
Latvia: Headline Inflation



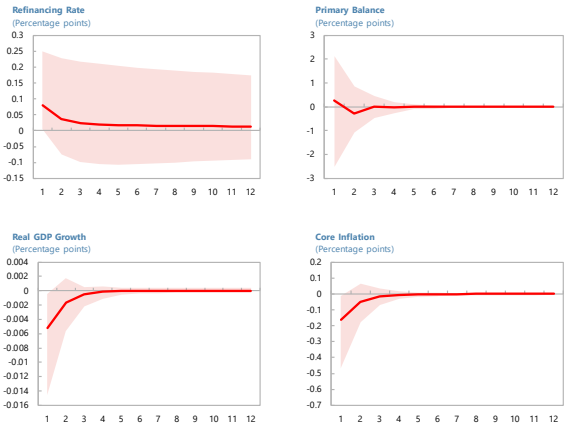
Latvia: Core Inflation



Lithuania: Headline Inflation



Lithuania: Core Inflation



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PUBLICATIONS

High Inflation in the Baltics: Disentangling Inflation Dynamics and Its Impact on Competitiveness

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