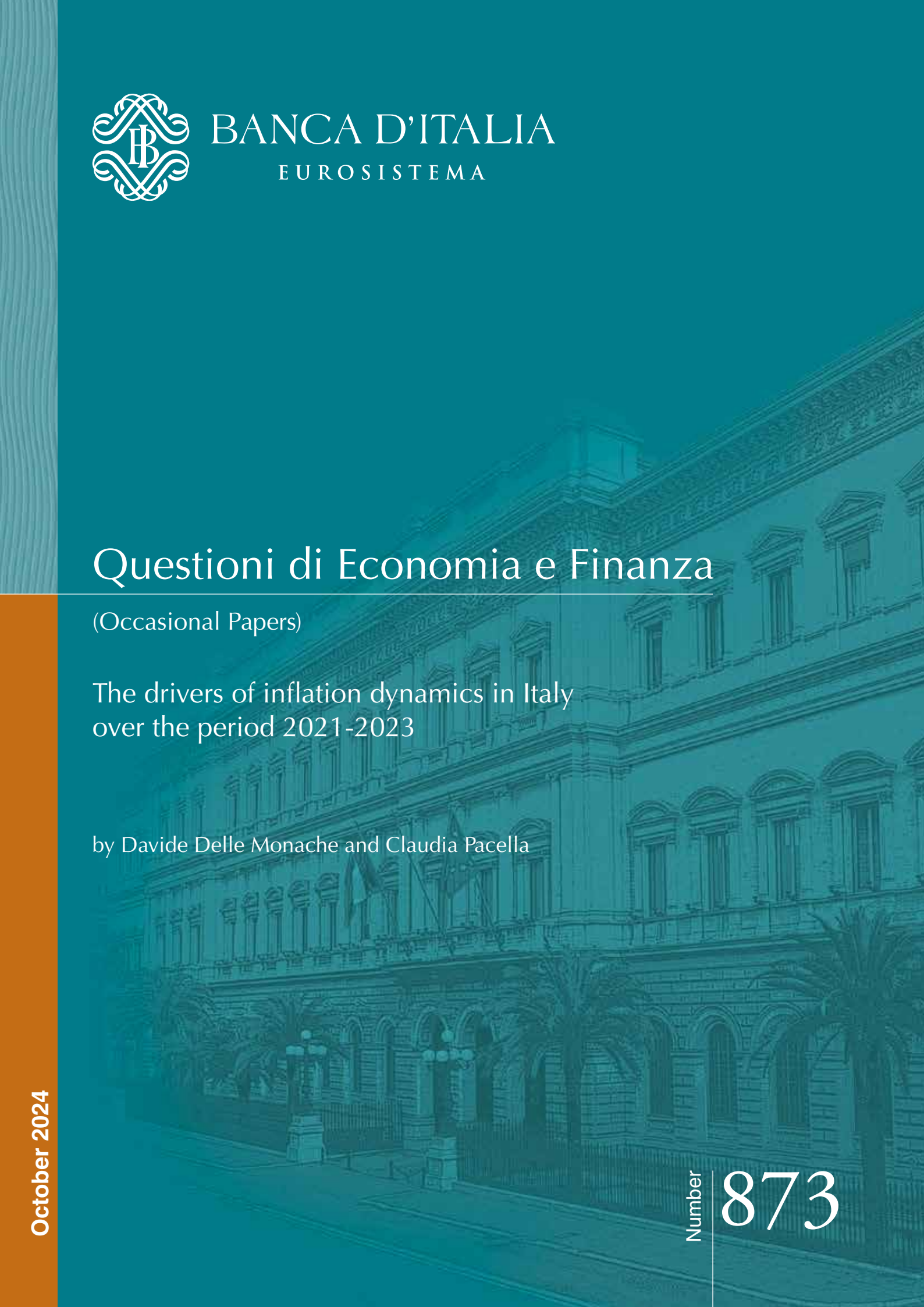

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ISSN 1972-6643 (online)

Designed by the Printing and Publishing Division of the Bank of Italy

THE DRIVERS OF INFLATION DYNAMICS IN ITALY OVER THE PERIOD 2021-23

by Davide Delle Monache* and Claudia Pacella*

Abstract

In this paper, we use the Bank of Italy's quarterly model to decompose the pattern of inflation in Italy over the 2021-23 period into the contributions from its most important drivers: international factors, like the prices of commodities and manufactured goods and the foreign demand; exchange and interest rates; fiscal measures; pressures stemming from unexpectedly strong domestic demand. Most of the increase in inflation in 2021-22 can be attributed to the direct and indirect impact of the extraordinary rise in international prices, which also drove the decline in 2023. Fiscal support measures helped to contain the impact of energy commodity prices on inflation in 2021-22, but their effect was reversed in 2023. Monetary policy contributed to dampen inflation, especially in 2023. Finally, the inflationary pressures arising from the unexpectedly strong growth in aggregate demand and employment were overall contained over the period 2021-23, partly as a result of a sluggish adjustment of wages.

JEL Classification: C32, C53, E31, E37.

Keywords: inflation, energy prices, macro-econometric model, policy simulations.

DOI: 10.32057/0.QEF.2024.873

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I. Introduction♦

In 2021-23 inflation in all major advanced economies increased to historical highs. In Italy, the harmonized index of consumer prices (HICP), rose on average by 1.9 per cent in 2021, 8.7 per cent in 2022 and 5.9 per cent in 2023. Consumer inflation peaked at the end of 2022 and then rapidly declined. The sharp increase came almost totally unexpected: in January 2021 the Bank of Italy as well as the analysts surveyed by Consensus Economics expected an inflation rate below 1 per cent for both 2021 and 2022.[1] Several exogenous factors contributed to these developments, including the faster-than-expected reopening of the economies after the Covid-19 pandemic, the resulting global supply bottlenecks and in particular the energy shock that was exacerbated by the Russian invasion of Ukraine.[2]

Understanding the role of the different channels that contributed to these inflation developments is essential for the monetary authority to calibrate the appropriate policy response. Corsello and Tagliabracci (2023) and Neri et al. (2023) assess the direct and indirect effects of energy price shocks on euro area inflation: they find that on average in 2022 those shocks contributed for almost two thirds to the increase in headline inflation, while the contribution to the increase in core inflation was about one quarter. Pallara et al. (2023) and Guerrieri et al. (2023) compare the consequences of the energy shock on inflation in the U.S. and in the euro with a focus on the core component. Both studies find that the impact of the energy shock on core inflation was much larger and persistent for the euro area than for the United States; the latter article argues that, especially in the euro area, the recent inflation episode is mainly explained by the transmission mechanism in the goods market, rather than by second-round effects in the labour market. Alessandri and Gazzani (2023) study the effects that the recent shock in gas supplies had on economic activity and on the prices of both energy and non-energy goods. De Santis and Tornese (2023) assess non-linearities in the propagation of energy shocks to the euro area inflation and find that the transmission is stronger in high-inflation regimes. This is consistent with Neri et al. (2023) that shows that the pass-through of energy prices on the euro area core inflation have roughly doubled compared to the pre-pandemic period. Pisani and Tagliabracci (2024) uses the model proposed by Bernanke and Blanchard (2023) for studying the contribution of selected determinants of consumer prices in Italy and concludes that the surge in inflation in 2022-23 was mainly driven by shocks to the energy and food components.

These empirical analyses are mostly based on reduced-form econometric model or small size vector autoregressive models. In this paper on the other hand we aim at identifying the main factors that underlie the largely unexpected developments in Italian inflation in the period 2021-23 and at quantifying their contributions by means of the Bank of Italy quarterly model (BIQM), a large scale structural macroeconometric model with a detailed description of price formation mechanism which will be presented later on. The model is used for both macroeconomic forecasting and policy analysis; see Bulligan et al. (2017).

♦ We thank Fabio Busetti, Michele Caivano, Stefano Neri and Alessandro Secchi for valuable comments and suggestions.

[1] Similarly, in the euro area inflation stood at 2.6 per cent in 2021, 8.4 in 2022 and 5.4 in 2023, compared to estimates by private analysts surveyed by Consensus in January 2021 of 0.9 per cent for the 2021 and 1.3 for the 2022. The ECB's March 2021 projections indicated inflation around 1.4 per cent on average for each year of the period 2021-23.

[2] See Neri (2024) for a comprehensive description of inflation developments in the euro area from the pre-pandemic period until the recent energy crisis.

The analysis takes as a starting point the projections published in the January 2021 issue of the Economic Bulletin (EB 2021/1), in which inflation for the 2021-23 triennium was projected to be much lower than actually observed, and decomposes the forecast error into the contributions of the main determinants underlying inflation projections. Those factors have been divided into four groups: (i) international factors; (ii) exchange and interest rates; (iii) fiscal measures; (iv) domestic demand pressures.

Overall, we find that in 2021-22 almost 90 per cent of the upward pressures on consumer prices unforeseen at the beginning of 2021 came from the much higher-than-expected growth in foreign prices of commodities and manufactured goods, whose impact was further amplified by exchange rate developments. Pressures attributable to the unexpectedly high growth in domestic demand were more subdued. Fiscal policy helped to mitigate the acceleration of prices in the period 2021-22, while in 2023 inflationary pressures progressively attenuated also thanks to the increasing contribution of monetary policy.

The paper is organized as follows. Section 2 describes the inflation developments in Italy for the triennium 2021-23. Section 3 outlines the price formation mechanism embedded in the BIQM. In section 4 the shocks that occurred over the period are described, and in section 5 their impacts on the prices developments are quantified and the various transmission mechanisms are disentangled. Section 6 concludes the analysis.

II. Inflation in Italy in 2021-23

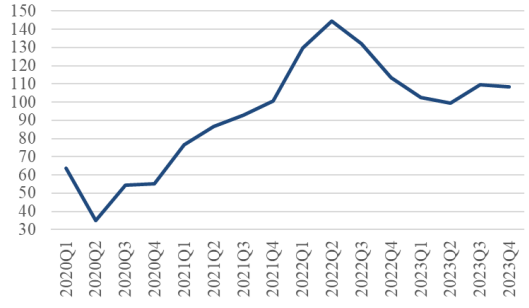
After years of subdued dynamics, in 2021 consumer prices returned to grow at a marked pace in Italy and in the rest of the euro area, initially driven by the energy component. In the second half of 2021, further inflationary pressures were triggered by the bottlenecks in supply chains that emerged in the aftermath of the pandemic due to the faster-than-expected recovery of the aggregate demand, which induced a sizeable increase in the price of intermediate products. In 2022, the Russian invasion of Ukraine exacerbated the tensions on commodity markets with oil prices nearing historical highs and natural gas prices rising to levels more than ten times higher than those recorded on average before 2019 (figure 1). In Italy, the impact of the increase in natural gas prices was especially acute, due to the strong reliance of electricity production on gas-powered plants, as well as to the relevance of natural gas in key manufacturing sectors.

The prices of food commodities also rose, affected by the increases in energy inputs and exacerbated by the reduction in the supply of fertilizers and fats of vegetable origin following the conflict in Ukraine.

Figure 1 – Energy commodity prices

(indices: averages 2010-2019=100)

A. Oil price



B. Other energy prices

The increase of imported input prices was soon transmitted to production costs of industrial goods sold on the domestic market, especially for energy-intensive firms, and then to services; consequently, prices of non-energy goods and services accelerated too.

The transmission of inflation to wages was much limited and slower than in other European countries, mainly due to the still large availability of margins for the use of labour and to the peculiar characteristics of the collective bargaining system, which tends to attenuate the impact of increases in inflation in the short term. In Italy, the collective agreements have a multi-year validity and delays in renewals further extend the effective duration of the agreements. Furthermore, there is a limited diffusion of indexation clauses which concern only a small part of the wage bill.[3]

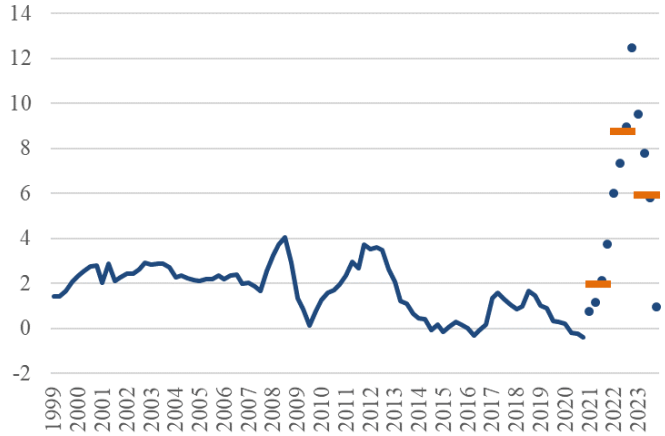
Albeit with a delay, wages are gradually catching up with the inflation experienced in 2021-22. Indeed, they started to accelerate in the second part of 2023 and are expected to grow at an average rate of about 3.5 per cent per year in the 2024-26 triennium.[4]

Fiscal policy reacted to shield households and firms from the sharp increase in energy prices. Among the most relevant measures, cuts in excise duties on fuel and VAT on gas were introduced and the network fees on electricity and gas bills were temporarily cancelled. Moreover, social bonus for electricity and gas users were repeatedly extended to low-income households, since they were hit more by rising energy prices.[5] Measures specifically targeted to firms were also adopted, amounting to around 1.5 per cent of GDP. Approximately half of those measures were targeted in favour of companies with high gas and electricity consumption, as well as of those operating in the agricultural, fishing and road transport sectors for the purchase of fuel.

Despite those measures, inflation in Italy rose to levels unseen since the 1980s, reaching a peak of 12.5 per cent in the last quarter of 2022, followed by a rapid decline during 2023 (figure 2).

Figure 2 – Quarterly HICP inflation in Italy

(year-on-year percentage changes)



Note: The dots indicate the y-o-y quarterly inflation rate and the three horizontal orange lines denote average annual inflation.

The unprecedented increase in consumer prices came almost totally unexpected. Understanding the role of the various drivers underlying the inflationary shock is key to grasp the nature of this surprise, particularly to assess the relevance and usefulness of the interpretative frameworks, embedded in economic models, that have so far guided inflation forecasts.

[3] For more details, see Banca d'Italia (2023, pp. 26-30).
[4] See *Macroeconomic projections for the Italian economy*, Banca d'Italia, December 2023.
[5] See Curci et al. (2022) and Corsello and Riggi (2023) for an analysis on the distributional effects of the energy shock.

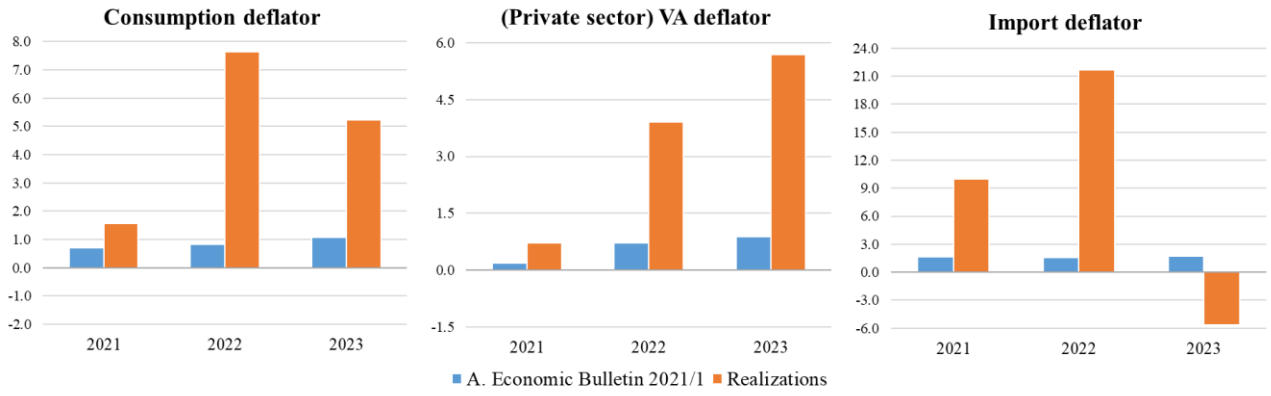
It is interesting to look at the evolution of some of the key variables. Figure 3 shows the projections made at the beginning of 2021 for the period 2021-23 together with the actual realizations of three main variables of interest: consumer prices, as proxied by the household consumption deflator, and foreign and domestic supply prices, represented by the import deflator and the value added deflator at factor costs for the private sector, respectively.

A simple comparison of the dynamics of the three variables already suggests that for the biennium 2021-22 most of the difference between projected and realized inflation is attributable to the unprecedented shock in import prices, which increased by nearly 32 per cent cumulatively over the two-year period compared with the projection of just over 3 per cent made in January 2021. The value added deflator increased by about 4.5 per cent cumulatively, against a projected growth of 1 per cent.

Differently, in 2023 the forecast error in the consumer price is driven by a forecast error for value added deflator of similar magnitude. Import prices declined, mainly as a consequence of the fading out of the energy shock, resulting in a negative forecast error.

Figure 3 – The household consumption deflator and its determinants in 2021-23

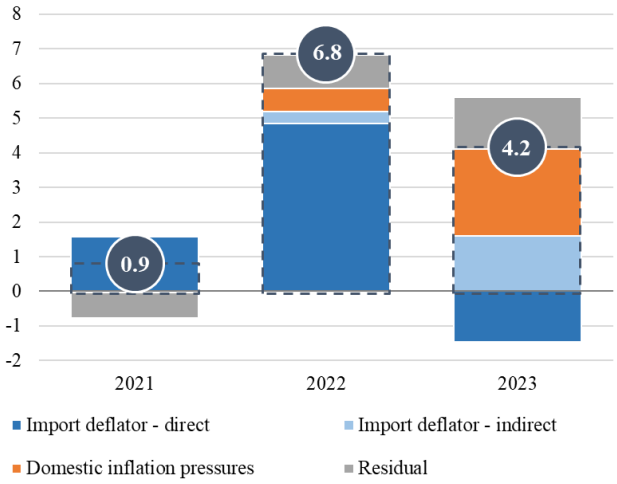
(percentage changes with respect to previous year)



The conjecture that imported inflation is responsible for most of the projection error on consumer price inflation is also confirmed by a model-based exercise using the BIQM: in a counterfactual simulation in which we assume that import prices were fully known in January 2021, while domestic supply prices are kept fixed at the level forecast in the Economic Bulletin of January 2021, the forecast error on consumer price inflation in 2021-22 would shrunk by almost 90 per cent (figure 4). In 2023 the decline in import prices results in a negative direct impact on consumer price inflation; however, the indirect impact of the past increase in import prices on domestic prices was still positive and, together with ‘pure’ domestic pressures, which are mostly unrelated with imported inflation, accounts for most of the forecast error in consumer price inflation.

Figure 4 – Decomposition of the projection error on the household consumption deflator

(percentage changes with respect to previous year)



While this simple exercise provides some hints on the nature of the inflationary episode, it does not allow to understand to what extent the increase in inflation could have been anticipated had the size of the exogenous shocks be known in advance. Before tackling this question, a description of the price formation mechanism included in the BIQM is provided in the next section.

III. Price formation mechanism in the Bank of Italy Quarterly Model

The BIQM is the main model underlying the Bank of Italy's projections for the Italian economy. It is a large-scale 'semi structural' macro-econometric model (with 750 endogenous variables, of which 95 are generated by stochastic equations, the others by identities). In the long-run the model is supply-determined, with GDP growth being function of population and productivity growth and of capital accumulation; in equilibrium, capital and labour are consistent with the level of output and of relative input prices, inflation is constant and equal to expected inflation. In the short run, the model is mainly determined by aggregate demand, with the capital stock being non-malleable and prices and wages sticky and possibly different from expectations (see Bulligan et al., 2017, for details).

Here we describe briefly how the prices dynamics are modelled within the BIQM. A stylized representation of the price formation mechanism is reported in figure 3. In the model demand prices depend on domestic supply prices $P_{Y,t}$ and import prices $P_{M,t}$, with restrictions that ensure long-run homogeneity. The equations also include fiscal determinants, such as indirect tax rates, excise taxes and administered prices. In particular, the consumption deflator $P^{\tau}_{C,t}$ is modelled as follows:[6]

$$log\left(P^{\tau}_{C,t}\right) = \beta_0 + \beta_1 log\left(P^{\tau}_{C,t-1}\right) + \beta_2 log\left(P^{\tau}_{C,t-2}\right) + \beta_3 log\left(P_{Y,t}\right) + (1 - \beta_1 - \beta_2 - \beta_3) log\left(P_{M,t}\right) + \beta_5 \Delta log(1 + \tau_t) \quad (1)$$

where $P^{\tau}_{C,t} = \frac{P_{C,t}}{1+\tau_t}$ is the consumption deflator net of indirect taxes and τ_t the implicit tax rate. The main exogenous variables, such as the energy prices and other commodities prices, together with foreign demand, exchange rates, and interest rates, directly affect import prices and indirectly domestic supply prices. The latter, proxied by the deflator of the value added at factor costs in the private sector, are

[6] Consumer prices are measured by the implicit household consumption deflator; supply prices are proxied by the import deflator and the factor cost value added deflator for the private sector.

determined assuming that monopolistic competitive firms fix a markup over average minimum costs, proxied by a measure of unit labour costs ULC_t, as in the following equation:

$$\log(P_{Y,t}) = \beta_0 + \beta_1 \log(P_{Y,t-1}) + \beta_2 \log(ULC_t) + (1 - \beta_1 - \beta_2) \log(P_t^* EEN_t) + \beta_3 x_t + \beta_4 \pi_t^{COM} I_t(\pi_t^{COM} < 0) + \beta_5 \sum_{i=0}^{3} \Delta \log(ULC_{t-i}) \quad (2)$$

where ULC_t is the ratio between compensation per employee in the private sector and a moving average of labour productivity, so as to capture "smoothed component" of unit labour costs. The other explanatory variables capture factors affecting the short-run pricing behaviour of private firm. P_t^* denotes foreign prices of manufactured goods, and EEN_t is the nominal effective exchange rate: these variables account for the effects of foreign competitiveness and enter the equation with a positive sign, thus implying that firms could expand their markup in case foreign competitors raise their prices; x_t is the output gap and captures the impact of cyclical conditions on pricing behaviour; π_t^{COM} is the rate of change of a weighted average of commodity import deflators and $I_t(\pi_t^{COM} < 0)$ an indicator variable equal to 1 when π_t^{COM} is negative and 0 otherwise: this specification accounts for an asymmetric impact of cost pressures stemming from commodity prices, with increases in the latter that *coeteris paribus* are fully passed-through to final prices, while decreases of commodity prices are assumed to partially increase markups. In the long run, supply prices are homogeneous in the unit labour cost, implying that the markup is constant.

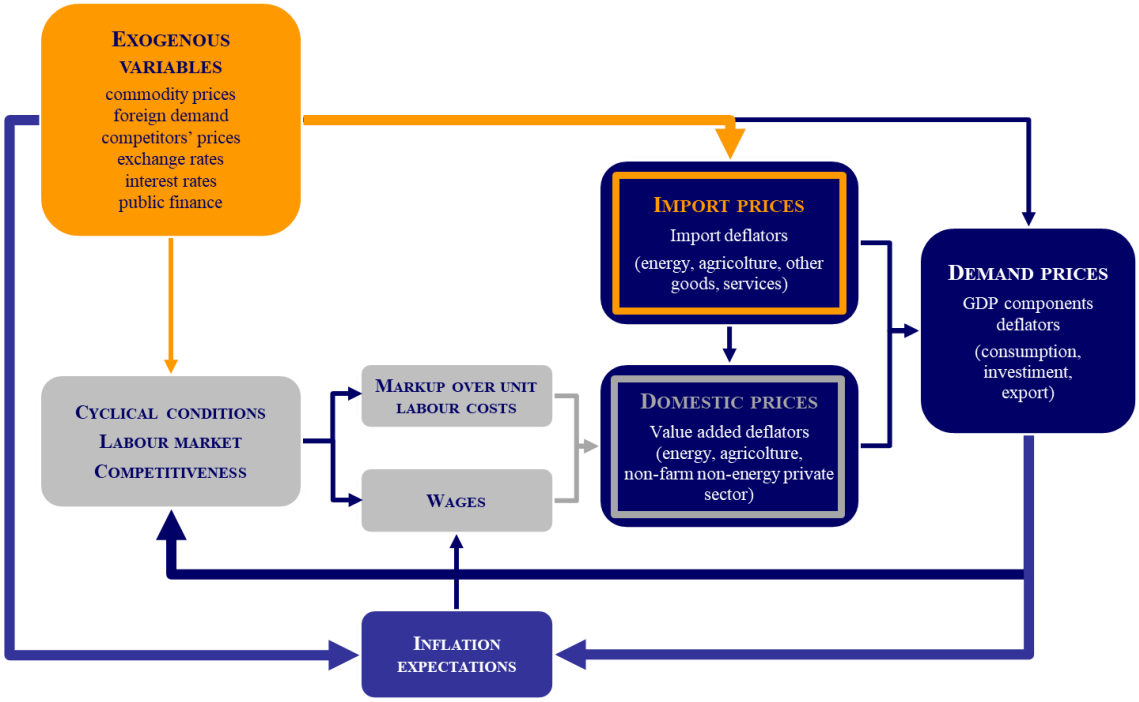
Nominal wages w_t depend on inflation expectations $\pi_{t|t-1}^e$ and cyclical conditions on the labour market, with the latter proxied by the unemployment rate u_{t-1}, as represented in the following relationship:

$$\Delta w_t = \alpha_0 + \pi_{t-1} d_{BF93} + \pi_{t|t-1}^e (1 - d_{BF93}) + \beta_1 u_{t-1} + \bar{a}_t \quad (3)$$

where π_t is consumer price inflation, d_{BF93} is a dummy variable equal to one in periods before and including 1993 and zero afterwards to describe the pre-1993 regime of indexation of wages to past inflation and $\bar{a}_t$ is a five-year average of labour productivity growth, whose coefficient is restricted to one to ensure theoretical consistency.

The fiscal policy can affect consumer prices both directly, through interventions on indirect taxes and administered prices, and indirectly through its effects on aggregate demand, employment and wages.

Figure 5 - Price formation mechanism in the BIQM



The transmission mechanism represented in figure 5 allows to identify the different channels through which the unexpected developments in exogenous variables impact the final prices. In order to quantify the impact along the various channels through simulations of the BIQM, first we compute the shocks to the exogenous variables of the model (such as energy prices, food prices, and foreign demand, and discretionary fiscal policy) and then we identify additional shocks that can help accounting for the forecast errors in selected endogenous variables that are relevant for price formation, such as domestic demand components. We then assess to what extent the impact of these shocks, computed by simulations of the BIQM, can account for the difference between the 2021 projection and actual data.

It is worth to stress some caveats around this analysis. One limitation may stem from possible changes in economic relationships over the triennium 2021-23, that has seen inflation surging to unprecedented levels from the beginning of the monetary union. Such large fluctuations may have induced (temporary) changes in the elasticities implied by BIQM, which are based on average historical regularities. A further caveat of the decomposition presented here is that we implicitly treat the shocks to the main drivers of inflation as if they were independent of each other. In practice this orthogonality is not satisfied in most cases: for instance, the fiscal measures enacted to mitigate the loss of purchasing power due to the energy commodity price shock would have not been adopted had that shock not occurred.

One important change in the BIQM relationships is related to the role of gas prices, which were absent in previous versions of the model but they are explicitly taken into account in this analysis.[7]

IV. The shocks and the counterfactual scenario

In this section the shocks are retrieved by comparing the evolution of the main exogenous variables of the BIQM in 2021-23 with the assumptions underlying the projections published in January 2021. We identify four main channels of transmission along which unexpected inflationary pressures materialized: (i) international factors; (ii) exchange rates and interest rates; (iii) fiscal measures; (iv) unexpected domestic demand pressures.

In projection exercises, variables under channels (i) and (ii) are usually set according to a set of assumptions of technical nature, and the related shocks can be readily retrieved by comparing the assumptions adopted in January 2021 and actual data. The comparison is reported in Table 1.

Energy commodity prices experienced an unprecedented increase to levels higher than those implicitly embedded in futures contracts recorded at the beginning of 2021, by 70 per cent for oil and by more than 300 per cent for natural gas prices. The price of other commodities, such as agricultural products and metals, and those of foreign manufactures rose markedly, reflecting the increase in energy costs, supply bottlenecks as well as demand pressures. As a consequence, competitors' prices grew by more than 5 per cent per year in 2021-23, well above the assumptions underlying the projections released at the beginning of 2021. Despite the negative effects of the war in Ukraine and the global supply chain disruptions, the growth of foreign demand for Italian goods and services was much higher than expected in 2021-22 but lower in 2023. Interest rates increased significantly more than expected, especially in 2023, as a

[7] In the version of the BIQM in use in January 2021 energy commodity prices were proxied by the oil price. This was justified by the fact that before 2021 the price of other energy commodities, notably of natural gas, displayed a strong co-movement with oil prices. During the triennium 2021-23, as the decoupling between oil and gas prices became visible, as a temporary strategy the model forecasts of the price of imported energy were adjusted in order to match those of a satellite equation accounting for natural gas prices. In 2023 the energy price block of the model was updated in order to explicitly take account of the price of natural gas as a driver of energy prices. Neither of these solutions was available at the beginning of 2021, when indeed the decoupling between oil and gas prices had not yet materialized. For details on the new version of the model see Cova et al. (2024).

consequence of the monetary tightening that followed the increase in inflation. However, the euro-dollar exchange rate depreciated, consistently with a relatively stronger and earlier monetary normalization in the United States than in the euro area.

Table 1 – Main exogenous variables: assumptions underlying the EB 2021/1 projections and the actual data

	Realizations			EB 2021/1			Differences		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
(i) International factors									
Oil price[(1),(2)]	71.1	103.7	83.7	52.1	50.4	49.7	19.0	53.3	34.0
Gas price[(1),(3)]	46.6	123.1	40.6	17.1	16.0	15.2	29.5	107.1	25.4
Food price[(4)]	36.1	15.9	-9.3	8.1	-2.3	-0.4	28.0	18.2	-8.9
Metal price[(4)]	49.6	-3.1	-11	16.1	1.5	1.5	33.5	-4.6	-12.5
Competitors prices[(4)]	6.9	13.6	2.4	1.4	1.8	1.8	5.5	11.8	0.6
Foreign demand[(4)]	10.9	7.1	0.0	6.9	5.0	3.5	4.0	2.1	-3.5
(ii) Exchange and interest rates									
Effective exchange rate of euro[(4),(5)]	-0.8	1.1	-2.5	-1.3	0.0	0.0	0.5	1.1	-2.5
USD per EUR exchange rate[(1)]	1.18	1.05	1.08	1.23	1.23	1.23	-0.1	-0.2	-0.2
Short-term interest rates[(1)]	-0.5	0.3	3.4	-0.5	-0.5	-0.5	0.0	0.8	3.9
Long-term interest rates[(1)]	0.4	2.4	3.9	0.3	0.6	0.8	0.1	1.8	3.1

(1) Level; (2) USD/barrel, Brent; (3) EUR/MWh; (4) Growth rate; (5) Positive values indicate depreciation of the euro.

Retrieving the shocks related to the unexpected fiscal policy measures and to the demand pressures that are not accounted for by the other channels is less straightforward and requires interventions on the add-factors of the equations of some endogenous variables, which are set exploiting external information. Fiscal policy stepped in several times with temporary measures aiming at countering the surge of energy prices. In particular, starting at the end of 2021 and for most of 2022 the government implemented a substantial reduction of various taxes and fixed costs weighing on energy prices, as well as direct transfers to low income households to reduce their gas and electricity bills; see Curci et al (2022). We also considered other fiscal measures aiming at supporting growth in the aftermath of the pandemic recession. The most prominent of such measures is represented by the package of fiscal incentives for housing renovations. Those measures, introduced in 2020 and initially set to expire in 2021, were repeatedly extended well into the following two-year period, and in 2022-23 involved a massive stimulus to housing investment.[8]

Despite the recessionary nature of the energy shock, GDP growth turned out to be much higher than estimated at the beginning of 2021, mainly supported by the post pandemic strong rebound of household expenditure and housing investment.[9] While both components benefitted from fiscal measures, the recovery of consumption was larger than could have been foreseen had fiscal measures be known in advance and was likely driven by the success of vaccination campaign (which was largely unpredictable in January 2021, when vaccines had just started to be deployed) as well as by the limited savings need after the accumulation of high forced savings during periods with restrictions to mobility and production[10].

[8] Besides modifying the relevant items of the fiscal block of the model, the shocks were introduced in the simulations also using other instruments, among which the fiscal component of the price of energy goods and the residual of the housing investment equation.

[9] GDP grew cumulatively by more than 13% in 2021-23 and household consumption by more than 11%, about 4 and 3 percentage points higher than in the January 2021 projections, respectively. Specifically, in the biennium 2021-22 the growth has been much higher than expected while in the 2023 the slowdown of output was more pronounced than expected.

[10] The excess consumption is introduced in a model-based simulation by adding factors into the main consumption equation of the BIQM; this channel accounts for almost 9% of extra consumption in the triennium 2021-23.

V. The results of the model-based decomposition

Table 2 reports the estimated impact of the impact of the drivers identified in the previous section on demand prices, as proxied by the household consumption deflator, and supply prices, proxied by the import deflator and the value added deflator for the private sector. Row A reports the projections for these variables underlying the scenario published in the Economic Bulletin of the Bank of Italy in January 2021. Rows B, C, D, E report the impact of the shocks along the channels (i)-(iv). Row F reports the portion of the actual realizations that in the simulations of the model is not explained by the above mentioned channels. By construction, the last row (actual realization) is the sum of rows from A to F.

Table 2 - Determinants of price dynamics in Italy in 2021-23

(percentage changes with respect to previous year and percentage points)

	Consumer prices[(1)]				Import prices[(1)]				Domestic prices[(1)]			
	2021	2022	2023	**Cumulated**	2021	2022	2023	**Cumulated**	2021	2022	2023	**Cumulated**
A. Projections published in EB/1 2021	0.7	0.8	1.1	**2.6**	1.7	1.6	1.7	**5.0**	0.2	0.7	0.9	**1.8**
B. International factors	1.9	7.0	1.0	**9.9**	9.1	20.5	-6.9	**22.7**	0.5	2.9	5.0	**8.5**
of which: Energy prices	*1.4*	*4.4*	*-1.3*	***4.5***	*3.9*	*9.5*	*-7.0*	***6.3***	*0.0*	*0.5*	*1.3*	***1.9***
Prices of other commodities and manufactures	*0.5*	*2.6*	*2.3*	***5.4***	*5.2*	*11.0*	*0.1*	***16.4***	*0.5*	*2.4*	*3.7*	***6.6***
Foreign demand	*0.0*	*0.2*	*0.2*	***0.4***	*0.3*	*0.5*	*-0.2*	***0.6***	*0.0*	*0.2*	*0.4*	***0.6***
C. Exchange and interest rates	0.1	0.6	0.1	**0.8**	0.0	0.4	-0.1	**0.3**	0.0	0.2	0.1	**0.4**
of which: Monetary policy	*0.0*	*-0.6*	*-1.1*	***-1.6***	*0.0*	*-3.6*	*-2.2*	***-5.8***	*0.0*	*-0.1*	*-1.3*	***-1.3***
D. Fiscal measures	-0.1	-1.1	1.2	**-0.1**	0.1	0.5	0.5	**1.1**	0.1	0.5	0.7	**1.2**
of which: Energy compensation measures	*-0.2*	*-1.4*	*1.0*	***-0.6***	*0.0*	*0.0*	*0.1*	***0.1***	*0.0*	*-0.1*	*-0.2*	***-0.3***
Other measures	*0.0*	*0.1*	*0.3*	***0.5***	*0.1*	*0.4*	*0.4*	***1.0***	*0.1*	*0.5*	*0.9*	***1.5***
E. Domestic demand	0.1	0.5	0.4	**1.0**	0.0	1.4	1.1	**2.5**	0.1	0.9	0.5	**1.4**
F. Residual	-1.1	-0.2	1.5	**0.2**	-0.9	-2.6	-1.9	**-5.5**	-0.2	-1.2	-1.5	**-3.0**
Actual realization (A+B+C+D+E+F)	1.6	7.6	5.2	**14.4**	10.0	21.7	-5.6	**26.0**	0.7	3.9	5.7	**10.3**

[(1)]Consumer prices are measured by the implicit deflator of household consumption. Import supply prices are measured by the import deflator and the domestic supply prices are measured by the private sector value added deflator.

International factors. – Overall, we estimate that this channel contributed to the surge of consumer prices by 1.9 percentage points in 2021, by 7 points in 2022 and only 0.9 in 2023. International prices were the main factor underlying this impact.

The extraordinary increase in the price of commodities and manufactured goods prices has been transmitted to consumer prices directly through the cost of imported consumer goods and indirectly because of their effects on intermediate costs for domestically produced goods and services, which were passed on supply prices. It is worth noticing that, since supply prices are measured by the value added deflator, from an accounting point of view the transmission of higher costs is primarily captured by profit margins over labour costs, which does not necessarily imply higher profits on total costs. Furthermore, the BIQM features a transmission of commodity costs that is asymmetric, with an increase in costs being fully transmitted (everything else being equal) to final prices and a decline in costs being passed-through only partially. This implies a relatively persistent impact of shocks to commodity prices. Indeed, while the bulk of the shock did materialize in the 2021-22, indirect effects on supply prices materialized with a lag and reached their peak in 2023.

The effects of unexpected developments in foreign demand were limited and accounted for 0.3 percentage points of the increase in consumer prices and 0.5 percentage points for domestic prices in the three years.

Exchange and interest rates. – The impact of unexpected changes in exchange rates and interest rates was overall positive, and especially visible in 2023, when they contributed to consumer price inflation by 0.6 p.p. However, this channel masks two counteracting drivers. First, the monetary normalization in the euro area led to a strong increase in interest rates and, everything else being equal, would also have determined an appreciation of the exchange rate; according to our assessment, this would have mitigated

consumer price inflation by around 0.6 p.p. in 2022 and 1.1 p.p. in 2023.[11] Second, in the opposite direction for inflation, monetary normalization also took place abroad and, especially in the US, was overall stronger than in the euro area. This fact – together with other factors, such as different prospects for economic activity – resulted in a significant depreciation of the euro exchange rate, which was the dominant driver of the overall positive impact on inflation of this channel, reported in Table 2.

Fiscal measures. – We estimate that the overall impact of fiscal measures not yet announced at the beginning of 2021 (and thus not included in the projections released at that time) contributed to reduce inflation by more than 1 per cent in in 2021-22. Specifically, in the biennium 2021-22 the energy compensation measures helped to reduce inflation by about 2 percentage points: the downward impact was mainly due to the tax cuts on fuels and the network fees reduction on gas and electricity bills whose effects on inflation were only partially offset by other measures aimed at lifting aggregate demand. In 2023, the expiration of most energy support measures determined a counter shock that contributed to push up prices.

It is important to stress that the government implemented other indirect measures, in the form of tax credit, aimed at mitigating the increase in firms' energy costs. However, those measures, that amount roughly to 1.5 per cent of GDP, enter our simulations exclusively as a reduction of future direct taxes, which would, everything else being equal, increase firm's profits.[12]

Beyond these energy compensatory measures, fiscal policy indirectly contributed through measures aimed at raising domestic demand. The most prominent ones were the generous incentives for housing renovations (so-called "Superbonus" and "Bonus facciate"). Those measures, that according to the information available when the 2021 projections were finalised were set to expire in 2021, were repeatedly prolonged over the time period under examination, leading to a much stronger-than-expected increase in housing investment, with an overall positive impact on consumer prices (cumulatively by 0.5%).

Domestic demand. – Domestic demand pressures in excess of those already captured by higher foreign demand and more expansionary fiscal policy account for around 1.2 percentage points of real GDP and mostly reflect stronger consumption spending. Those pressures are estimated to have boosted domestic supply prices by around 1 percentage point and consumer prices by around 0.5 percentage points.

The results of the analysis overall suggest that most of the unexpected surprises on consumer price inflation reflected the corresponding surprises in the evolution of international prices, while the contribution from domestic demand pressures was overall limited. Fiscal and monetary policy helped containing the increase in inflation.

All in all, the surprises recorded along the channels of transmission that we have identified allow to explain most of the forecast errors recorded on both demand and supply prices, although in all cases their combined impact is quantified to be larger than that strictly necessary to explain the forecast errors. Indeed, when adding the impact of the various shocks to the figures reported in the January 2021 projection, all final price measures tend to grow more than actually recorded, thus giving rise to a negative residual. Overall, in cumulative terms the portion of error in the household consumption deflator that remains unexplained is negligible (-0.2 pp), but the pattern of consumer prices that the model would have predicted along the triennium – had the exogenous sources of inflationary pressures be known in advance

[11] The uncertainty on the impact of monetary policy is elevated. In this analysis, it depends on the specific assumptions adopted for assessing the consequences of increases in policy rates on long-term interest rates and exchange rates. Specifically, we used an expectation hypothesis to translate increases of short-term interest rates on long-term rates and a standard uncovered interest parity condition to quantify the impact on exchange rates.

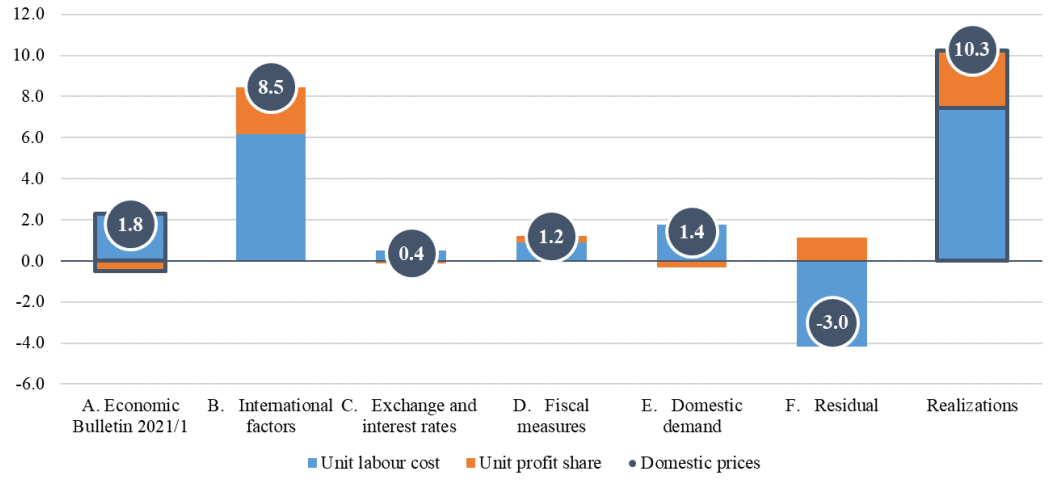
[12] The possibility that firms could transfer on final prices the reduction of energy costs associated to those measures cannot be ruled out. In that case, any negative impact on prices will merge to the residual component.

– is somewhat different from that actually recorded. Specifically, the model would have predicted somewhat higher inflation in 2021-22, followed by a more rapid disinflation in 2023. In terms of supply prices, the residual error for import prices is overall low (compared with the variability of these prices along the triennium), while it is larger for domestic prices.[13] Similar conclusions can be drawn on the main drivers of core inflation with some differences. As for headline inflation, international commodity prices played a major role; however, the effect of those drivers was gradual and still positive in 2023, because of the lagged transmission of foreign shocks, especially on energy prices, to the prices of other goods and of services.

Figure 6 decomposes the cumulative impact of the factors outlined above (including the residual) on domestic supply prices into that attributable to unit labour cost and unit profits. The negative residual is largely explained by unit labour costs, for which the model would have predicted a stronger increase had the exogenous shocks that occurred in 2021-23 been known in advance. Specifically, the model would have predicted a faster increase in wages, whose dynamics remained on the contrary fairly moderate compared with the size of the inflationary shock. Indeed, one notable feature of wage dynamics in Italy over the past years was the sluggish adjustment to the shock, which led to a sizeable decline in real wages. This reflected the institutional features of the Italian collective bargaining, which entails a relatively long duration of labour contracts and wage adjustment that tend to exclude increases in inflation that are due to imported energy prices. But it could also reflect specific features of the past triennium. One is related to the substantial delays recorded in wage renewals: over 2021-23 the average time with expired contracts per employee rose to above 12 months in the private sector, from less than 9 months on average in the 2015-2019 period. Another factor that could explain the slow adjustment of wages to inflation might be related to the difficulties, which were generalized across institutional and private forecasters, in predicting the extent of the rise in inflation at the time of wage renewals and the correspondingly slow catching up of inflation forecasts with actual developments.[14]

Figure 6 – Cumulated contribution of domestic prices' components over the period 2021-23

(percentage points)



[13] The gap between the negative residuals for supply prices and the nil residual for consumer price inflation is largely explained by the contribution of net indirect taxes, which is affected by the energy compensatory measures.

[14] For instance, in 2021 the forecasts of the inflation rate of the HICP net of imported energy, which is the reference rate for wage adjustment in the Italian collective bargaining, were 0.5%, 1.0% and 1.2% for 2024-25-26, against realized rates of 0.7, 6.6 and 6.9% for the three years respectively. For a detailed report on forecast errors on the HICP net of imported energy in the 2020-23, see https://www.istat.it/comunicato-stampa/ipca-al-netto-degli-energetici-importati-scostamenti-2020-2023-e-previsioni-2024-2027/.

VI. Concluding remarks

Overall, the analysis suggests that the large forecast errors on consumer price inflation in 2021-23 can be largely explained in terms of the economic relationships described in the Bank of Italy econometric model. The errors are mostly related to the surprises in the exogenous variables, in particular international prices, and only to a minor extent to unexpected developments of domestic demand.

Fiscal policy measure helped to mitigate the effects of the spike in energy prices, and monetary policy contributed to dampen inflation, especially in 2023.

The increase in domestic supply prices however turned out to be lower than predicted by the model under the large inflationary shocks occurred during the biennium 2021-22. This largely reflects an adjustment of private sector wages which has been slower than it would have been suggested by past regularities.

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