INTERNATIONAL MONETARY FUND

# Inflation in Croatia: The Role of Fiscal Policy

Mariarosaria Comunale

SIP/2025/158

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# Inflation in Croatia: The Role of Fiscal Policy

**Prepared by Mariarosaria Comunale**

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**ABSTRACT:** After a period of sharp deceleration, inflation in Croatia has inched up since late 2024 to about 4–4½ percent year-on-year lately, among the highest in the euro area. As monetary policy is set at the euro zone level, this paper aims to quantify how fiscal policy has affected inflation in Croatia via the use of a Bayesian VAR model. Results show that fiscal policy, particularly the public wage increase implemented in 2024, explained more than 40 percent of the endogenous variations in inflation in recent quarters.

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SELECTED ISSUES PAPERS

# Inflation in Croatia: The Role of Fiscal Policy

Republic of Croatia

Prepared by Mariarosaria Comunale[1]

[1] We acknowledge Anh Dinh Minh Nguyen (FAD) for his helpful guidance and comments, and Estefania Cohn Bech (EUR) for great assistance. We thank participants of the Croatian National Bank (CNB) seminar during the Article IV mission, Davor Kunovac (CNB), and Jean-Jacques Hallaert and Tarak Jardak (EUR) for helpful discussions and suggestions, and the Croatian authorities and Gordi Sušić for data sharing.

INTERNATIONAL MONETARY FUND

# REPUBLIC OF CROATIA

## SELECTED ISSUES

November 20, 2025


Approved By
**European Department**

Prepared By Mariarosaria Comunale (EUR)


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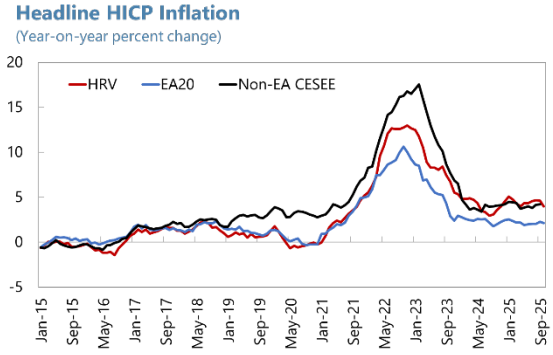
# INFLATION IN CROATIA: THE ROLE OF FISCAL POLICY[1]

*After a period of sharp deceleration, inflation in Croatia has inched up since late 2024 to about 4–4½ percent (y/y) lately, among the highest in the euro area. As monetary policy is set at the euro zone level, this paper aims to quantify how fiscal policy has affected inflation in Croatia via the use of a Bayesian VAR model. Results show that fiscal policy, particularly the public wage increase implemented in 2024, explained more than 40 percent of the endogenous variations in inflation in recent quarters.*

## A. Introduction

**1. Although having fallen significantly from its peak in 2022, Croatia's headline HICP inflation still hovers around 4–4.5 percent in 2025, among the highest in the euro area.** After a decade of relatively low and stable inflation, commodity price shocks and disrupted supply chains pushed inflation to a peak of 13 percent at the end of 2022, following a similar pattern elsewhere in Europe. As the impact of the shocks waned and the ECB's tightened its monetary policy, HICP inflation fell sharply to an average of 4 percent in 2024. But the disinflation process has slowed since late 2024, with inflation edging up (4.6 percent in September and 4 percent in October 2025 flash estimates due to lower commodity prices), while the euro area inflation has been close to the ECB's 2 percent target. Core inflation exceeded headline inflation in Croatia up to the recent months, driven by persistently high services inflation (above 7 percent y/y), which tends to be stickier and less volatile than goods inflation.

**Figure 1. Inflation Dynamics in Croatia**




Sources: Eurostat; Haver Analytics; and IMF staff calculations.
Note: Non-EA CESEE countries include Czech Republic, Hungary, Poland, and Romania that have independent monetary policy.

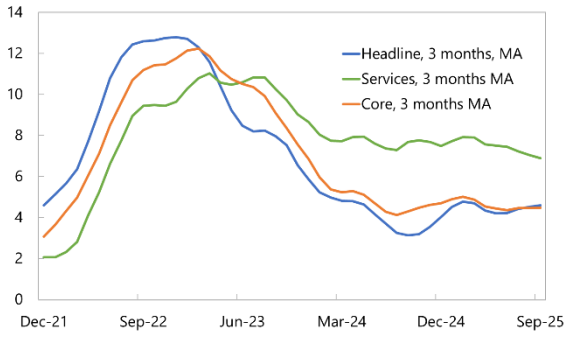



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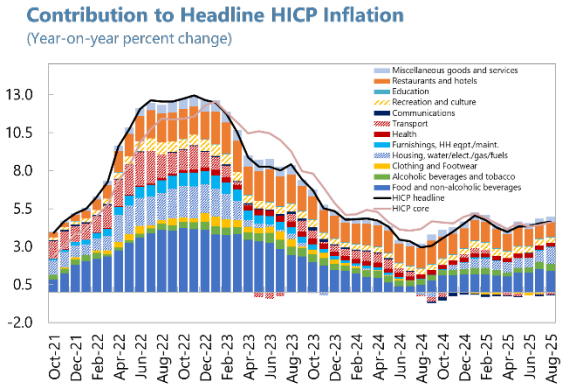
**Figure 1. Inflation Dynamics in Croatia** (Concluded)



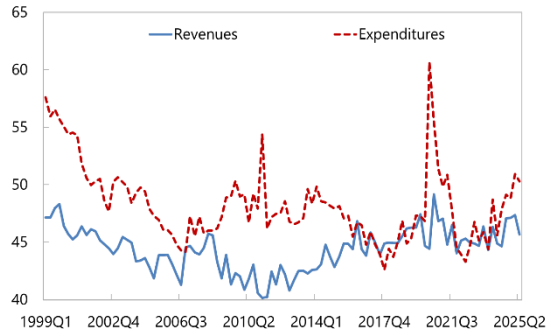

Sources: Eurostat; Haver Analytics; and IMF staff calculations.

**2. The persistence of inflation in Croatia raises an important question about the role of domestic aggregate demand in the recent inflation episode.** As a small open economy in the euro area, Croatia is no doubt vulnerable to external developments. But this does not rule out the role of domestic policies, notably fiscal policy and macroprudential policy, in managing aggregate demand pressures and containing inflation. With monetary policy set at the euro zone level, fiscal policy becomes even more important for managing aggregate demand in Croatia. Furthermore, one should bear in mind that the ultimate objective of macroprudential policy is limiting systemic financial risks and safeguarding financial stability, by strengthening the resilience of the financial system and containing the buildup of vulnerabilities. Its impact on aggregate demand and inflation is indirect.

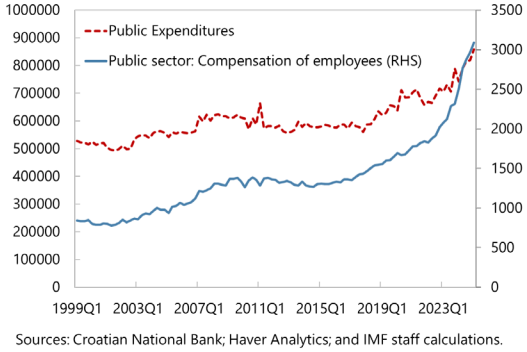
**3. Fiscal policy has played an important role in shielding businesses and households from the impacts of consecutive shocks since the pandemic, but it has turned pro-cyclical since 2023.** The general government primary balance deteriorated from a surplus of 1.4 percent of GDP in 2022 to a deficit of 0.9 percent of GDP in 2024, largely driven by expenditure growth. In particular, wage growth in the public sector reached over 30 percent y/y at its peak in 2024Q2.[2] On an annual basis, public wage grew by 26 percent in 2024. Wage pressures appear to have tapered so far in 2025, with public wage growth normalizing, but the past large increases could have had a persistent impact on inflation.

[2] Public wage growth is defined as y/y growth in compensation of employees (seasonally adjusted). The average growth for 2024 in real average monthly gross earnings was 19 percent. We did not use this as a measure of wages because of the limited time dimension. In a Bayesian VAR setup (with medium-to-loose priors) it is important to have large T for unbiased estimates. Public expenditure also climbed up to around 48 percent of GDP on average in 2024 (45 percent of GDP in 2022) and was close to 50 percent by the end of 2024. This is a substantial increase considering the high nominal GDP growth in recent years.

**Figure 2. Components of Fiscal Balance**



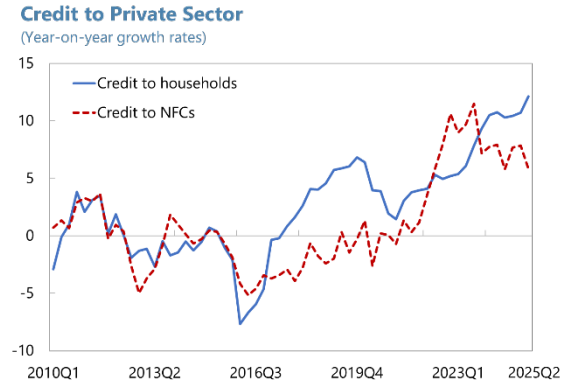

Sources: Croatian National Bank; Haver Analytics; and IMF staff calculations.



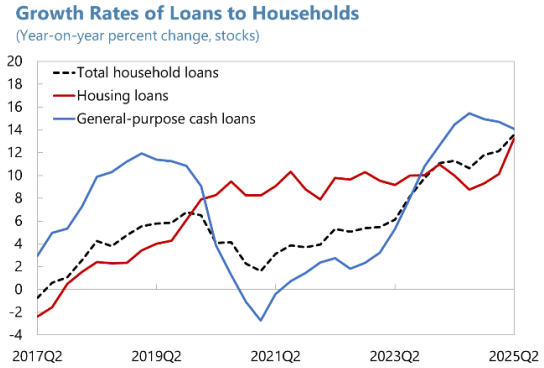

Sources: Croatian National Bank; Haver Analytics; and IMF staff calculations.

**4. Credit to the private sector has grown strongly since 2022, potentially fueling domestic demand.** Household credit growth has been persistently over 10 percent since 2024 while credit to Non-Financial Corporations (NFCs) has been growing slower. Most of the credit growth to households is in general purpose cash loans, widely used for consumption and housing related expenses.[3] General purpose cash loans do not require collaterals and can be requested via mobile apps. Easy access to this form of credit has made them increasingly popular. In line with Fund's past recommendation, the Croatian National Bank (CNB) introduced explicit borrower-based measures (BBMs) limits, effective in July 2025, to contain the buildup of systemic risks, which are also expected to contribute to the reduction of inflationary pressures associated with increased household consumption.[4] Recently, the CNB announced a further increase of the countercyclical capital buffers (CCyB) to 2 percent effective in January 2027, which will strengthen the banking system's resilience and expand releasable buffers in the event of shocks.[5]

**Figure 3. Evolution of Credit to the Private Sector**




Sources: Croatian National Bank; Haver Analytics; and IMF staff calculations.




Sources: Croatian National Bank (CNB); and IMF staff calculations.

[3] For more details on credit dynamics, see Croatia 2025 Article IV staff report.

[4] See Consumer lending criteria and Decision on consumer lending criteria from the CNB website.

[5] See Countercyclical capital buffer from the CNB website.

**5. This paper aims to analyze how fiscal policy shocks can transmit to inflation, compared to other possible domestic and external shocks that might have played a role**.[6] Section B explains the empirical methodology of a Bayesian VAR. Section C discusses results of the baseline specifications using the general government primary balance and its components, notably public wage growth, to measure fiscal policy shocks. Section D concludes.

## B. Methodology

**6. We analyze the impact of fiscal and other shocks on inflation by using a Bayesian vector autoregressive (VAR) model for the period of 2000Q1 to 2025Q2.** The model, which is based on Nguyen et al. (2023), allows us to investigate the historical decomposition of inflation, i.e. the contribution of each factor to inflation over time, and the transmission of shocks.[7] The baseline Bayesian VAR setup includes pre-determined factors (i.e., those are non-stochastic elements, such as initial conditions and constants) which are structural to the economy, both domestic and euro area aggregate demand and aggregate supply shocks, fiscal shocks, and remaining exogenous shock.

**7. The model is a standard VAR in the literature:**

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

where $X_t$ is the vector of endogenous variables; $q$ is the lag length (this is 4 in our case); $B_0$ represent deterministic terms; $B_l$ is a matrix of parameters corresponding the lag-$l$ of $X_t$; $A_0$ is a matrix of parameters, capturing the contemporaneous relationships between the endogenous variables; and $\epsilon_t$ is a vector of orthogonal structural shocks with a Gaussian distribution of mean zero and identity covariance matrix. Endogenous variables in the baseline include Croatian and euro area real GDP growth (i.e., log difference of real GDP) and inflation, and the Croatian primary fiscal balance in percentage of GDP. We opt for Bayesian estimation because it allows us to incorporate prior knowledge and better quantify uncertainty, which is especially useful when data is limited or volatile—like during the post-COVID-19 period.

**8. A fiscal shock is taken as an *expansionary* fiscal policy that *decreases* fiscal primary balance but *increases* GDP growth and inflation.** Shocks are identified via contemporary sign restrictions using 4 lags and a Normal-Wishard distribution. In an extended model, we looked at specific components of an expansionary fiscal shock, which are defined as an increase in either government spending (an expenditure shock) or public wage growth, and as tax cuts (a tax revenue shock). They can have different effects.[8] The euro area aggregate demand and supply are identified separately via block exogeneity, such that they can affect Croatian variables (e.g., imported inflation

[6] Ascari et al. (2024) show that in the euro area fiscal policy shocks' contribution to the inflation surges is far from negligible and has been lagged, with clear heterogeneity across member states.

[7] More details on the methodology are provided in Appendix I.

[8] See Appendix I. We identify a positive expenditure shock to increase expenditure, GDP, and inflation, while a negative tax revenue shock, such as tax cuts, increases GDP while inflation is left unrestricted.

and transmission to growth) but not the other way around (see Kunovac et al., 2025).[9] In our setup, a negative aggregate demand shock would lower GDP growth and inflation, while reducing the primary balance. The aggregate supply shock is identified with different signs on GDP growth and inflation. An exogenous shock includes a COVID-19 dummy.

**9. The model demonstrates a strong fit, with results statistically significant at the 95 percent confidence level and robust across a range of diagnostic checks.** Validation tests confirm the soundness of the selected priors and the reliability of the baseline setup, both in terms of in-sample performance and structural coherence (Appendix I). These findings support the credibility of the model specification and its suitability for the analytical objectives at hand.

## C. Contribution of Fiscal Shocks to Inflation

**10. We found that fiscal policy supported growth during 2021–22, while its contribution to inflation was moderate.** Fiscal interventions played an important role in supporting the economy both during the pandemic and during the commodity price surge and supply chains disruptions in 2022, acting counter-cyclically. Fiscal policy shocks accounted for 62 percent of the total contribution of *endogenous* shocks to GDP growth in 2022 (see Appendix II, Figure 3).[10], [11] As shown in several papers for the euro area (e.g., Dao et al., 2023) as well as in Croatia, fiscal policy in 2022 did not have a major impact on inflation, accounting for only 18 percent of the total contribution of endogenous shocks to inflation. Inflationary pressures during this period were mostly external, which is reflected in the substantial role of exogenous and euro area shocks in explaining inflation, while growth was mainly driven by domestic aggregate demand and supply (including fiscal).[12]

**11. Fiscal policy became pro-cyclical later in 2023 and contributed significantly to headline inflation in 2024 and 2025H1.** The impact in magnitude has been 0.6 ppts on average since 2024. While it was higher in 2022 in absolute terms, relative to inflation the contribution of fiscal shocks is much larger now than before. Since 2024, the negative primary balance shock accounted for more than 40 percent of the impact attributed to *endogenous* shocks on headline HICP inflation. Looking at only shocks that Croatia can influence and act upon (i.e., without euro area or exogenous shocks), fiscal policy contributed to about 60 percent of the total headline HICP inflation. The pre-determined factors (initial conditions not explained by shocks) consistently explain about 2.3–2.4 ppts of the headline HICP, depending on the sample period used; this represents the structural

[9] An alternative setup including a specific euro area monetary policy shock in the exogenous block (similarly to Deskar-Škrbic et al., 2020) is also available in Appendix II. The results are similar to those of the baseline.

[10] We define shocks that arise from interactions within the Croatian economy and the euro zone such as policy responses, as *endogenous*.

[11] This translates to around 15 percent of total GDP growth, considering all the shocks and pre-determined factors.

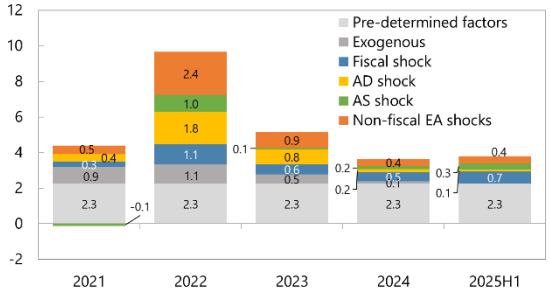
[12] See Appendix II for a model specification controlling for exogenous oil shocks, which was particularly relevant in 2022. In that setup, exogenous shocks—now including COVID-19 *and* oil shocks—matter more for the headline HICP inflation in 2022. The specification also confirms the strong impact of fiscal shocks on inflation in the most recent quarters, reinforcing our main conclusion.

part of headline HICP inflation due to the characteristics of the Croatian economy.[13] Fiscal shocks account for around one-quarter of the headline HICP, when *excluding* only these pre-determined factors. The forecast error variance decomposition confirms the importance of fiscal shocks to the headline HICP, which can explain about 18 percent of the total inflation uncertainty forecasted in the longer run.[14] The contribution of fiscal shocks to Croatia's national CPI is in line with that to the HICP, as the two series largely overlap.[15]

**12. A decrease in the primary balance to GDP ratio by 1 standard deviation (around 1 ppt) is estimated to increase inflation by 0.2 ppts in the first quarter after the shock.** The impact is also persistent over time, cumulatively accounting for around ½ ppts one year from the shock and almost 1 ppt in the longer run (3 years). The magnitude of the response is robust across different specifications of fiscal shocks, i.e., as an increase in expenditure or in public wage growth, and highly significant (see Appendix II).

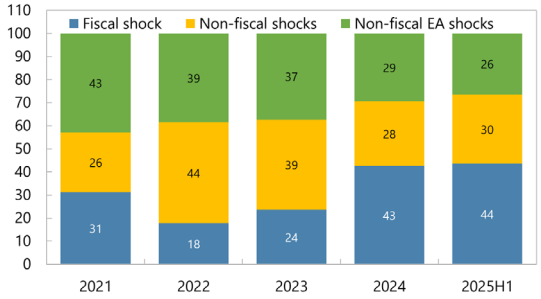
**Figure 4. Baseline Results for Headline HICP**

**Headline HICP Historical Decomposition, 2021-2025Q2**
(Percentage points)



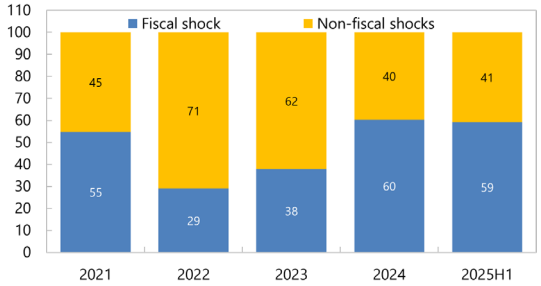

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks.

**Headline HICP Shocks Distribution, 2021-2025Q2**
(Percentage of total endogenous shocks)



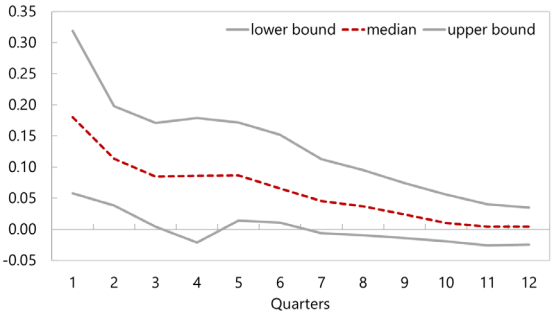

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks. Exogenous shocks are excluded.

**Headline HICP Shocks Distribution, 2021-2025Q2**
(Percentage of total *domestic* endogenous shocks)




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks. Exogenous and euro area shocks are excluded.

**Headline HICP Response to Fiscal Shocks**
(Response to a 1 standard deviation decline in primary balance/GDP)




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals. 1 standard deviation shock is around 1 ppt.

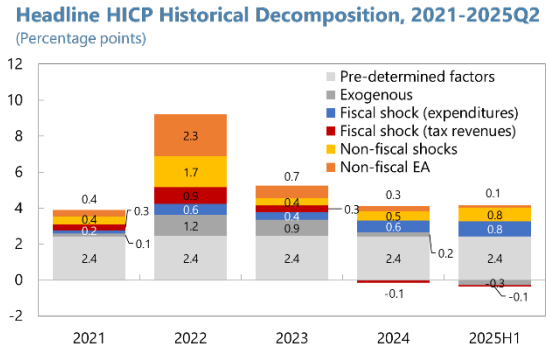
[13] It is slightly higher in the setup with public wages, and in the case of core inflation, ranging from 2.3 to 2.7 percent.

[14] For a detailed explanation of the forecast error variance decomposition, see Appendix II.

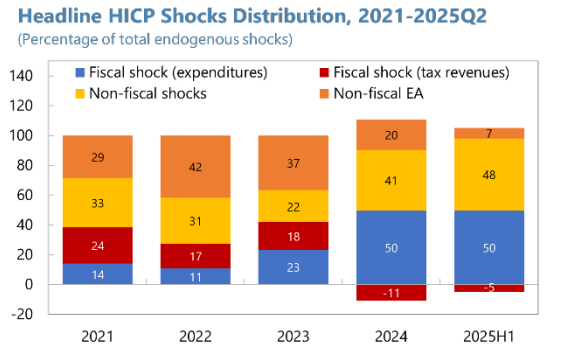
[15] See also Appendix II for the differences between CPI and HICP. Checks for CPI are available upon request, which confirm that the baseline results are robust.

**13. We re-estimated the Bayesian VAR using different components of the fiscal primary balance and the key conclusions of our baseline model remain.** We first looked at expansionary tax revenues and expenditures shocks. Reductions of tax rates to mitigate the "cost of living" crisis in 2022 played an important role in explaining the headline inflation that year (especially combined with wage growth), while the impact of tax revenue shocks have been much smaller in the most recent years. An increase in expenditures or in public wages growth is found instead to have played a primary role in explaining headline HICP inflation since 2024, making up nearly half of the total impact from endogenous shocks. The impulse responses to both tax revenues and expenditures shocks are highly comparable (see Appendix II).[16]

**Figure 5. Results for Headline HICP with Fiscal Components**




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks.




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
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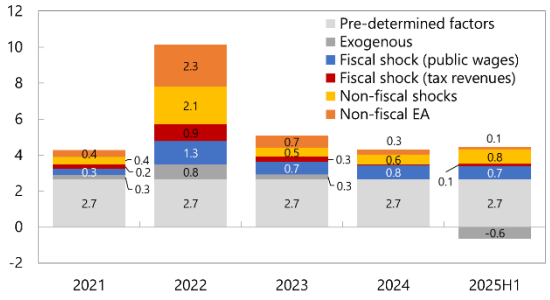


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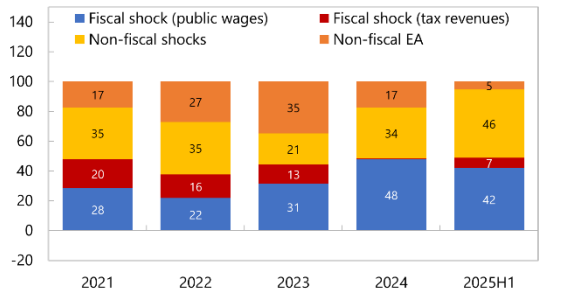



Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks. Exogenous shocks are excluded.

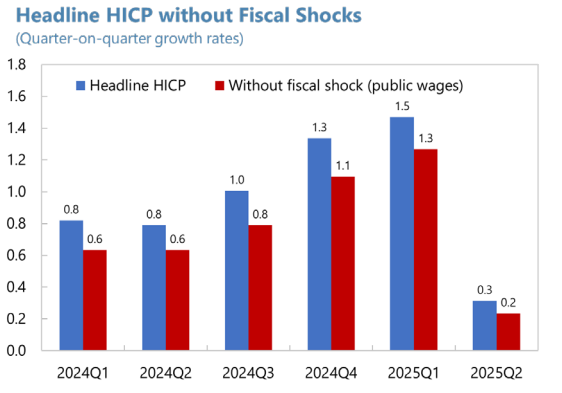
**14. The increase in fiscal expenditure and public wage growth is found to have contributed to around 20 percent of the headline inflation since 2024.**[17] Without the increase in public wages in 2024, q/q headline inflation would have moved from 1.3 percent to 1.1 percent and in y/y terms from 4.0 percent to 3.1 percent. In 2025Q1–Q2 the headline HICP would have been

[16] We used tax revenues in percent of GDP in the extended model, as they capture more accurately discretionary policy actions. Total revenues include components like social contributions, fees, and non-tax income (e.g., dividends from state-owned enterprises and EU grants) that are highly endogenous to the business cycle and can distort shock identification. A robustness check using *total* revenues is presented in Appendix II and confirms our main findings.

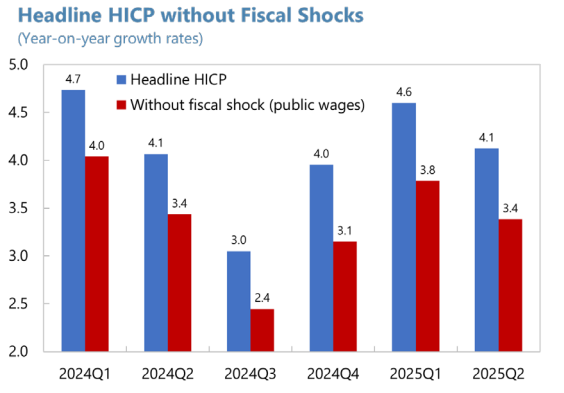
[17] This includes all the shocks and pre-determined factors.

below 4 percent (y/y). Cumulatively, 0.8 ppts of the headline HICP inflation in 2024 and 0.7 ppts in the first half of 2025 was attributable to the increase in public wages. The impact of total public expenditure is found to be more limited but still around ½ ppts, this has become larger in 2025 reaching 0.8 ppts. Previous work on Croatia did not find a direct effect of a public wage increase on inflation and a relatively modest indirect effect (Nadoveza, 2025). Ivanac, Kunovac and Nadoveza (2024) estimates the impact of *total* wage growth on inflation to be about 1 ppt in 2024. This result is in line with our findings, but it includes both private and public wages growth and does not fully cover the 2024 fiscal developments and their subsequent effects on inflation.[18]

**Figure 6. Counterfactuals: Without Increase in Public Wages**




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

**15. Regardless of how fiscal shocks are measured, their impact on inflation took time to materialize.** The pick-up in inflation starting at the end of 2024Q3 shows that the full effects materialized likely with some lags, together with the contribution of the base effect from energy prices. In 2024Q4 and 2025Q1, about one quarter of the q/q inflation was due to fiscal shocks, including all shocks and pre-determined factors, i.e., more than half of total endogenous shocks.

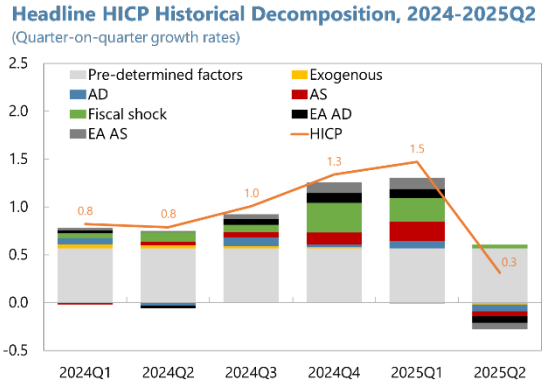
**16. The impact of fiscal shocks on core inflation persists longer than in the case of headline inflation, lasting up to 2 years from the time of the shock.**[19] The stronger impact of fiscal shocks on core inflation in 2022 (1.6 ppts for core compared to 1.1 ppts for headline inflation) is explained by the fact that core inflation removes the effects of commodity and energy prices, reducing the contribution of exogenous shocks and partially of euro area shocks. The largest contribution of fiscal shocks is estimated to be in 2024Q4 and 2025Q1, when they accounted for 1/3 of the total endogenous shocks, or over a half of *domestic* shocks. However, fiscal shocks are found to have contributed to a larger part of core inflation in 2025Q2 compared to the results for headline, confirming higher persistence of fiscal shocks' impact on core inflation. It is also worth noting that the structural explanatory part of core inflation is bigger than that of the headline inflation (2.5 percent versus 2.3 percent in the baseline), confirming structural persistence in the core

[18] Ivanac, Kunovac and Nadoveza (2024) show that wage increases can lead to higher inflation rates, but only when the macroeconomic environment is dominated by demand shocks.

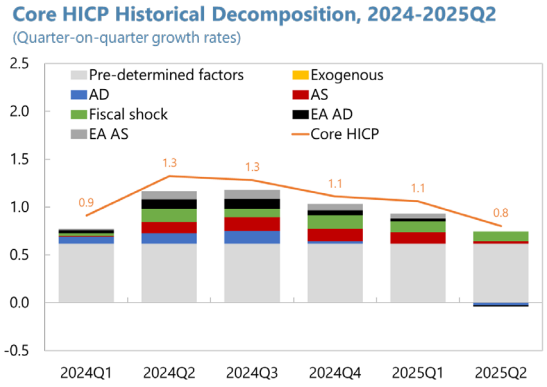
[19] HICP core inflation excludes energy and unprocessed food.

inflation's components, such as services. The other results are overall in line with those for the headline HICP (see Appendix II).

**Figure 7. Headline and Core HICP Historical Decomposition 2024–25Q2**




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

## D. Concluding Remarks

**17. Fiscal policy has played a notable role in Croatia's recent inflation dynamics.** While fiscal measures supported growth during the pandemics and in 2022 with limited inflationary effects, fiscal loosening in 2024, particularly through public wage increases, accounted for more than 40 percent of the total contribution of endogenous shocks to headline HICP and about 60 percent of the total shocks that Croatia can influence. The effects of fiscal shocks, including wage hikes, became more visible with a lag, coinciding with a sharp price increase in late 2024. Cumulatively, 0.8 ppts of the headline HICP inflation in 2024 was due to the increases in public wages. Furthermore, fiscal shocks are found to have a more lasting impact on core inflation than on headline inflation.

**18. Fiscal policy should be mindful of its inflationary impact.** With monetary policy set at the euro area level and macroprudential tools now actively deployed to contain the growth of households' credit—thereby helping to reduce demand-driven inflationary pressures—fiscal policy, while pursuing its own objectives—should be tightened considerably to ensure a coherent overall policy mix to limit imbalances in the economy and safeguard macroeconomic stability.

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# Appendix I. Econometric Methodology

**1. We use a Bayesian VAR model** based on Nguyen et al. (2023), which looks at the impact of fiscal and non-fiscal shocks on inflation. Specifically, the fiscal shock is identified by sign restrictions in the baseline such as an *expansionary* fiscal policy that *decreases* primary balance but *increases* GDP growth or inflation (Table 1).

We use a (Bayesian) VAR model as follows:

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

where $X_t$ is the vector of endogenous variables, for the baseline those are Croatian and euro area real GDP growth (i.e., log difference of real GDP) and inflation, and the primary fiscal balance in percentage of GDP. For the other notations: $q$ is the lag length (this is 4 in our case); $B_0$ represent deterministic terms (constants); $B_l$ is a matrix of parameters corresponding the lag-$l$ of $X_t$; $A_0$ is a matrix of parameters, capturing the contemporaneous relationships between the endogenous variables; and $\epsilon_t$ is a vector of orthogonal structural shocks with a Gaussian distribution of mean zero and identity covariance matrix.

The reduced form representation implied by the structural model is:

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

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

It is known that the reduced-form estimation does not provide enough information to identify even one column of $A_0$, so additional restrictions/information are needed to identify the shock of interest. To overcome this, we apply sign restrictions to identify the shocks. We opt for Bayesian estimation because it allows us to incorporate prior knowledge and better quantify uncertainty, which is especially useful when data is limited or volatile—like in the post-COVID-19 period.

**2. The identification of the shocks** is made via contemporary sign restrictions following Nguyen et al. (2023), using 4 lags. Gibbs Sampling is used to draw the posterior distribution of VAR coefficients using Normal-Wishart priors. The priors are tight enough for the available data and set depending on the number of observations. A COVID-19 dummy equal to 1 for 2020Q1 to 2021Q2 is included. Importantly, sign restrictions are imposed only on the contemporaneous (first period) responses so that the data are left free for the estimation of the impact size, as well as on both the sign and size of the impulse response functions (IRFs) in the following periods. The euro area aggregate demand and supply are identified separately via block exogeneity such that they can affect Croatian variables (e.g., imported inflation and transmission to growth) but not the other way around (see Kunovac et al., 2025). In the extended model, we also look at the impact of expenditures

and (tax) revenues to GDP and then the impact of public wage growth, with the latter replacing expenditures (Table 2).[1]

**3. To assess the sensitivity of our results to the choice of prior tightness,** we also re-estimate the Bayesian VAR model using alternative values of the overall tightness parameter $\lambda_1$ under the Normal-Wishart prior. Specifically, we compared results using $\lambda_1 = 0.7$ (our baseline, which has looser priors), $\lambda_1 = 0.5$ and $\lambda_1 = 0.1$ (tighter). The impulse response functions and historical decompositions remain qualitatively and quantitatively similar across specifications, suggesting that the results are robust to moderate changes in prior tightness. This indicates that the data is sufficiently informative and that the model's structural dynamics are not overly sensitive to the priors.

**Appendix I. Table 1. Croatia: Identifying Fiscal Shocks in the Baseline**

| Variables/Shocks | Fiscal shock | AD | AS | EA AD | EA AS |
|---|---|---|---|---|---|
| Primary balance | - | - | | | |
| Output growth | + | - | - | - | - |
| Inflation | + | - | + | - | + |
| EA output growth | 0 | 0 | 0 | - | - |
| EA inflation | 0 | 0 | 0 | - | + |

**Appendix I. Table 2. Croatia: Identifying Fiscal Shocks in the Extended Model**

| Variables/Shocks | Fiscal expenditure shock | Fiscal (tax) revenue shock | AD | AS | EA AD | EA AS |
|---|---|---|---|---|---|---|
| Expenditure/GDP[1] | + | | - | | | |
| Revenue/GDP | | - | | | | |
| Output growth | + | + | - | - | - | - |
| Inflation | + | | - | + | - | + |
| EA output growth | 0 | 0 | 0 | 0 | - | - |
| EA inflation | 0 | 0 | 0 | 0 | - | + |

[1] We also replace expenditures to GDP with public wage growth, while keeping the same identification.

## Data

**4. The data are from Haver based on CNB and ECB data, covering the period from 2000Q1 to 2025Q2**. For the baseline we use Croatian and euro area real GDP and HICP and

[1] In the setup with public wage growth, we did not control for other public expenditure components beyond compensation to employees. This is because identifying a shock based on a second expenditure item is challenging using sign restrictions, as both wages and other expenditures may move in the same direction. A possible solution would be to apply magnitude-based sign restrictions; however, data suggest that the size of the shocks might be very similar, making it difficult to distinguish between them.

Croatian fiscal primary balance to GDP.[2] All the variables, besides the balance, are also seasonally adjusted. The real GDP and prices are taken in quarterly log difference. In the extended model, the primary balance is replaced by two variables: (tax) revenues to GDP and expenditures to GDP (or wage growth in the public sector).

**Tests**

**5. The model demonstrates a strong fit, with results statistically significant at the 95 percent confidence level and robust across a range of diagnostic checks.** The baseline specification with the primary balance and a smoothing parameter $\lambda_1$ of 0.7 yields an adjusted $R^2$ of 0.446 and the lowest sum of squared residuals (SSR = 25.77) for the baseline, indicating solid in-sample performance. The RMSE of 0.513 falls well within the acceptable range for HICP forecasting in the euro area using BVAR methods. Moreover, the Deviance Information Criterion (DIC) in the baseline and extended models supports the model's parsimony. These results confirm the soundness of the selected priors and the reliability of the setup, both in terms of statistical coherence and empirical relevance.

**Appendix I. Table 3. Croatia: Tests of Different Specifications**

| HICP_SA | R2 | Adj- R2 | SSR | RMSE | DIC |
|---|---|---|---|---|---|
| **Baseline with primary balance ($\lambda_1$ = 0.7)** | 0.566 | 0.446 | 25.77 | 0.5128 | 1399.77 |
| **Baseline with primary balance ($\lambda_1$ = 0.5)** | 0.554 | 0.430 | 26.53 | 0.5200 | 1402.73 |
| **Baseline with primary balance ($\lambda_1$ =0.1)** | 0.431 | 0.274 | 33.80 | 0.5870 | 1548.45 |
| **Extended with expenditures and *tax* revenues** | 0.575 | 0.427 | 25.27 | 0.5080 | 1941.51 |
| **With public wages growth** | 0.597 | 0.458 | 23.92 | 0.494 | 1999.70 |
| **Extended with expenditures and *total* revenues** | 0.516 | 0.347 | 28.78 | 0.5419 | 1766.83 |
| **With public wages growth** | 0.568 | 0.416 | 25.63 | 0.5114 | 2007.27 |

Note: SSR is a measure of in-sample fit. The SSR is the sum of the squared differences between the actual values of your endogenous variables and the values predicted by the model. The lowest SSR is the better fit. MSE is the SSR over number of observations. Root Mean Squared Error (RMSE) is the square root of MSE. In the literature an acceptable range for HICP forecasting in the euro area (using a BVAR method) is believed to be between 0.5 and 0.7. [1] The Deviance Information Criterion (DIC) is a model comparison metric used in Bayesian estimation. It helps assessing a model fit while penalizing for model complexity, similar in spirit to AIC or BIC in frequentist settings. When comparing models (e.g., different priors, lag lengths, variable sets), the model with the lowest DIC is preferred. A difference of 10 or more is often considered substantial.

[1] See Capolongo and Pacella (2021) Forecasting inflation in the euro area: countries matter! and Banbura et al. (2023) A new model to forecast energy inflation in the euro area.

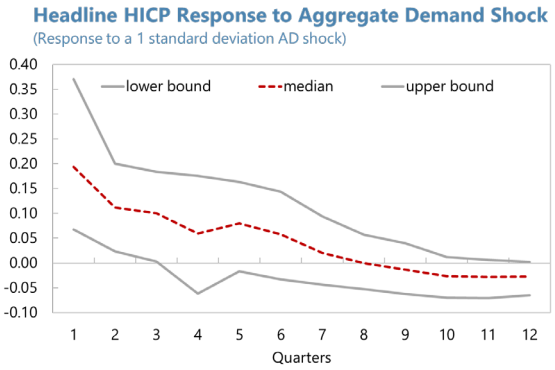
[2] We constructed a measure of cyclically adjusted primary balance for robustness check. It is calculated as the observed fiscal primary balance adjusted for the economic cycle and subtracting 0.5 times the output gap. The assumed semi-elasticity of the primary balance with respect to the output gap is set at 0.5. The results are similar to those in the baseline and available upon request.

# Appendix II. Additional Information and Robustness Checks

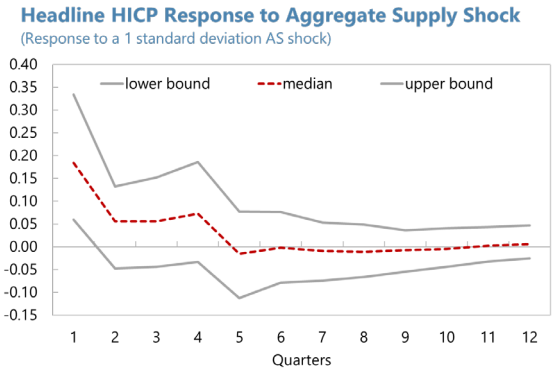
## Baseline: IRFs for Headline HICP in the Baseline

**1. The charts present the impulse responses of headline HICP to the three domestic endogenous shocks considered in the baseline:** aggregate demand, aggregate supply, and fiscal shocks. In order to properly identify the shocks (see Appendix I, Table 1), both aggregate demand and aggregate supply shocks are imposed to be negative for growth and to have the opposite sign in case of inflation. For the sake of narrative, we use here a *positive* aggregate demand shock, reversing the sign. The response of HICP to demand or fiscal shocks are similar, while in case of a supply shock, the shock is less persistent.

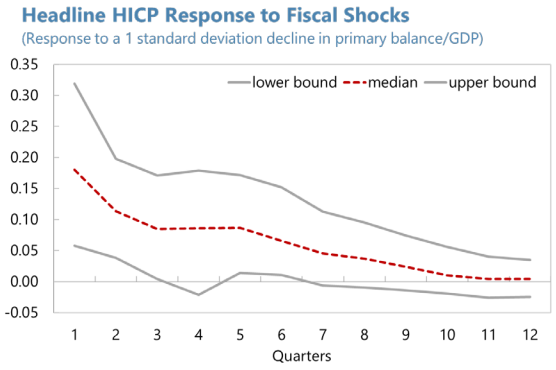
### Appendix II. Figure 1. Impulse Responses of Headline HICP




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals.




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals.



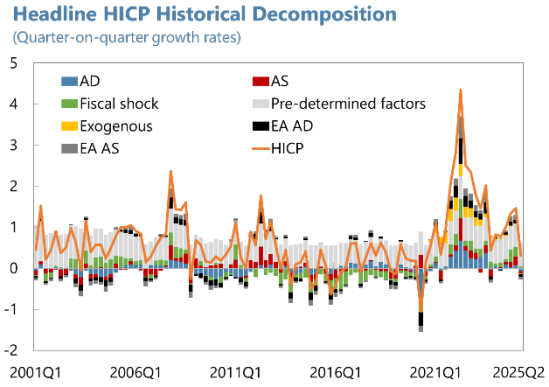

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals. 1 standard deviation shock is around 1 ppt.

## Baseline: Historical Decompositions of Headline HICP

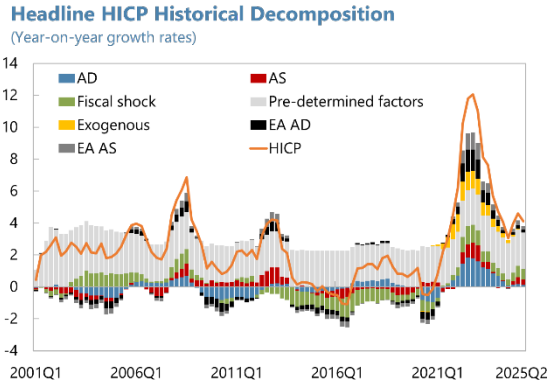
**2. The charts present the historical decomposition of quarter-on-quarter and year-on-year HICP inflation rates (top row),** followed by a focused view of the latter over the past decade. The bottom right chart shows the forecast error variance decomposition (FEVD), useful to understand inflation forecast uncertainty at horizon h. It includes *all* the shocks in our model. The FEVD looks at *future uncertainty* given the model's dynamics, not the contributions of past realized shocks, which are highlighted instead in the charts about historical decomposition. Fiscal shocks

have been unusually large in recent periods, hence their notable historical contributions, but they might not dominate future uncertainty in forecast.

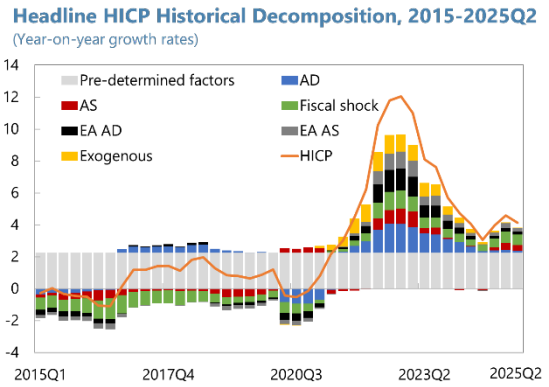
**Appendix II. Figure 2. Historical Decomposition of Headline HICP and FEVD**



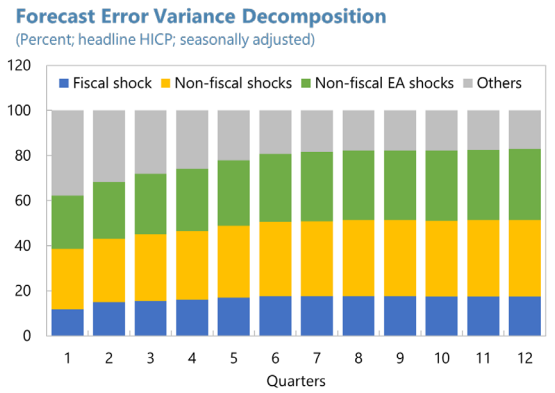

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).



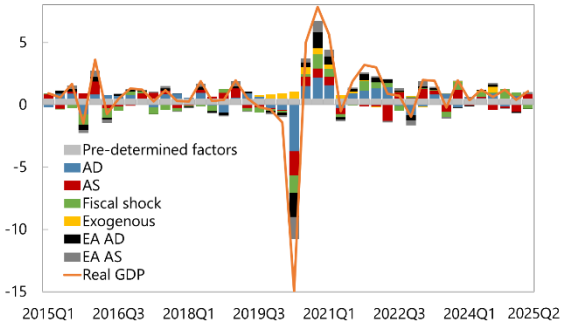

Sources: Haver Analytics; and IMF staff calculations on based Nguyen et al. (2023).

## Baseline: Real GDP Growth

**3. The chart (top LHS) shows the decomposition of real GDP growth on a quarter-on-quarter basis,** followed by the cumulative annualized decomposition during the post-COVID-19 period. Below we show the impulse response of GDP growth to an expansionary fiscal shock and the decomposition of endogenous shocks. The response of GDP growth to a fiscal shock is large initially but not persistent over time. This implies a positive fiscal multiplier, meaning that a fiscal expansion leads to higher GDP growth. The magnitude and persistence of the response suggest the multiplier is greater than zero, and possibly close to one in the very short run. In 2022, fiscal shocks were a sizable positive contributor to GDP growth.

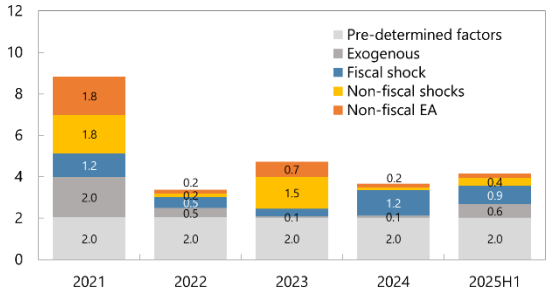
## Appendix II. Figure 3. Impulse Response and Historical Decomposition of Real GDP Growth

**Real GDP Growth Historical Decomposition, 2015-2025Q2**
(Quarter-on-quarter growth rates)



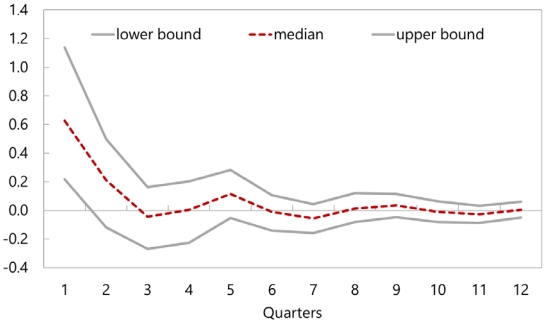

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

**Real GDP Growth Historical Decomposition, 2021-2025Q2**
(Percentage points)



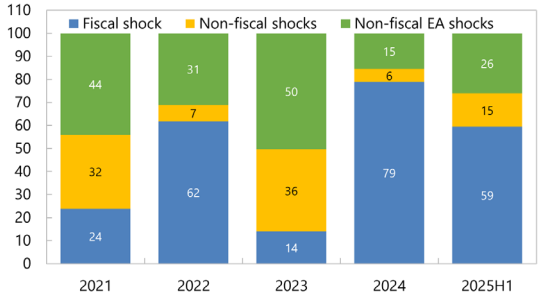

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks.

**Real GDP Growth Response to Fiscal Shocks**
(Response to a 1 standard deviation decline in primary balance/GDP)




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals. 1 standard deviation shock is around 1 ppt.

**Real GDP Growth Shocks Distribution, 2021-2025Q2**
(Percentage of total endogenous shocks)



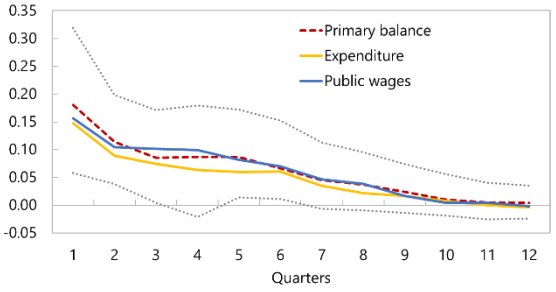

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks. Exogenous shocks are excluded.

### Comparison Across Different Fiscal Shocks to Headline HICP

**4. The charts illustrate the impact of various fiscal shocks on headline HICP inflation**. The top panel shows the impulse responses of primary balance, public expenditure, and public wages to a 1 percentage point fiscal shock over a 12-quarter horizon. The panel on the RHS presents the contribution of these fiscal components to HICP inflation from 2022 to 2025H1. The bottom left panel displays the historical decomposition of year-on-year HICP inflation for each quarter of 2024 and 2025 for the model specification with public wages growth. On the bottom RHS, we show the IRFs to either a tax revenue shock (e.g., a tax rate reduction) or an increase in expenditure.

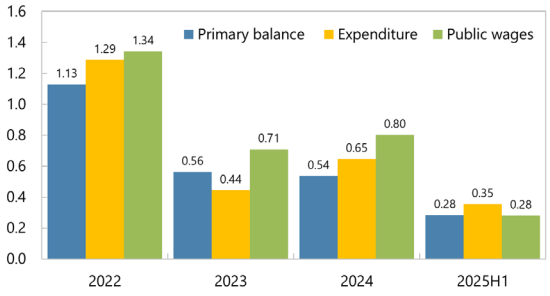
## Appendix II. Figure 4. Comparison of Different Fiscal Shocks to Headline HICP

### Headline HICP Response to Fiscal Shocks
(Response to a 1 standard deviation fiscal shock)



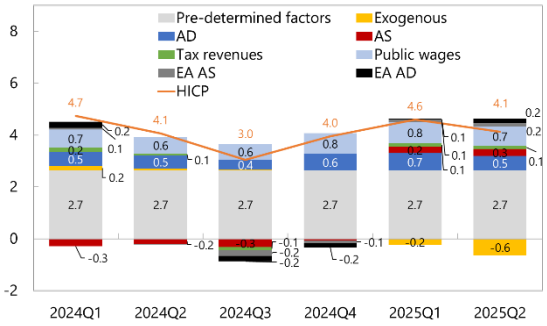

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals, dashed is for primary balance. Fiscal shock is expansionary, i.e., is a decrease in primary balance over GDP, an increase in public expenditure over GDP, or in public wage growth by 1 std. dev.

### Contribution of Fiscal Shocks to Headline HICP Inflation
(Percentage points)



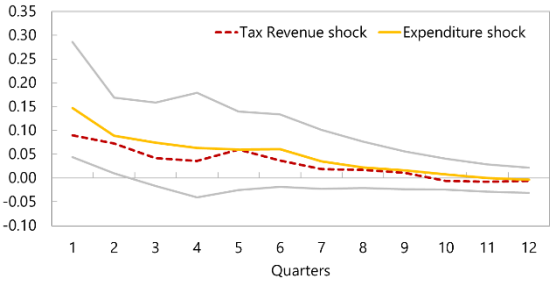

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: Fiscal shock is expansionary, i.e, is a decrease in primary balance over GDP, an increase in public expenditure over GDP, or in public wage growth by 1 std. dev.

### Headline HICP Historical Decomposition, 2024-2025Q2
(Year-on-year growth rates)




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

### Headline HICP Response to Fiscal Shocks
(Response to a 1 standard deviation fiscal shock)



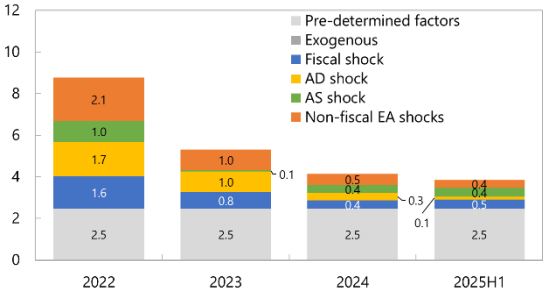

Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals for expenditure shock. Fiscal shock is expansionary and either a decrease in tax revenues over GDP or an increase in public expenditure over GDP by 1 standard deviation.

## Baseline: Core HICP

**5. The charts provide a breakdown of core HICP inflation dynamics.** The top-left panel presents the historical decomposition of core HICP from 2022 to 2025H1, attributing movements to pre-determined factors, exogenous shocks, fiscal shocks, and domestic or euro area non-fiscal shocks. The second panel illustrates the impulse response of core HICP to a one percentage point fiscal shock over a 12-quarter horizon at 95 percent confidence.

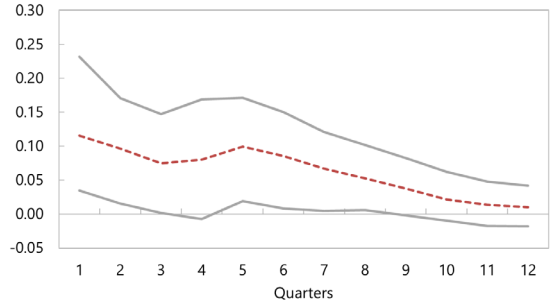
## Appendix II. Figure 5. Baseline Results for Core HICP

### Core HICP Historical Decomposition, 2021-2025Q2
(Percentage points)




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks.

### Core HICP Response to Fiscal Shocks
(Response to a 1 standard deviation fiscal shock, quarters)

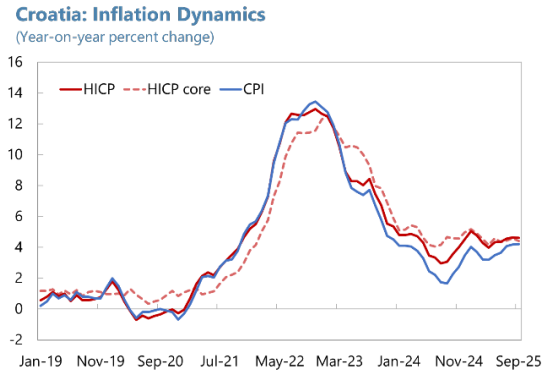



Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: 95 percent confidence intervals. Fiscal shock is a decrease in primary balance over GDP by 1 standard deviation.

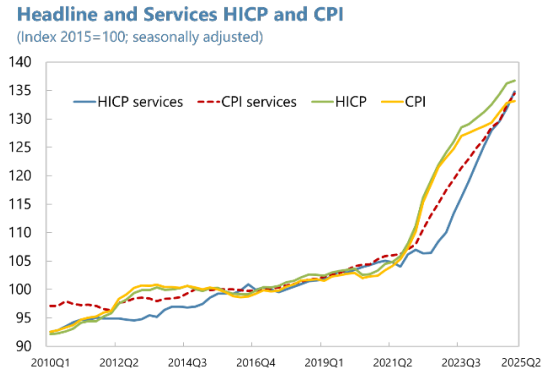
## Differences Between CPI and HICP

**6. The main difference between CPI and HICP is the coverage of the population (HICP includes the total consumption of institutional households and non-residents in the economic territory,** and this consumption is not included in the national consumer price index**).** The results of our BVAR analysis using CPI instead of HICP are robust, as the two series overlap for most of the period considered.[1] The main differences are indeed seen in the services inflation (see chart below).

**Appendix II. Figure 6. Differences Between CPI and HICP**




Sources: Eurostat; Croatian Bureau of Statistics; and Haver Analytics.




Sources: Eurostat; Croatian Bureau of Statistics; Haver Analytics; and IMF staff calculations.

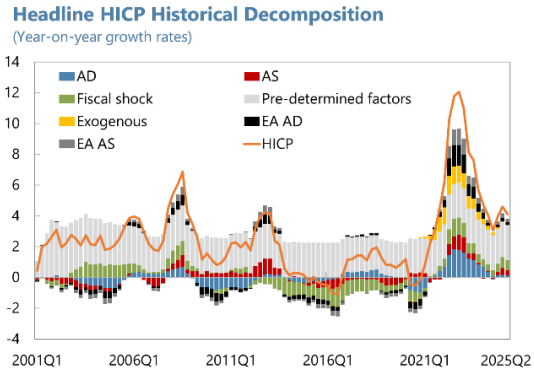
## Baseline: Impact of an Exogenous Oil Shock

**7. These charts compare the baseline model with a version that explicitly controls for an exogenous oil shock, as occurred in 2022.**[2] In this specification, both domestic and euro area aggregate shocks lose prominence, while exogenous shocks—now including: COVID-19, *and* oil shocks—become significantly more important, as expected, for that year. Notably, the impact of fiscal shocks in the most recent quarters remains very similar to that of the baseline, reinforcing our main conclusion about their role in driving inflation.

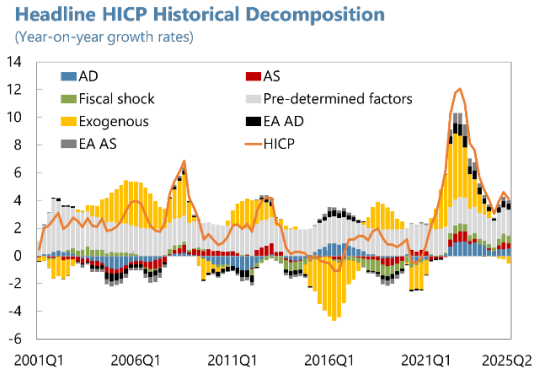
[1] This robustness check is available upon request.

[2] We did not explicitly model other global factors but in this check, we included oil prices as a proxy, to stay parsimonious. This is what we differ from Kunovac et al (2025) at time t=0.

## Appendix II. Figure 7. Historical Decomposition of Headline HICP Without/With an Oil Shock




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

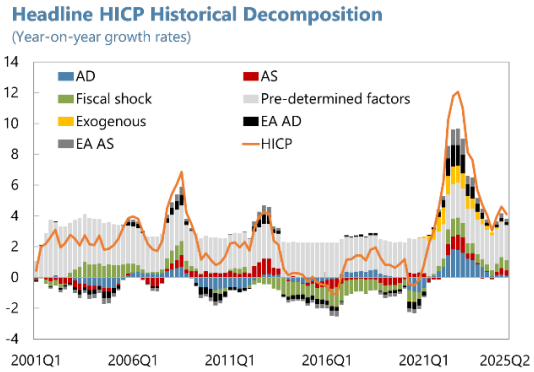
**Baseline: with Euro Area Monetary Policy Shock**

**8. In this check, we include a euro area monetary policy shock identified as in Deskar-Škrbic et al. (2020)**, as reported in the table below. The results are once again robust to our baseline.

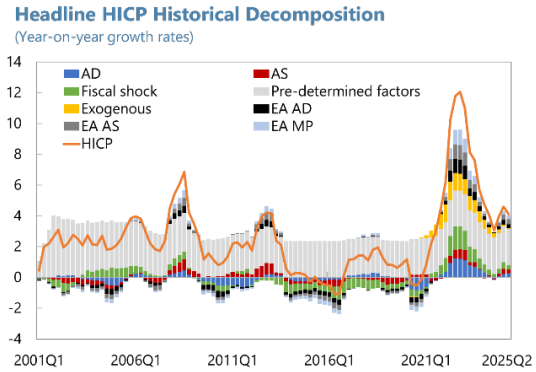
## Appendix II. Table 1. Croatia: Identifying Fiscal Shocks in Baseline with Euro Area Monetary Policy

| Variables/Shocks | Fiscal shock | AD | AS | EA AD | EA AS | EA MP |
|---|---|---|---|---|---|---|
| Primary balance | - | - | | | | |
| Output growth | + | - | - | - | - | |
| Inflation | + | - | + | - | + | + |
| EA output growth | 0 | 0 | 0 | - | - | |
| EA inflation | 0 | 0 | 0 | - | + | + |
| EA interest rates | 0 | 0 | 0 | + | | - |

## Appendix II. Figure 8. Results of the Baseline Without/with Euro Area Monetary Policy




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

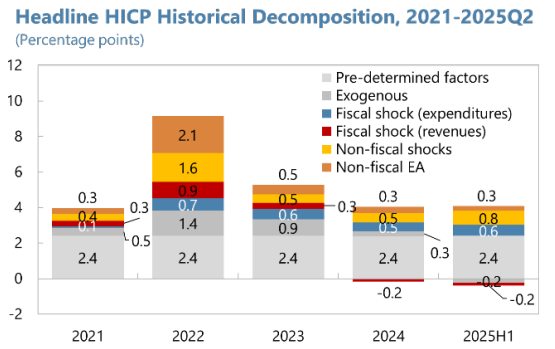



Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).

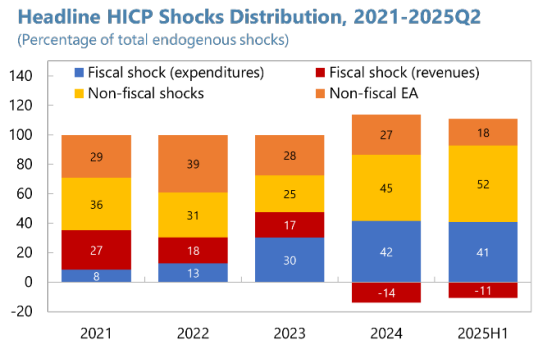
## Extended Model with Total Revenues

**9. These charts look at the extended model, but we replaced tax revenues with total revenues.** The impact is slightly reduced in 2024–25 but the overall narrative holds.

### Appendix II. Figure 9. Extended Model with Total Revenues




Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks.

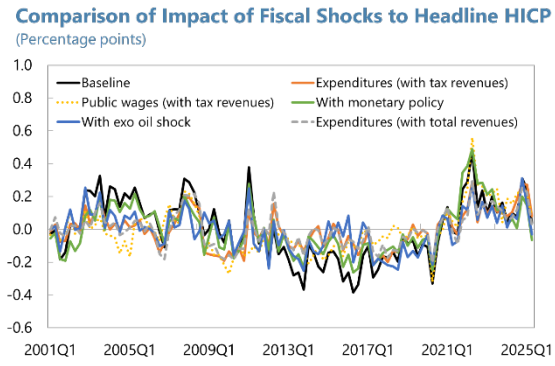



Sources: Haver Analytics; and IMF staff calculations based on Nguyen et al. (2023).
Note: The annual number is the sum of decomposition over quarters. Non-fiscal shocks are the sum of demand and supply shocks. Exogenous shocks are excluded.

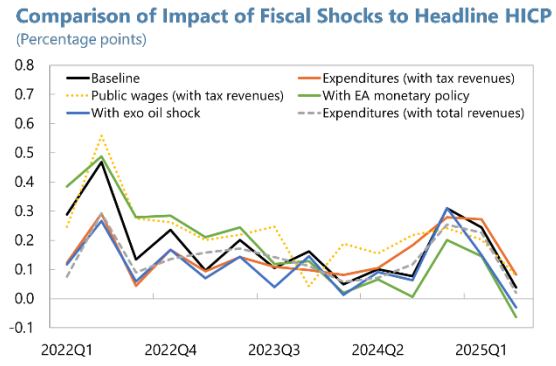
## Comparison Across Models: Fiscal Shocks Impact on Headline HICP Inflation

**10. Drawing a comparison across all our main setups and further checks, the contribution of fiscal shocks (also using different definitions) is very robust, especially since 2024.**

### Appendix II. Figure 10. Robustness of Fiscal Shocks Impact on Headline HICP




Sources: IMF staff estimates based on Nguyen et al. (2023); Kunovac et al. (2025); and Deskar-Škrbic et al. (2020).




Sources: IMF staff estimates based on Nguyen et al. (2023); Kunovac et al. (2025); and Deskar-Škrbic et al. (2020).