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Quarterly Report on the Euro Area

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Economic and Financial Affairs

The **Quarterly Report on the Euro Area** is written by staff of the Directorate-General for Economic and Financial Affairs. It is intended to contribute to a better understanding of economic developments in the euro area and to improve the quality of the public debate surrounding the area's economic policy.

The Report is released every quarter of the year.

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Quarterly Report on the Euro Area

Volume 22, No 2 (2023)

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Boxes

The euro area economies have demonstrated resilience in a challenging global context. GDP grew by 3.5% in 2022, underpinned by a record strong labour market. The Spring Economic Forecast published on 15 May projects real GDP growth in the euro area to slow down to 1.1% in 2023 and then rebound to 1.6% in 2024. Admittedly, recent signals are more mixed, with early data for Q1 looking slightly negative. However, current data still indicate that the contraction over the winter months was shallow and job creation in the first quarter continued at a solid pace. The unemployment rate was at a record low in May.

The Spring Economic Forecast projects headline inflation in the euro area to ease from 8.4% in 2022 to 5.7% in 2023 and to 2.6% in 2024, largely on the back of a correction to energy prices. Consistent with this forecast, in June, headline inflation in the euro area slowed to 5.5%, the lowest rate in 17 months. Underlying inflationary pressures have also abated somewhat, with core inflation (measured as headline inflation without energy and unprocessed food prices) easing for the third month in a row to below 7% in May and June. Clearly, however, the process to bring inflation down still has a long way to go. We will update the outlook for GDP and inflation in the euro area later this summer.

The historically high inflation levels related to energy and food price increases have been accompanied by a sharp and unseen widening differences between inflation levels across euro area countries. The previous issue of the Quarterly Report on the Euro Area (QREA) focused on the unequal social impact across income quintiles of this inflation increase. Chapter I of this issue of the QREA looks at why inflation rates have differed so much across euro area countries and discusses the potential implications. It shows that global factors, essentially commodity prices and supply disruptions, explain the largest share of the differences in inflation levels. While these global shocks were highly synchronised, structural differences in income and spending patterns across euro area countries have resulted in a very uneven incidence of the shock. As the impact of global drivers fades, national levels of inflation is progressively driven by domestic, country-specific factors. Workers' and firms' efforts to protect purchasing power and profits by raising wages or prices are likely be reflected in more differences to inflation levels. Inflation persistence at national level, depending on domestic institutions, such as wage or price indexation mechanisms, or the tempering effect of income support to shore up real income levels, could prolong the asymmetric inflation patterns across the euro area. Protracted differences to the level of inflation could become the source of costly macroeconomic imbalances within the euro area.

Given the role played by global factors in inflation, Chapter II of this issue of the QREA focuses on how wholesale prices pass through to retail prices on EU electricity and gas markets. The chapter starts by describing the differences between wholesale and retail prices (the price consumers pay for electricity and gas) on electricity and gas in the EU Member States, following the gas supply constraints that resulted from Russia's invasion of Ukraine. Although wholesale prices of electricity and gas rose sharply in all Member States, retail prices differed widely across Member States. The chapter shows that the peak of wholesale electricity prices – the EU average peaked at over EUR 400/MWh in summer 2022 – was followed by an average increase in peak retail prices equal to almost half the increase in the wholesale price. The average pass-through to retail gas prices was very similar. There were wide differences across Member States as the peak in retail electricity prices corresponded to between -1% and 135% of the wholesale price peak, and they appeared after different time lags. Again, the figures were similar for gas prices. The analysis indicates multiple explanations for the differences. First, it stresses the role of government action, with Member States implementing different levels of consumer protection via regulated prices or adjustments to taxes, levies and network charges. Second, it highlights the role of market specificities, as different levels of competition have different levels of impact on the pass-through. Finally, the speed of transmission from wholesale to retail prices depends on the share and types of fixed-price contracts.

Soaring energy costs affected not only consumers but also the European corporate sector. Chapter III of this issue analyses the sectoral differences of the impact of the energy price hikes on firms' production costs and balance sheets. Simulations of a hypothetical worst-case scenario in which firms absorb all cost increases and do not adjust final prices indicate that, on aggregate, the increase in the share of financially vulnerable firms due to the energy shock is similar to the one associated with the COVID-19 pandemic. However, different sectors are affected by the two shocks. This time, energy-intensive manufacturing and service industries were the sectors most affected by the high energy prices. The chapter also shows that the impact of higher energy costs has been mitigated by two factors. First, firms were generally able to charge higher final prices, including in less energy-intensive sectors, and this absorbed at least part of the cost increase. Second, government support helped cushion the impact of higher energy prices. As fiscal interventions raise issues in terms of fiscal costs, incentives to pursue climate goals, and the level playing field, our analysis provides evidence in favour of phasing out current measures and moving to more targeted and temporary measures.

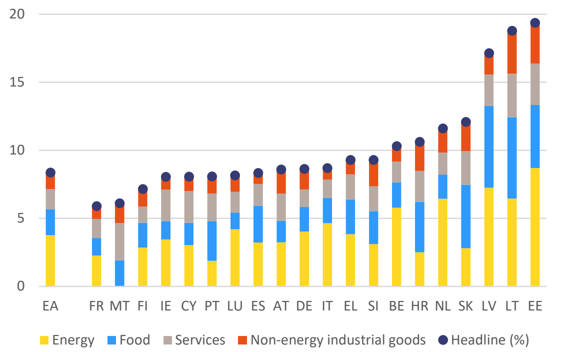
I. The great dispersion: euro area inflation differentials in the aftermath of the pandemic and the war

By Christian Buelens ([1])

Abstract: *Differences in inflation levels between euro area countries have risen sharply to previously unseen levels. This has come alongside the recent surge in inflation in the euro area following the pandemic and the energy price shock triggered by Russia's aggression of Ukraine. This article reviews the recent evidence on why inflation rates have differed so much across countries and discusses the potential implications for the euro area. Most of the differences are attributed to global factors, essentially commodity prices and supply disruptions, that led to inflation patterns that were on the one hand highly synchronised, but on the other hand very uneven in magnitude, reflecting structural differences in energy intensity. As the impact of these factors gradually fades, the impact of domestic country-specific drivers of national inflation is now increasing. The extent of future dispersion in inflation will thus largely depend on households' and firms' efforts and ability to safeguard purchasing power and profits by raising wages or prices. If inflation persists at national level, it could give rise to asymmetric inflation patterns across the euro area, depending on domestic institutions such as wage or price indexation mechanisms, or the tempering effect of income support provided in response to the various real income shocks on wages. Persistent and significant asymmetries could give rise to costly macroeconomic imbalances.*

I.1. Introduction

Graph I.1: **Inflation by euro area country, 2022**



Source: Eurostat, own calculations

The recent historical surge in euro area inflation has attracted considerable attention and has been a source of preoccupation for euro area citizens and policymakers alike. Their counterparts in other advanced economies share similar concerns about high inflation. However, in a monetary union, such as the euro area, it is also natural to ask whether inflation in some countries is higher than in others and, if so, why and what it could mean. Indeed, alongside aggregate inflation, inflation differentials have also recently widened to previously unseen levels (Graph I.1). The underlying factors and potential implications are discussed below.

I.2. Are inflation differentials in a monetary union a problem?

In a monetary union such as the euro area, it is natural to focus on the area-wide inflation rate, which is the target of the single monetary policy. But different levels of inflation across constituent parts of monetary unions are a natural phenomenon, in particular the larger and more heterogeneous they are (see Box I.1) ([2]). They are natural for several reasons ([3]): structural differences, for example because regions specialise in different sectors of the economy; differences in their regulatory environments; or population differences in terms of people's preferences or income levels. The resulting differences in regional supply- and demand-side factors behind price formation, and related to this, the potential asymmetric impact of union-wide shocks, explain why price levels and price dynamics may differ across a monetary union ([4]).

([1]) I wish to thank Leonor Coutinho, Sven Langedijk, Mirko Licchetta, Eric Ruscher, Matteo Salto and Przemek Wozniak for useful comments and discussions. This section represents the authors' views and not necessarily those of the European Commission.

([2]) That said inflation differentials are not limited to large economic areas. Recent analysis shows that inflation cycles and pricing behaviour across five cities in Lithuania – a country with about 2.9 million inhabitants and accounting for about 0.4% of euro area GDP in the first quarter of 2023 – also still lack full synchronisation (Cevik S. (2022). Mind the Gap: City-Level Inflation Synchronization. IMF Working Paper WP/22/166).

([3]) For a literature review on inflation differentials see Coutinho and Licchetta (2023, forthcoming). Inflation differentials and energy dependency in the EU Directorate General Economic and Financial Affairs (DG ECFIN), European Commission

([4]) The HICP tracks prices over time in a country but does not appraise differences in price levels across countries, which can be substantial.

Although differences in inflation levels are a natural occurrence, they matter in any monetary union composed of different regions. They have consequences for policy and ultimately for the cohesion and social welfare across regions. With a single monetary policy, different regional inflation rates mean that real interest rates diverge, and that monetary policy will affect demand across the monetary union in different ways.

Literature on the optimum currency area (5) indicates that the more heterogeneous the constituent regions are, as captured by dissimilar inflation dynamics, the less optimal the currency area is, unless other mechanisms are used to correct asymmetries and internal imbalances, such as intra-regional fiscal transfers, labour mobility or structural agility. The latter notably depend on the degree of nominal and real rigidities in product and labour markets. If the level of rigidities is low, a region will react to a negative demand shock by reducing prices and wages relative to the rest of the monetary union, thereby stimulating net exports and activity. In that case, different levels of inflation would indicate the functioning of a correction mechanism.

The ability to correct for structural and cyclical heterogeneity is crucial because monetary policy is inherently not able – and consequently not designed - to react to regional disparities. Monetary policy must instead be set for the union as a whole. The necessary focus on the 'average picture', however, could risk delivering a policy that is inadequate for each individual constituent region.

Different levels of inflation within monetary unions mean that cross-regional relative prices change, i.e., the inter-regional real exchange rates fluctuate (6). They also indicate that the cost of living – and possibly the costs of production – evolves at different rhythms. The implications of such changes depend on underlying factors and initial price-level differences. Productivity convergence in the tradable sectors would explain, for example, why catching-up regions may experience higher inflation, a phenomenon known as the Balassa-Samuelson effect. Essentially, price equalisation for traded goods on international markets and wage equalisation across domestic sectors (producing traded and non-traded goods, respectively) mean higher prices for non-tradable items in countries with higher productivity levels in the traded good sector. So, productivity convergence will lead to higher prices in the non-traded sectors in the converging region, typically over the longer term. Inflation differentials would then be a 'benign' by-product of convergence. By contrast, local price (and cost) increases that are not driven by productivity convergence imply a drop in price competitiveness. Even short-term inflation differentials may therefore have lasting implications by facilitating the emergence of macroeconomic imbalances that may be destabilising, and costly to correct.

I.3. The euro area: united in heterogeneity

As noted above, all monetary unions are to some extent characterised by cyclical and structural differences between their constituent regions. The euro area, in which 'heterogeneity is part of the DNA' (7) and where fiscal and other economic policies are mostly decentralised, is clearly no exception. Differences are evident in terms of sectoral structures, income levels, social safety nets, public and private debt levels, regulation, etc. They are even more pronounced in terms of cultural characteristics such as languages, or preferences, including attention and attitudes to inflation. After all, in the euro area, monetary policy and central bank traditions were still national not so long ago.

(5) See Mundell, R. A. (1961), A theory of optimum currency areas, *The American Economic Review*, 51(4), 657-665.
(6) The common currency implies that nominal exchange adjustments are not possible.
(7) Cœuré, B. (2019). Heterogeneity and the ECB's monetary policy, Speech 29 March 2019

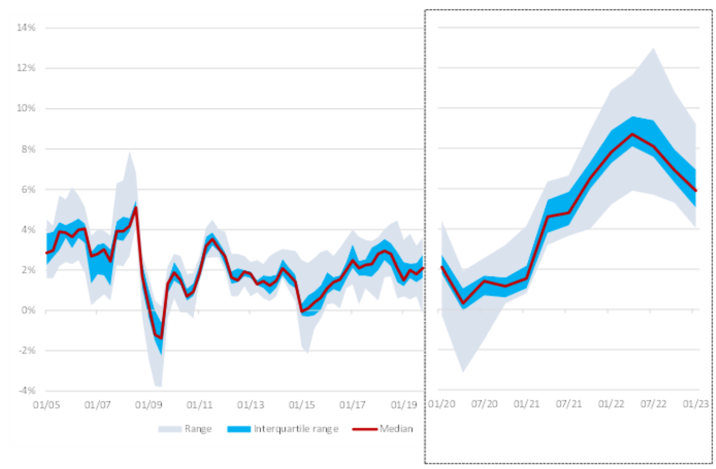
Box I.1: **Inflation differentials across US metropolitan areas**

Inflation differentials are not an exclusive characteristic of the euro area; they are also a natural feature in other monetary unions, such as the United States. ([1]) This box looks at inflation differentials across US metropolitan areas. Graph A shows that the overall US inflation pattern during the pandemic was very similar to that of the euro area, although the relative contribution of the different drivers varies, reflecting different designs in the policy support provided during the pandemic and levels of exposure to the energy shock. ([2]) After a disinflationary period at the outset of the pandemic, inflation rapidly picked up to a multi-decade peak in the second half of 2022 before easing, also in a context of monetary policy tightening by the Federal Reserve.

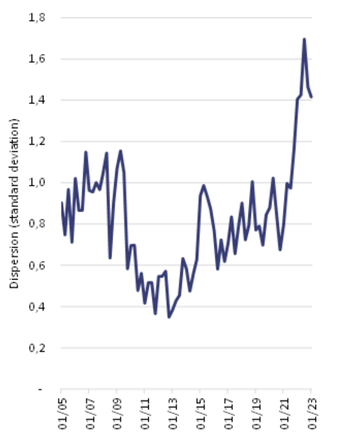
Inflation in the metropolitan areas followed this pattern but there were differences in inflation levels. For example, in Phoenix-Mesa-Scottsdale (Arizona), inflation peaked at 13% in Q3 2022, while in San Francisco-Oakland-Hayward (California), inflation peaked at 5.9% in Q2 2022. These ranges are not as extreme as in the euro area and no US metropolitan areas are outliers as the Baltic countries are in the euro area.

Comparisons between euro area and US inflation dispersion have limitations as measurement may differ, e.g. regarding the inclusion of housing in the price index. Housing inflation appears to be the key driver of inflation differentials across metro areas in both geographies. ([3]) That said, inflation dispersion also clearly picked up and reached new highs (Graph B). Like in the euro area, inflation dispersion seems to increase as inflation rises or when there are abrupt changes to inflation, as happened following the global financial crisis in 2009.

Graph A: **Inflation range, US metropolitan areas**



Graph B: **Inflation dispersion, US metropolitan areas**



Notes: Bands show range (grey) and interquartile (blue) range across US metropolitan areas. The red line shows median inflation. The analysis is based on 23 US metropolitan areas. Last observation: Q1 2023.
Source: Bureau of Labor Statistics, own calculations.

([1]) Gupta and McGranahan (2023), *What is driving the differences in inflation across U.S. regions?* Chicago FedLetter May 2023, Number 478.
([2]) Ball et al (2022), *Understanding U.S. Inflation During the COVID Era*, IMF Working Paper WP/22/208.
([3]) Gascon and Fuller (2022), Variations in Inflation across U.S. Metro Areas, Federal Reserve Bank of St. Louis, 1 December 2022.

Heterogeneity does not need to be a 'bad' characteristic *per se*. It can reflect the situation that risks are diversified and the economies are complementary, which in aggregate has the potential effect of making the monetary union more resilient to external shocks. However, this is conditional on there being risk-sharing mechanisms in the form of fiscal transfers, integrated capital markets, a high adjustment capacity or a high degree of factor mobility. Otherwise, common shocks will have asymmetric effects with potentially lasting adverse consequences (see above).

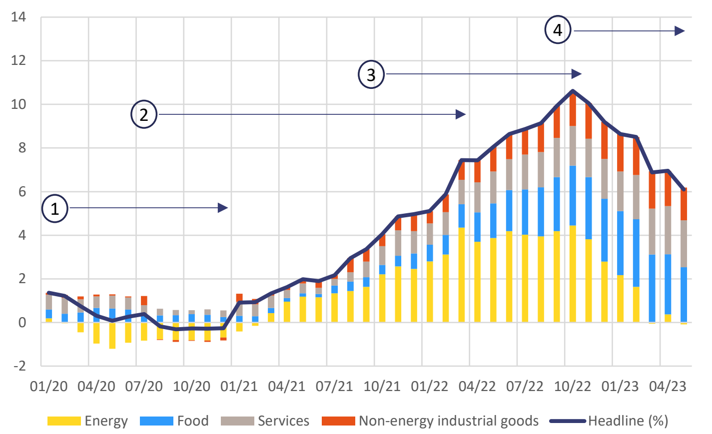
Inflation differentials resulting from a common external shock are hence primarily symptoms of underlying heterogeneities. While real and cyclical convergence may be an outcome of closer economic integration (8), it is not an automatic consequence of joining a monetary union and will depend on policies implemented in its regions (9). In the euro area, the principle of monetary dominance requires that other, predominantly national, policy domains support and complement the ECB's euro area mandate to maintain price stability, by reducing nominal and real rigidities and being fiscally prudent (10).

I.4. The four phases of euro area inflation since 2020

I.4.1. Inflation in the euro area

The two defining global events of the past 3 years – the COVID-19 pandemic and Russia's aggression of Ukraine – have had a fundamental impact on worldwide inflation patterns (11). The unprecedented and extraordinary inflation developments recorded in all four corners of the world, including in the euro area, have been commensurate with the scale of the impact that these two events have had on global society and international politics. The aggregate euro area inflation path in the years since the outbreak of the pandemic, which stands in stark contrast to the low inflation years preceding the pandemic, can be split into four partly overlapping phases (Graph I.2) (12) as follows:

Graph I.2: **Euro area inflation in four phases, January 2020– May 2023**



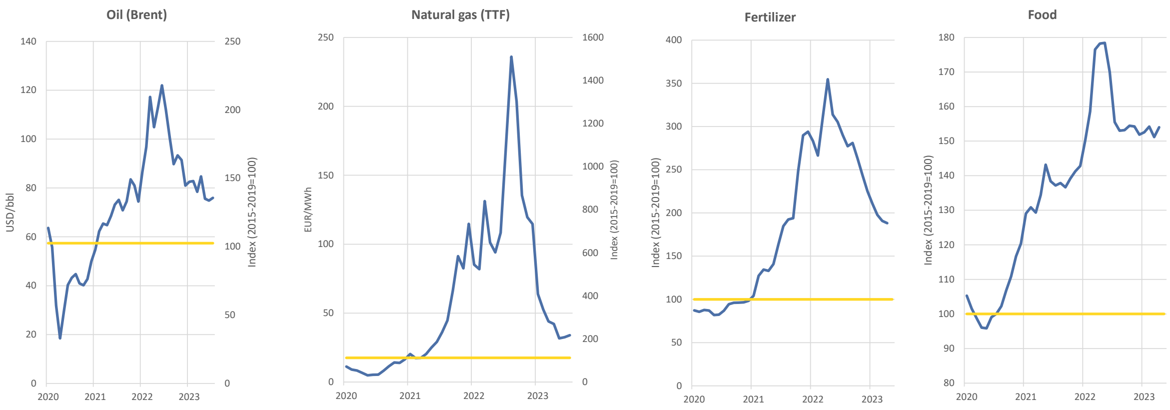
Note: The arrows indicate the four phases of inflation described in the text.
Source: Eurostat, own calculations

- The Great Lockdown phase, following the outbreak of COVID-19 in early 2020 and roughly spanning the remainder of that year, initially triggered an economic collapse accompanied by falling prices and inflation turning negative. The economic impact of the pandemic was uneven across euro area countries. It depended on the strength of the outbreak, the stringency of lockdowns, the extent of compensatory and job retention schemes for households and firms, and in particular the country's economic structure, with the share of contact-intensive sectors being a key scaling factor (13).

(8) Frankel, J. A., & Rose, A. K. (1998). The endogeneity of the optimum currency area criteria. Economic Journal, 108(449), 1009-1025.
(9) Even when convergence criteria are met, which is a formal requirement for joining the euro area, this is not a guarantee that the degree of convergence will be sustained.
(10) Cœuré, B. (2019). *op cit.*
(11) BIS (2022). Inflation: a look under the hood. Annual Economic Report June 2022.
(12) Buelens, C. and V. Zdarek (2022), Euro area inflation shaped by two years of COVID-19 pandemic, Quarterly Report on the Euro Area (QREA); Ascari et al. (2023), The Euro Area Great Inflation Surge, DNB Analyse.
(13) Buelens, C. (2021). Lockdown Policy Choices, Outcomes and the Value of Preparation Time A stylised model (No. 143). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

- The subsequent rebound phase was characterised by the combined effects of lockdowns and supply bottlenecks ([14]), and an unwavering and coordinated global fiscal and monetary policy response, implemented swiftly after the outbreak of the pandemic ([15]). While the primary aim of the lockdowns was to mitigate the spread of the virus, the primary aim of policy support was to prevent hysteresis effects resulting from stalled production by maintaining business viability and safeguarding jobs (via job retention schemes). The schemes also maintained income prospects and reduced the need for precautionary savings. The outlook brightened further with the arrival of COVID vaccines, which charted a credible path to exit the pandemic and move towards recovery. Mismatches between robust demand, rotating from services towards goods, and constrained supply, exacerbated by setbacks caused by new infection waves or lockdowns, led to a surprisingly vigorous acceleration in inflation as of early 2021. Euro area inflation matched the previous 2008 peak of 4.1% in October 2021 and continued to rise thereafter.

Graph I.3: **Selected commodity prices relative to pre-pandemic average, 2020-2023**



Note: Pre-pandemic average refers to the 2015-2019 period. Last observation: April (Food, Fertilizer), July (Oil, Natural Gas) 2023.
Source: IHS, World Bank, own calculations

- Commodity prices were already boosted by the strong recovery, before surging in the run-up to Russia's aggression of Ukraine that started in February 2022, reflecting the high global market shares of Ukraine and Russia for many commodities. The price surge was particularly pronounced for natural gas, which Russia started to withhold as from the second half of 2021. This led to prices surging in August 2022 by 14 times their pre-pandemic average, including prices of agricultural commodities (Graph I.3). Exposure and geographic proximity to Russia played a central role in this third inflation phase, both at global level (euro area versus other advanced economies) and in the euro area (countries bordering Russia or with stronger economic ties to Russia versus others), in determining the severity of the energy price shock. The surge in energy prices had both a direct impact on retail prices and an indirect cost effect on virtually all other items of spending. Energy inflation peaked at 44.3% in March 2022 and headline inflation peaked at 10.6% in October 2022. While commodity prices have since abated from these peaks, they all remain significantly above pre-pandemic levels (Graph I.3).

([14]) Celasun et al. (2022), *Supply Bottlenecks: Where, Why, How Much, and What Next?* IMF Working Paper 22/31, International Monetary Fund, Washington, DC.

([15]) In the euro area, this notably includes the ECB's launch of the pandemic emergency purchase programme (PEPP) and, for all EU member states, the Support to mitigate Unemployment Risks in an Emergency (SURE) programme and the Next Generation EU (NGEU) instrument to support the post-pandemic economic recovery.

Box I.2: **Stylised facts on inflation dispersion in the euro area**

Standard measures of regional inflation dispersion, such as the (interquartile)-range or standard deviation do not control for inflation at area level. This box examines the statistical relationship between inflation dispersion across the euro area, and the level and volatility of headline inflation of the euro area. The main aim is to detect empirical regularities based on the following regression model:

$$\sigma_t^{ea} = c + \beta_1 \sigma_{t-1}^{ea} + \beta_2 \pi_{t-1}^{ea} + \beta_3 Vol_{t-1}^{\pi\_ea}$$

where σ_t^{ea} refers to inflation dispersion measured by the standard deviation of national inflation rates (variable euro area composition), π_t^{ea} refers to year-on-year euro area headline inflation and $Vol_t^{\pi\_ea}$ is inflation volatility measured as the rolling 12-month standard deviation of euro area inflation. The sample ranges from January 1997 to April 2023. The regressions are also run over a restricted sample ending before the pandemic.

Table A: Regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full sample				Pre-pandemic sample			
Inflation (lagged)	0.37***		0.24***	0.03***	0.04**		0.06***	0.01+
	(28.37)		(20.51)	(4.32)	(3.07)		(5.08)	(1.71)
Volatility (lagged)		1.64***	0.96***	0.20***		0.31***	0.36***	0.07*
		(25.37)	(18.09)	(6.27)		(6.20)	(7.47)	(2.24)
Dispersion (lagged)				0.86***				0.83***
				(36.21)				(24.74)
Constant	0.37***	0.39***	0.21***	0.01	0.85***	0.81***	0.68***	0.11***
	(11.09)	(10.36)	(8.13)	(1.19)	(33.81)	(39.71)	(21.93)	(3.74)
R-squared	0.72	0.68	0.87	0.98	0.03	0.13	0.21	0.76
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	315	303	303	303	275	263	263	263

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Notes: Dependent variable is inflation dispersion measured by the standard deviation of national inflation rates (variable euro area composition).
Source: Eurostat, own calculations

The results are shown in Table A. Three broad findings emerge. The first is that inflation dispersion increases as the level of inflation rises, i.e. the higher inflation is in the euro area, the higher the rate of dispersion. This has been visible in 2008 and 2022. It suggests that the drivers of inflation and intra-euro area inflation dispersion are likely to be the same. Secondly, inflation dispersion increases in inflation volatility. This has been visible in the aftermath of the financial crisis, at the outset of the euro area sovereign debt crisis in 2009 and 2010, and again in 2022. This suggests that rigidities differ across countries. Even similar adjustments to a common shock would generate inflation differentials if the pace of adjustment differed. Thirdly, inflation dispersion is persistent, a characteristic that in general applies to the inflation rate too.

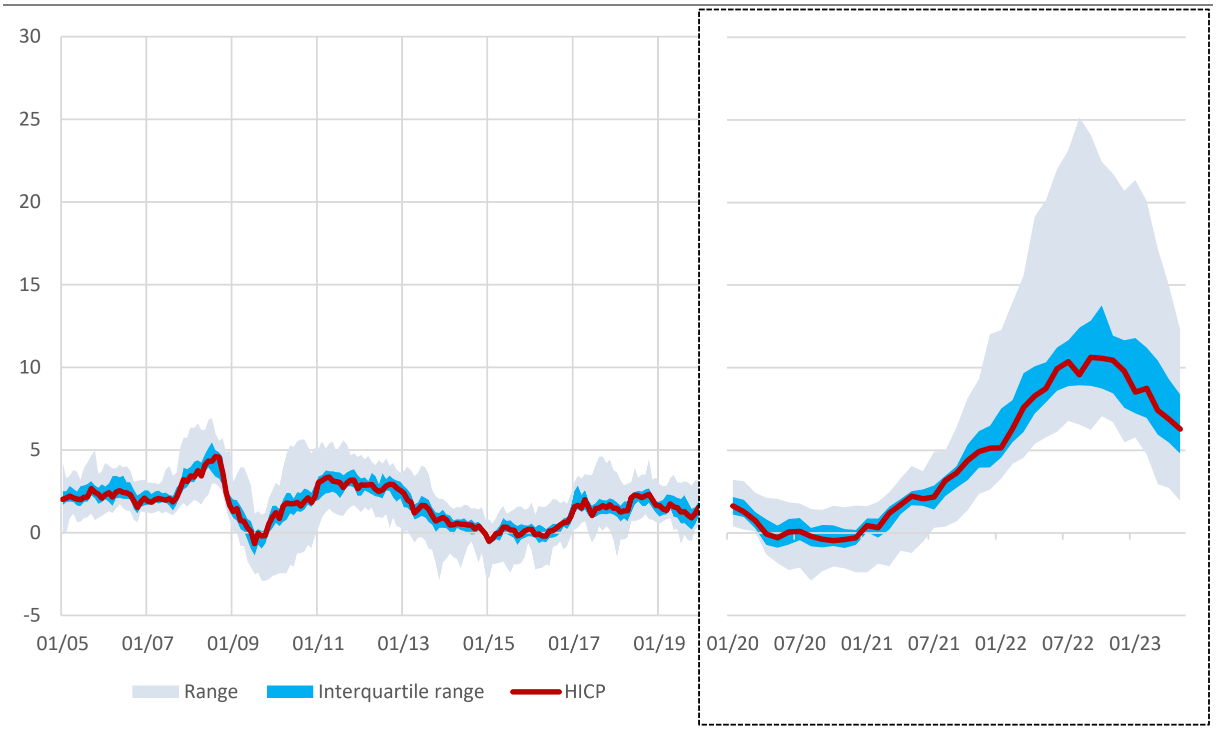
These stylised facts became more pronounced with the pandemic, but they are also reflected in the restricted sample of pre-pandemic data. Generally speaking, the coefficients on inflation level and volatility are significant when including lagged dispersion. This applies to the pre-pandemic sample too, although with a lower confidence level.

- The fourth phase, which began after inflation peaked and is ongoing at the time of writing, is characterised by the broadening of inflation across consumption categories an improvement in terms of trade and the eventual fading of energy as the main headline inflation driver. This reflects the fact that the direct effects of the energy commodity price shock are fading out and the indirect effects, which typically come in after a time lag, are becoming apparent. A second related characteristic is the inflation drivers ([16]). This is partly a consequence of strong and often untargeted policy support to help households and firms manage the fallout of the energy price shock, which shores up aggregate demand. It is also a result of efforts by households and firms to offset past drops in purchasing power or profit margins by negotiating higher wages or setting higher prices. Inflation has progressively fallen from its October 2022 peak to 6.1% in May 2023 but it remains high, with the risk of falling only slowly.

I.4.2. Inflation at national level

Given the pervasiveness of the global shocks and coordination of policy responses, national inflation patterns also follow these four phases in euro area inflation dynamics. Inflation soared to multi-decade highs in all countries, initially fuelled by the recovery following the first wave of the pandemic and later by energy and other commodity prices. The inflation peaks seen in different countries were, however, very far apart. The lowest peak was seen in France at 7.3% in February 2023 and the highest peak at 25.2% in Estonia in August 2022. Together with the two other Baltic countries, Latvia and Lithuania, Estonia has been a consistent outlier, recording inflation rates above 20% for a large part of 2022.

Graph I.4: **Inflation range across euro area countries (%), January 2005 – May 2023**



Note: Bands show range (grey) and interquartile (blue) range across euro area Member States (variable composition). The red line shows median inflation.
Source: Eurostat, own calculations

Inflation differentials remained in their historic range during the pandemic and for most of the recovery (Graph I.4 and Graph I.5). Large differences mostly appeared in the second of the four phases identified above. Although different fiscal responses and other government policies to respond to the pandemic have affected national inflation dynamics during the first phase (e.g. temporary changes in value added tax rates or shifts in seasonal sales periods), the asymmetries started to become visible around the fourth quarter of 2021 and during the run-up to Russia's aggression of Ukraine.

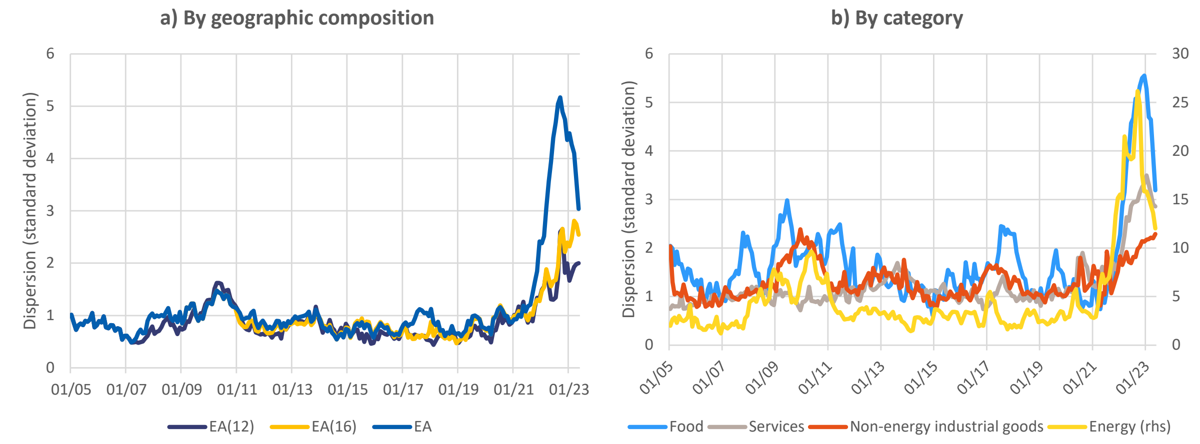
([16]) Binici, M. et al. (2022), Here Comes the Change: The Role of Global and Domestic Factors in Post-Pandemic Inflation in Europe, IMF Working Papers, 2022(241).

This fits with the stylised empirical regularities that characterise inflation dispersion, i.e. it increases both with the level and the volatility of euro area inflation (see Box I.2). In line with this, inflation differentials have narrowed again since euro area inflation passed its peak, but they nonetheless remain high.

Headline inflation dispersion has been primarily driven by dispersion in energy inflation (Graph I.5), which has been particularly pronounced. The range between the lowest and highest national energy inflation rate exceeded 100 percentage points over the summer of 2022. Nevertheless, inflation dispersion has spread across the consumption basket and has been clearly visible in inflation differentials in food and services. Their dispersion levels represent only a fraction of the energy equivalent but here too differentials have surged to unprecedented levels. While this is likely to partly reflect the indirect effect of different energy prices on firms' production costs, it may also indicate other sources of divergence, such as domestic wage and markups or the pace of reopening.

The structural nature of many of the current shocks means that they primarily affect price levels. The effects of the repricing process on inflation should therefore be transitory. Consequently, inflation differentials should fade once the new costs are priced in. Indeed, dispersion appears to have peaked around the turn of the year in all categories. Only manufactured goods, which were particularly hard hit by supply bottlenecks, are an outlier from the other categories. Although the inflation differentials for manufactured goods picked up, they have remained within their historical range. A possible explanation is that in the single market, arbitrage opportunities for goods, in particular, may ultimately limit price differences beyond what can be justified by structural cost differences, such as transport or local costs (taxes or administrative), or market barriers.

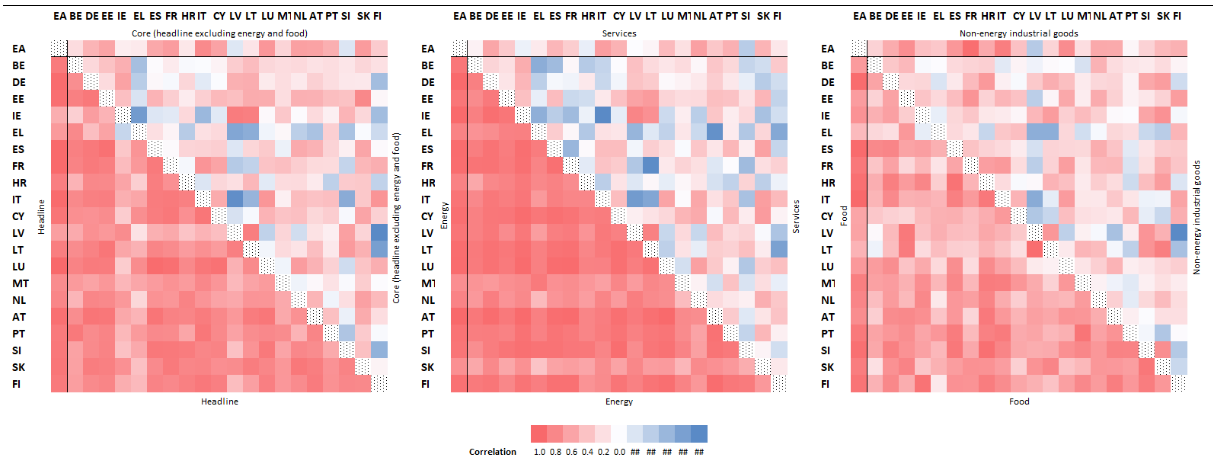
Graph I.5: **Inflation dispersion in the euro area, January 2005-May 2023**



Note: (1) In panel a), EA shows the euro area in variable composition. EA(16) corresponds to the current composition, excluding the Baltic countries and Croatia. EA (12) corresponds to the original euro area configuration (including Greece). Panel b), shows the euro area in variable composition.
Source: Source: Eurostat, own calculations

Graph I.6 shows the synchronisation of inflation across euro area countries in the decade before the pandemic. It is measured by the inflation correlation for each country pair (with red and blue squares indicating whether the correlation is positive or negative). The first block highlights the contrast between the correlation of headline and core inflation (headline inflation excluding energy and food) among euro area countries, which indicates that idiosyncratic factors are driving core inflation. Looking at aggregates of the main consumption categories, the level of inflation synchronisation (correlation) is indeed highest for energy, reflecting the rapid pass-through of crude oil prices in particular. It is somewhat lower for food, where domestic costs, spending habits or production (including weather) conditions are likely to play a bigger role. Global commodity prices are hence key common factors of inflation in the 'non-core' categories. Meanwhile for services, and to a lesser extent for manufactured items, inflation among country pairs often moves in opposite directions (as evidenced by the high prevalence of blue squares). Again, this highlights the important role played by domestic economic fundamentals in driving the price of services.

Graph I.6: **Cross-country synchronisation of inflation, January 2010-February 2020**



Note: Red (blue) marks a positive (negative) correlation between inflation for each country pair. The depth of colour increases in the strength of correlation, i.e., two inflation series are more likely to move up and down at the same time (albeit possibly to different levels). The lower and upper triangles refer to different aggregates. The left column and upper row show the inflation correlation between a country and the euro area aggregate.
Source: Eurostat, own calculations

I.5. The drivers behind dispersion

The analysis above indicates that a high degree of inflation synchronisation and high inflation dispersion are not mutually incompatible. Indeed, the categories with the strongest inflation co-movement across countries (energy and food) are also those that contributed most to the great inflation dispersion. The reconciling driver therefore seems to be underlying heterogeneities across euro area countries leading to an asymmetric pass-through of common inflation drivers, despite prices moving in the same direction.

I.5.1. Euro area composition

To some extent, the great dispersion documented above may be driven by inflation in only a few outlier countries. Graph I.5 (panel a) confirms that a high share of the increase in euro area inflation dispersion is the result of a composition effect brought by successive enlargements of the euro area, notably to the three Baltic countries. Estonia (2011), Latvia (2014) and Lithuania (2015) account for the lion's share of the increase in dispersion. This indicates the important role of geography in the fallout of the war. These are also countries with lower per capita income than the euro area average (Graph I.7, panel a) and which, together with Slovakia, also have the highest share of non-core components (energy and food) in their consumption baskets. This makes national inflation structurally more sensitive to (external) commodity price shocks (see next sub-section). However, the recent euro area inflation dispersion is not simply a 'Baltic story'. The level of dispersion among the twelve countries already in the euro area in 2005 also reached new highs in 2022, exceeding its previous peak reached during the euro area sovereign crisis in April 2010.

I.5.2. Income heterogeneity

Income heterogeneity in the euro area is considerable, with the highest GDP per capita (Luxembourg) more than six times higher than the lowest (Latvia). This divergence matters for spending patterns, as can be illustrated by cross-country Engel curves, which relate income level to the proportion of income spent on a given item. Engel curves for food and energy are shown in Graph I.7, which uses GDP per capita and weights in the HICP consumption basket as proxies for income and expenditure share. The distribution of food consumption weights closely follows Engel's law, which suggests that the share of food expenditure falls as income rises. There is a similar negative relationship for energy, another necessary good ([17]).

The high income dispersion across euro area countries thus entails considerable variation in the composition of national consumption baskets. The combined weight of energy and food (excluding alcohol and tobacco) ranges from 21.6% in Austria to 45.4% in Latvia. That implies that even a similar change in food and energy prices – in response to a common shock in food commodities or energy, say – would mechanically have a larger effect on headline inflation in countries with lower income levels ([18]). Different spending patterns resulting from structural income differences thus imply that common shocks have very different effects on the cost of living. Since food and energy prices are traditionally volatile ([19]) and dependent on commodity prices set on international markets, another upshot is that the countries with lower income per capita are likely to experience more volatile inflation. Large movements in commodity prices and divergent income levels should thus naturally give rise to inflation differentials. This is consistent with the findings that global factors have an asymmetric effect on domestic prices that is higher in eastern European countries ([20]).

Graph I.7 (panel b) illustrates the implications of different national weights in the HICP composition by breaking down the difference in the effect of energy and food prices on headline inflation between individual countries and the euro area aggregate, into a weight and a price effect. It shows that in 2022, the energy contribution to headline inflation in the Baltic countries exceeded the euro area aggregate both due to a higher share of spending and higher price growth. At the other extreme, headline inflation in France, Portugal and Malta ([21]) was limited both by the lower weight and lower price increase relative to the euro area aggregate. Likewise, food prices significantly pushed up headline inflation in the Baltic countries and Slovakia, in particular, both due to the higher weight in overall spending and to stronger price increases.

I.5.3. National markets, policy support and non-linear pass-through effects of costs

Different spending patterns (weights) are only a partial explanation for the differences in headline inflation. So why were actual price changes so different across countries?

Differences in the energy production mix are one explanation. Energy firms in countries that rely less on natural gas from Russia, or have a higher share of renewables, generally face lower cost increases. Furthermore, retail prices include distribution costs, taxes, market (and price) regulation as well as profit margins, which depend on factors that are mostly determined nationally ([22]). The higher these additional price factors, the lower the actual 'commodity content' of the retail product and as a result, a lower pass-through effect can be expected.

National inflation patterns have also been affected by national policy measures taken to mitigate the impact of the energy shock for households and firms. Governments have implemented a wide-ranging set of measures in response to the energy price shock and the 'cost of living' crisis more broadly ([23]). These measures have often substantially affected national price and inflation dynamics, depending on how each measure is designed. They have included incentives to reduce energy consumption, changes to the price-setting mechanism or transfers to households, in particular vulnerable ones, and to firms under financial pressure as a result of the energy crisis, enabled by the Temporary Crisis Framework of State Aid measures ([24]). Through their effect on supply and demand patterns, the impact of the measures on prices

([17]) Countries with high energy weights typically also have high energy intensity (Coutinho and Licchetta, 2023 (forthcoming), *op cit.*).
([18]) Similar distributional effects also hold for households.
([19]) They are often excluded from headline inflation to obtain measures of underlying inflation.
([20]) Baba C. et al. (2023). The Inflation Surge in Europe. IMF Working Paper No. WP/23/30. Washington DC; Coutinho and Licchetta, 2023 (forthcoming), *op cit.*
([21]) Energy inflation in Malta was 0%, a consequence of a long-term fixed-price contract for liquefied natural gas.
([22]) Hernnäs et al. (2023), *Pass-through in EU electricity and gas markets*, Quarterly Report on the Euro Area (QREA).
([23]) Note that many governments have tackled the costs of living more broadly and policies to cushion the impact of the energy price shock have also focused on other expenditure items, such as transport or housing.
([24]) Communication from the Commission of 24 March 2022 – Temporary Crisis Framework for State Aid measures to support the economy following the aggression against Ukraine by Russia (2022/C 131 I/01). The Framework has subsequently been amended and prolonged.

over time may be more or less direct, depending on their design and duration ([25]). Direct interventions in the pricing mechanism, e.g. price reductions by reducing energy taxes or limiting price increases, have significantly reduced the sectoral contribution to inflation in some countries ([26]). While such measures limit inflation in the short term, they however mute price signals, thereby decreasing the speed of structural adjustment and prolonging the period of repricing. Depending on their design, that may also lead to delayed price increases ([27]). By contrast, broad-based lump-sum transfers, which support disposable income have a less distortive impact on relative prices. But they do have income or wealth effects (as do price-based measures), which shore up aggregate demand and add to general price pressures. The more targeted the transfers, the less pronounced these effects are. The impact of national measures on inflation differentials within the euro area is *a priori* ambiguous and depends on the types of measures taken and their timing.

Graph I.7: **Impact of income and weight differentials on inflation dispersion**

Note: In panel a) GDP for Ireland is replaced by Modified Gross National Income. In panel b), the percentage point contribution to headline inflation by item i in country c is approximated as $pp_i^c \approx \pi_i^c w_i^c = (\pi_i^{ea} + \Delta^{c-ea}\pi_i)(w_i^{ea} + \Delta^{c-ea}w_i)$, where w_i^c is the average weight of item i in 2021 and 2022. is the difference operator between a country and a euro area variable. This expression can be rewritten as $pp_i^c - pp_i^{ea} = \pi_i^{ea}\Delta^{c-ea}w_i + w_i^{ea}\Delta^{c-ea}\pi_i + \Delta^{c-ea}w_i\Delta^{c-ea}\pi_i$, i.e. the difference in the contribution to headline inflation in country c and the euro area is split into a weight effect, a price effect and a residual.
Source: Eurostat, own calculations

Finally, in a context of unusually large shocks, the price-setting behaviour of firms is likely to be different from behaviour in regular times. Large shocks may reveal non-linear effects in how costs are passed through to consumer prices, whereby the impact on the latter depends on the magnitude of the input cost increase. This may, for example, be the case if firms adjust prices whenever input cost changes exceed a certain threshold, hence accelerating the degree of pass-through ([28]). Even slight changes to input costs across countries or different thresholds may explain why common cost shocks would exacerbate inflation differentials. This would also be consistent with the stylised fact indicating that inflation dispersion generally increases as the rate of inflation rises.

I.6. Implications of the great inflation dispersion

I.6.1. Price level adjustments

Inflation differentials imply that relative national price levels change. The first panel of Graph I.8 displays national price levels for consumer goods and services relative to the euro area average. In 2021, Ireland

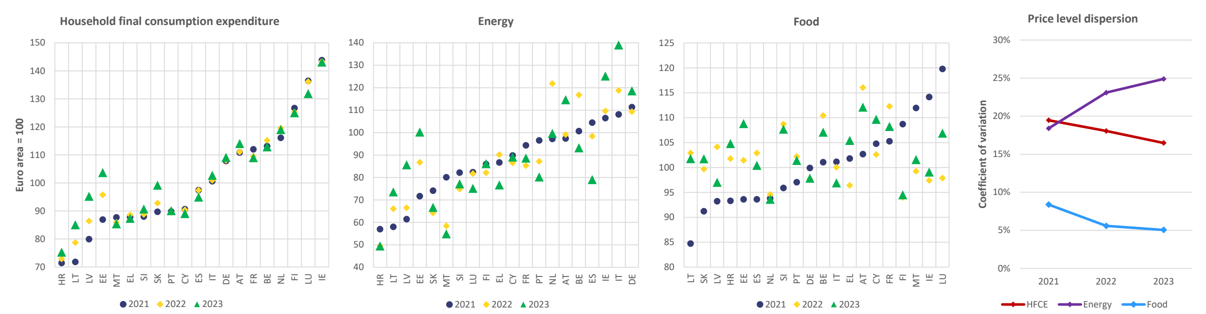
([25]) The price impact may also pose methodological challenges for statistical institutes (Eurostat, 2022, Treatment of energy prices compensation measures in the Harmonised Index of Consumer Prices (HICP)).
([26]) See for example: Insee, 2022, Insee Analyses No 75, September 2022; Banca d'Italia, 2023, Economic Bulletin No 1 - 2023; Banco de España,2022, Macroeconomic projections for Spain 2022-2025; Bundesbank, 2022, Monatsbericht Dezember 2022, December 2022.
([27]) For example, price caps only have an effect when they are binding. Price increases could only occur once a binding cap is lifted. The binding character in turn depends on the price fluctuations of the underlying commodity.
([28]) In such an environment, the role of adjustment costs ('menu costs'), which would otherwise be a factor of price stickiness, is less significant.

had the highest price level for household final consumption expenditure (44% above the euro area average) and the lowest was in Croatia ([29]) (29% below) and Latvia (28% below). As price level indices (PLI) for 2022 and 2023 are not available, they are extrapolated from the 2021 PLI based on HICP data. While the general price levels in the two polar countries – Croatia and Ireland – have remained stable relative to the euro area average, they rose sharply in the Baltic countries and Slovakia. The extrapolation exercise suggests that Estonia's price level, which in 2021 was 13% below the euro area average, exceeded it by 4% in April 2023. Relative price levels also moved significantly for individual items, such as energy and food (middle panels).

A consequence of the great inflation dispersion, which may seem counterintuitive at first, is that it appears to have fostered some convergence in overall consumer prices (fourth panel), at least temporarily. This also applies to categories such as food. Meanwhile, energy prices levels seem to have become more dispersed since 2021, but divergence metrics may be distorted by the (temporary) government measures taken that affected prices.

What is the upshot of this price level convergence? Essentially, price convergence in the absence of income (and productivity) convergence exacerbates inequalities in the cost of living across euro area countries. A resulting risk is that such inequalities potentially boost centrifugal forces of fragmentation. This could happen, for example, if pressure to offset past losses in purchasing power are commensurate to that loss and spill over to domestic production costs. Countries that have experienced higher inflation would consequently become less cost-competitive, and vice versa (see next sub-section). Inflation differentials would then also contribute to misalignments in countries' real effective exchange rates, as the latter would depart from the rates implied by country's economic fundamentals ([30]).

Graph I.8: **Comparative price levels across the euro area (extrapolated), 2021-2023**



Note: The price level indices (PLI) for 2022 and 2023 are extrapolated from the 2021 PLI based on annual HICP data in corresponding categories: $PLI_i^{2022} = PLI_i^{2021} \times \left(1 + \pi_i^{2022}/1 + \pi_{ea}^{2022}\right)$. Inflation in 2023 corresponds to the average annual inflation rates between January and April.
Source: Eurostat, own calculations

I.6.2. National cost patterns and risks of inflation dispersion persistence

A major general risk of high inflation periods - irrespective of what causes them in the first place and whether they originated in the labour market - is that inflation begets inflation, and that in the extreme, self-reinforcing dynamics generate so-called wage-price spirals ([31]). The current institutional framework, with an independent central bank pursuing an explicit inflation target that also provides an expectations anchor, is expected to be less permissive of the emergence of inflationary spirals than the framework used in the 1970s, the period to which they are typically associated. Also, since 2022, the ECB has decisively tightened its monetary policy stance, as have other major central banks, which is contributing to easing

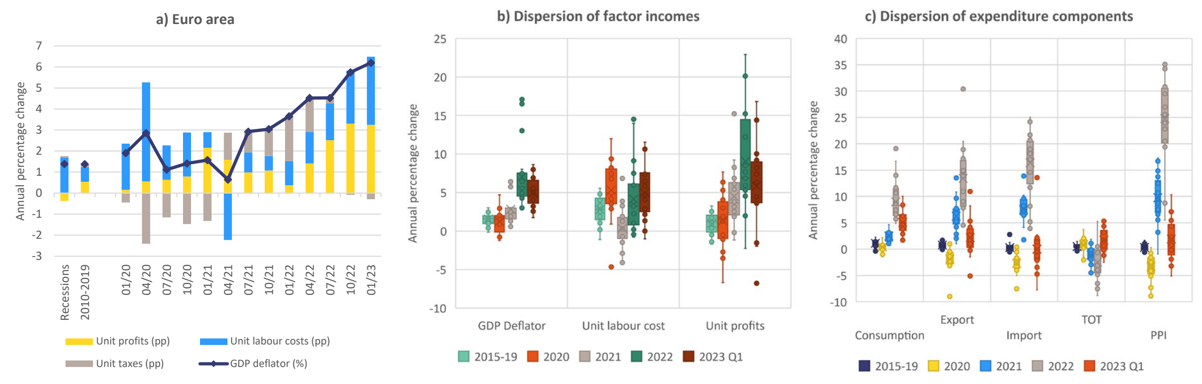
([29]) Croatia joined the euro area in 2023.
([30]) On the concept of equilibrium real exchange rates see Coutinho, L., Garcia, N. M., Turrini, A. andVukšić, G. (2021). "Methodologies for the Assessment of Real Effective Exchange Rates", European Commission Discussion Paper No 149.
([31]) International Monetary Fund (2022). Wage Dynamics Post-COVID-19 and Wage-Price Spiral Risks. Chapter 2 in World Economic Outlook, October 2022, International Monetary Fund, Washington, DC; Boissay et al (2022). Are major advanced economies on the verge of a wage-price spiral?. BIS Bulletin No. 53, May 2022.

inflationary pressure. Nonetheless, even if the broad-based easing of inflation across euro area countries now makes the more extreme spiral scenarios appear remote, the risk of inflation persisting through second-round effects seems plausible in the current phase of inflation (32).

Inflation persistence requires that prices spill over to domestic production costs. The GDP deflator provides a measure of prices of domestically produced goods and services. Using the income approach to calculate GDP, the GDP deflator can be broken down into labour costs, gross operating surplus (often referred to as profits or capital cost) and taxes. It therefore shows how each domestic factor is related to domestic price pressures (Graph I.9). Generally, as the 'wage-price' qualifier suggests, the focus is how it affects the cost of labour. Indeed, the losses in purchasing power that workers have experienced have led to higher wage demands and, also in a context of tight labour markets, to an acceleration in unit labour cost growth.

Recently, there has been a lot of emphasis on the price-setting reaction by firms and their possible attempts to maintain or increase profits, given a combination of special (and *a priori* temporary) factors that has been deemed conducive to price hikes (33). The reason is the rise in unit profits in 2022 and their atypical behaviour in the recession phase of the pandemic, when they increased rather than playing a buffer role, as they did in previous recessions (34).

Graph I.9: **GDP deflator composition and dispersion of factor incomes and expenditure components**



Note: Unit labour cost and unit profits are adjusted for self-employment (panels a and b). In panel c, TOT refers to the terms of trade. PPI refers to the producer price index.
Source: Eurostat, own calculations

The rapid recovery of aggregate demand in the aftermath of the COVID-19 crisis, facilitated by policy support and high household savings, was indeed favourable for the corporate sector overall (35). Another factor behind the price hikes was the supply shortages for many goods and commodities, caused by lockdowns and the war (36). Finally, the high inflation environment itself may have become conducive to retail price increases. Strategic complementarities in pricing, i.e. the response to competitor pricing, may provide an explanation for simultaneous increases in profit margins in an environment of accelerating

(32) European Commission (2023). European Economic Forecast Spring 2023.
(33) European Commission (2023), Profit margins and their role in euro area inflation, Thematic box in European Economic Forecast Spring 2023.
(34) Some qualifiers are necessary. The decomposition is an accounting exercise that does not reveal the uses that firms make of their higher operating surpluses. While they may distribute some surplus to their shareholders, firms may have other uses, including precautionary ones, for example in view of possible future investment, tax or wage increases. Moreover, the combination of adverse shocks and subsidies and other policy interventions are likely distorting the measurement of certain components.
(35) There are clear sectoral differences. For example, the initial rotation of demand towards goods, amid lockdowns and severe mobility restrictions, enabled firms in the manufacturing sector to raise their mark-ups. The services sector benefited most when restrictions were lifted in 2022. Meanwhile, in the energy sector, infra-marginal electricity producers benefited strongly from rising natural gas prices.
(36) For recent evidence for the US, see Weber, I. and E. Wasner (2023). 'Sellers' Inflation, Profits and Conflict: Why can Large Firms Hike Prices in an Emergency?' *Economics Department Working Paper Series*, University of Massachusetts Amherst.

inflation ([37]). Separately, the prevalence of cost shocks has blurred price signals and may have led consumers to both expect and 'accept' short-term price increases, meaning they may have been less inclined to view the increases as idiosyncratic decisions by firms and so they would not warrant 'punishment' by switching to a competitor.

Differentials in the GDP deflator and in its two main components – unit profits and unit labour costs – have significantly widened since the outbreak of the pandemic (Graph I.9, panel b), although they narrowed somewhat in early 2023. As the deflator captures purely domestic sources of production costs (i.e. labour and capital costs), this suggests that differences in domestic conditions (labour market and firm behaviour) play a central role in explaining the dispersion in some core inflation categories (goods and services), beyond the indirect effect of the energy and food price shocks ([38]). The asymmetric exposure to and pass-through of common shocks (see dispersion of the import deflator in Graph I.9) has been the main source of dispersion so far. But the recent widening suggests that this may be progressively replaced by asynchronous and diverse developments in national factor costs reflecting different degrees of labour market tightness.

Is there a risk that inflation dispersion will persist across the euro area? The answer notably hinges on how strong inflation will persist at national level, as price and wage stickiness are likely to differ and determine how far second-round effects keep inflation high. The sensitivity of inflation to cyclical conditions also matters and could drag out inflation differentials ([39]). Examples of features that are likely to matter in this regard are domestic institutions, such as wage or price indexation mechanisms and the degree of coordination in wage bargaining, or the tempering effect of income support provided in response to real income shocks on wage demands. However, possible protracted distributional conflicts, which could emerge at local level, would delay the process of national disinflation ([40]) and feed inflation dispersion.

Stable inflation expectations would provide a safeguard against the spillover of high inflation to costs. However, the duration of high inflation means that the risks of de-anchoring cannot be dismissed, despite the turning point and ongoing easing of headline inflation. Different reasons for de-anchoring risks can be found in the literature on subjective inflation expectations. For example, the frequency and size of price changes of items such as groceries, fuel or utility bills have been shown to affect households' expectations of inflation ([41]) – and while the nature of the shocks driving price changes matters for economic policy (in particular, in deciding whether or not to 'look through' a shock), it is less likely to for consumers.

Separately, the ubiquity of 'inflation' has raised consumer's attention to inflation (Graph I.10, panel c) ([42]). While consumers in low inflation environments have been shown to be relatively inattentive to inflation and its drivers, this is not the case in high inflation environments. A switch in the inflation attention-regime could indeed affect how inflation expectations are formed and by extension inflation dynamics. Related to this, living through a high inflation period has been shown to bias individuals' inflation expectations upwards ([43]). While this now applies to virtually all euro area citizens, the recent inflation experiences and changes in salient prices have differed strongly, which may have implications for how the inflation mechanism is understood in different countries. So far, household perceptions of inflation are not tracking the actual falls in inflation, as household opinion is generally that price increases have continued in recent months (Graph I.10, panel a). However, they expect price increases to start decelerating (Graph I.10, panel b). The dispersion around households' price expectations has narrowed around its peak but is widening again, reflecting differences in national contexts. Nonetheless, the country

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([37]) Andler, M. and A. Kovner (2022), '[Do Corporate Profits Increase when inflation increases?'] *Liberty Street Economics* (NY Fed), 13 July.

([38]) Note, however, that the comparatively lower dispersion rate for the GDP deflator suggests that dispersions in ULC and unit profits appear to offset, rather than to reinforce, each other.

([39]) Baba C. et al. (2023), *The Inflation Surge in Europe*, IMF Working Paper No. WP/23/30. Washington DC.

([40]) Arce, O. et al. (2023), 'How tit-for-tat inflation can make everyone poorer.' ECB blog, 30 March.

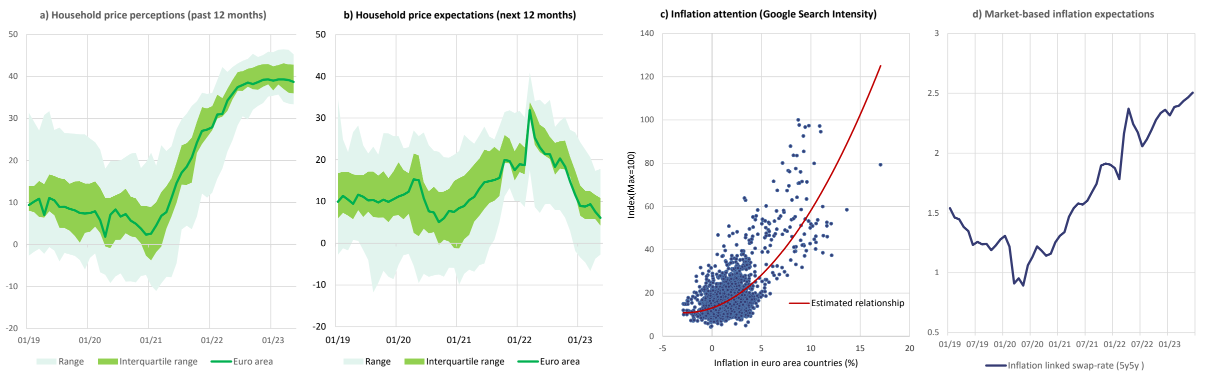
([41]) See for example: D'Acunto et al (2019). Exposure to Daily Price Changes and Inflation Expectations, NBER Working Paper No 26237; Kilian and Zhou (2020). Oil Prices, Gasoline Prices and Inflation Expectations: A New Model and New Facts, Federal Reserve Bank of Dallas Working Paper.

([42]) Buelens, C. (2023). Googling "Inflation": What does Internet Search Behaviour Reveal about Household (In)attention to Inflation and Monetary Policy?. European Commision Discussion Paper 183, March 2023.

([43]) Malmendier and Stefan (2016), *Learning from inflation experiences*, The Quarterly Journal of Economics 131.1 (2016): 53-87.

dispersion implicit in short- and medium-term inflation forecasts may also indicate a reconvergence of inflation rates (44). The steady upward movements in market-based inflation expectations (panel d), which include risk premiums and remain within the historical range, indicates that it may take quite some time to before inflation is back to its target level.

Graph I.10: **Inflation expectations and attention**



Note: Household perceptions and expectations are balance statistics centred around 0. Panel c plots national inflation rates between 2004 and September 2022 for the 12 countries that were part of the euro area in 2004 against the google search-intensity (seasonally adjusted) for the term "inflation". Panel d: inflation linked swap-rates include both inflation expectations and risk premia.
Source: European Commission Business and Consumer Survey (a, b), Buelens (2023) (c), Bloomberg (d).

A prolonged period of inflation dispersion is likely to be costly for the euro area, as it could set off destabilising mechanisms that could lead to imbalances, which in turn would require costly adjustments. Indeed, even short-lived inflation differentials may have permanent implications in terms of relative national price levels and purchasing power. If these asymmetries spill over to domestic costs, it would erode cost competitiveness and could result in increased external imbalances over time. The cost of this would be even higher for countries with existing macroeconomic imbalances, including high stocks of private and public debt, high unemployment, overvalued real exchange rates, or past credit misallocation (45). Macroeconomic imbalances accumulated by euro area countries before the euro area sovereign debt crisis have been found to be associated with a lower speed of convergence (46).

An aggravation of imbalances would also complicate common monetary policy, which would ultimately be powerless to resolve imbalances, requiring correction by structural polices. Energy prices are a case in point: once energy inflation dissipates, the price of energy is expected to remain permanently higher than it was before the pandemic, even though prices fallen from the 2022 peaks. Indeed, part of the EU's structural response to the new geopolitical situation resulting from Russia's invasion of Ukraine is to make Europe independent from Russian fossil fuels (and from fossil fuels more generally). The required structural adjustment will hence be proportionate to each country's level of energy intensity.

That said, in line with the stylised facts above, inflation differentials can be expected to narrow as euro inflation falls. A look into the pipeline corroborates this (Graph I.9). Improvements in supply chains and factors that have limited business activity (such as the scarcity of material and equipment, and stabilising energy prices) have eased producer price pressures. Also, upstream price dispersion, which leads headline inflation dispersion, (47) has narrowed significantly in the year to date. The broad-based easing of household inflation expectations implies that the risks of prolonged inflation dispersion, mainly as a result of domestic factors (domestic price and wage setting), remain contained.

(44) e.g. European Commission (2023), European Economic Forecast Spring 2023.
(45) European Commission (2023), Inflation Differentials in Europe and Implications for Competitiveness, Thematic Note to Support In-Depth Review, Institutional Paper 198, April 2023.
(46) Coutinho L. and A. Turrini (2020), Real Convergence Across the Euro Area, Intereconomics, Volume 55, September/October 2020.
(47) The correlation of monthly headline inflation dispersion is highest (0.83) with the fifth lag of producer inflation dispersion, using a sample from 2002 until April 2023. Restricting the sample to the pre-pandemic (pre-2020) yields a much weaker correlation and shifts the peak correlation to a lag of 22 months (0.43).

I.7. Conclusion

This article has documented the exceptional character of euro area inflation differentials after the COVID-19 pandemic and the energy price shock unleashed by Russia's war against Ukraine. Most of the dispersion thus results from global factors, essentially commodity prices and supply disruptions. These global factors have led to inflation patterns that were highly synchronous and yet uneven in magnitude, notably reflecting different levels of energy intensity. As the pandemic-related supply bottlenecks ease and energy prices stabilise above pre-pandemic levels, the level of dispersion has narrowed. With national inflation increasingly being driven by domestic factors, the result may be more asymmetric inflation patterns. Even if the levels of dispersion return to lower levels, they may well reveal a range of idiosyncratic drivers rather than asymmetric short-term reactions to a common shock.

While the great inflation dispersion in the euro area thus appears to be a temporary phenomenon directly related to global surge in inflation, its consequences may not be temporary. They are likely to shape the dynamics of inflation differentials in the future. The impact of high inflation on household purchasing power and firms' profits may determine the extent of second-round effects at national level. The income shock and the loss of purchasing power has been substantial in some euro area countries. Meanwhile, attempts to restore pre-pandemic purchasing power may give rise to spillover effects to domestic costs, which could affect cost competitiveness and could risk producing macroeconomic imbalances.

Moreover, a series of other structural challenges differ across euro area countries. The change to Europe's energy supply following Russia's invasion of Ukraine may well be permanent. The structural impact of severing the reliance on Russian energy imports is compounded by the ongoing need to reduce the use of fossil fuels in order to decelerate climate change. Other structural challenges have come to the fore with the pandemic, such as the vulnerability of cross-border supply chains. Others still persist, such as the impact of demographic shifts and climate- or weather-related disruptions. The necessary structural adjustments may significantly affect relative prices and inflation volatility. Heterogeneity in the euro area, different levels of exposure and structural adjustment needs also imply that national inflation trends may follow quite different paths. This may mean that inflation differentials persist, depending on the pace of adaptation of the Member States to these structural changes.

II. Pass-through in EU electricity and gas markets

By Helena Hernnäs, Åsa Johannesson-Lindén, Ruben Kasdorp and Magdalena Spooner

Abstract: *The sharp increase in electricity and gas prices in 2022 caused concern for households, businesses and policymakers across the EU. As a result of the gas supply constraints stemming from Russia's invasion of Ukraine, wholesale prices of electricity and gas rose sharply in all Member States. On the other hand, the effect on retail prices – the price consumers pay for electricity and gas – differed across Member States. This section presents developments in electricity and gas prices over the past 2 years and examines the pass-through – the effect that changes in wholesale prices have on retail prices – from wholesale to retail prices, and how this has differed across Member States. It also presents some of the factors that could explain the differences in pass-through. The data shows that the peak in wholesale electricity prices was followed by an increase in retail prices equal to, on average, 46% of the increase in wholesale prices, and that retail prices peaked 2 months after the wholesale price peak. This share ranged from 1% to 135% across Member States and occurred with different lags after the wholesale price peak. For gas, the retail price increase corresponded, on average, to 50% of the wholesale price increase, and ranged from 0% to 153% across Member States. There are multiple explanations for the differences. First, consumers in Member States with regulated prices were protected from the increase in wholesale prices. Second, some Member States have adjusted taxes, levies and network charges to limit the pass-through. Third, the level of competition in a market can influence pass-through. And last, fixed-price contracts result in a lag in transmission from wholesale to retail prices. Member States where a high share of consumers had such contracts could therefore have experienced a slower average pass-through.*

II.1. Introduction

In the past 2 years, high energy prices have raised concerns for households and firms. The price increase started with the recovery after the COVID-19 pandemic and was intensified by gas supply constraints. Russia's invasion of Ukraine caused considerable disruption to the world's energy systems and led to record-high electricity and gas prices in the EU, peaking in August 2022. Demand reduction, diversification of supply and high gas storage levels have set prices on a decreasing trend since then. Although the energy price shock has had a substantial impact across the EU economy, the impact on consumer prices has differed significantly across EU Member States.

Gas supply constraints affect wholesale prices of both gas and electricity ([48]). The contraction of the gas supply has a direct effect not only on the wholesale price of gas, but also on the wholesale price of electricity, which is determined on the basis of a marginal pricing model. In the current electricity market, with increased reliance on intermittent renewable energy sources and reduced reliance on baseload nuclear and coal plants, natural gas often acts as the marginal unit of electricity production, thereby setting the price.

Changes in wholesale prices do not necessarily translate directly into changes in retail prices, and the extent varies across Member States. The price of gas and electricity paid by households and firms is determined in the retail market, and the pass-through depends on a number of factors that vary between Member States. This chapter presents recent price developments in the retail electricity and gas markets and examines factors that determine the pass-through. These factors are described in qualitative terms, and no attempt is made to quantify their impact or disentangle the different effects from each other.

The analysis shows that on average, pass-through was larger and faster when wholesale prices increased than when they decreased. While wholesale prices have increased sharply in all Member States for both electricity and gas, their effect on retail prices differs. This can be explained by multiple factors: first, a number of Member States have changed the taxes and charges levied on retail prices to lessen the impact of surging wholesale electricity and gas prices on households' bills. Second, Member States with regulated retail prices on electricity or gas tend to have a lower pass-through on the regulated market. Third, the level of competition in the market can have an effect on pass-through, especially when prices are

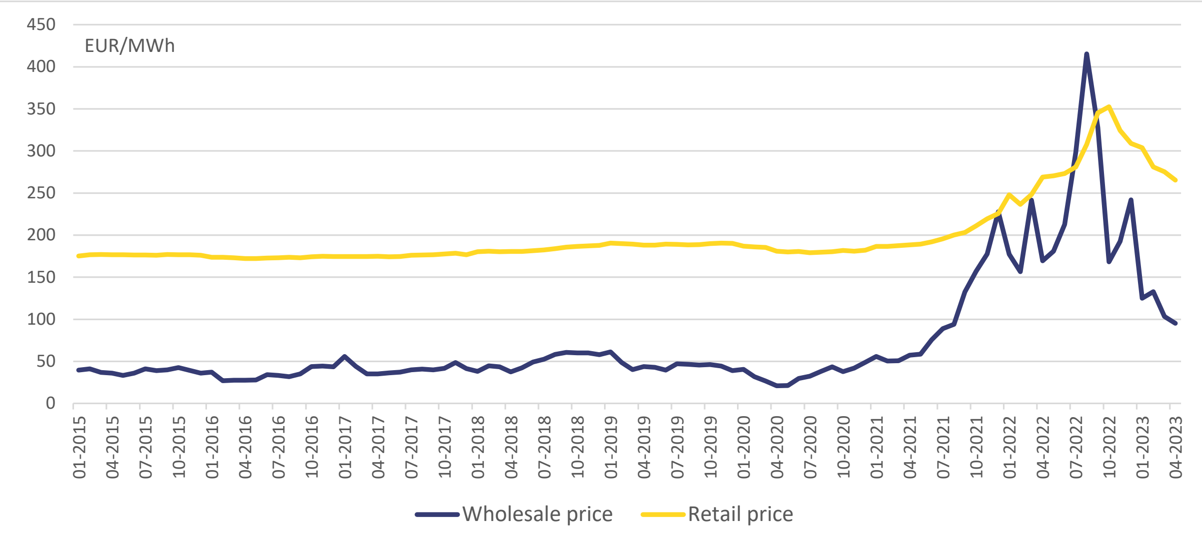
([48]) Wholesale prices refers to the prices charged for those who purchase electricity or gas with the purpose of reselling it (generally charged by producer to supplier). Retail prices are those charged to the final customer (generally charged by the supplier to the customer).

decreasing. And last, a large share of fixed-price contracts for electricity and gas results in a lagged pass-through.

II.2. Pass-through in electricity markets

Electricity price developments are smoother for retail prices ([49]) than for wholesale prices ([50]). Graph II.1 shows developments in the EU average wholesale and retail prices since January 2015. It shows a relatively steady level of, and relationship between, wholesale and retail prices until around April 2021, when increasing demand in the wake of the COVID-19 pandemic combined with gas supply disruptions led to an increase in wholesale prices. The supply disruptions were aggravated by Russia's invasion of Ukraine, and prices peaked in August 2022. Demand reduction, including due to high prices and mild weather, increased LNG imports and capacity. High storage levels have also resulted in falling prices since then. The sharp increases in the wholesale price of electricity were not directly and fully passed through to retail prices, which show a more modest increase. The electricity retail price on average less than doubled at its peak compared to April 2021, while the wholesale price increased six-fold over the same period. The price decrease in the post-peak period is also smoother for retail prices. Despite the downward trend since August 2022, retail and wholesale prices are both still significantly higher in April 2023 compared to pre-crisis levels. When gas constraints drove up the wholesale prices of electricity, electricity producers that used inputs other than gas for their production (such as renewables, nuclear or lignite) made large profits. On the other hand, electricity suppliers often saw their profits squeezed ([51]). Sub-Section II.2.3 discusses the structural consequences of the squeeze in the retail markets.

Graph II.1: **Electricity prices (un-weighted EU averages) ()**



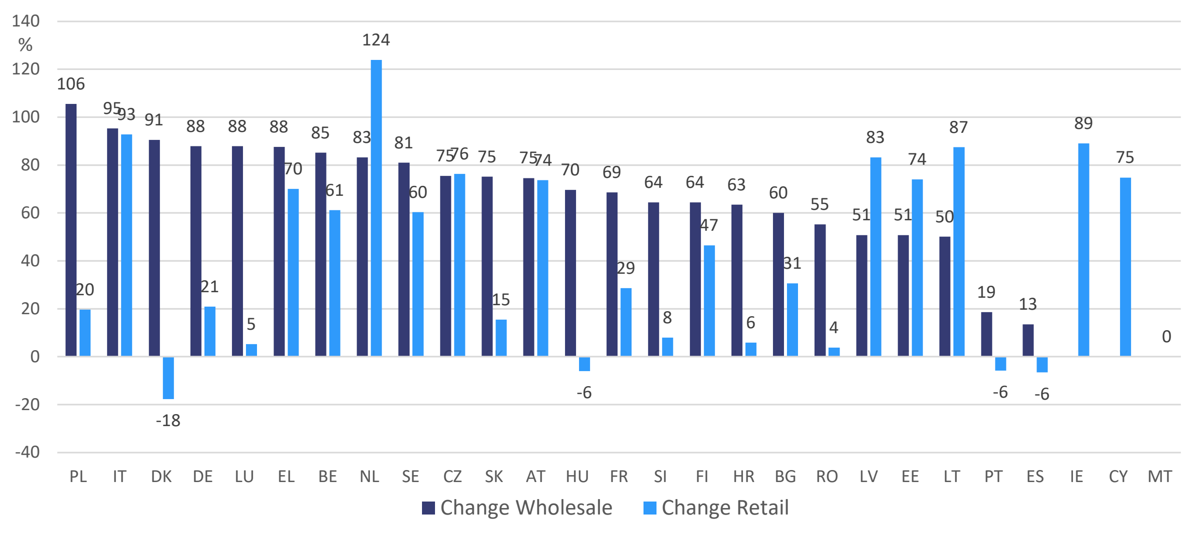
Source: VaasaETT (via DG ENER) and Ember.

Price developments during this crisis have varied across Member States. Graph II.2 shows the relative increase in wholesale prices (dark blue) and retail prices (light blue) from April 2021 to April 2023. Wholesale prices were 50% to 100% higher in April 2023 compared to 2 years earlier, in all Member States except in Spain and Portugal ([52]). The change in retail prices is more varied across Member States. By April 2023, retail prices were below pre-crisis levels in some Member States (DK, HU, PT and ES), while

([49]) The retail prices as provided by the energy consultancy VaasaETT, i.e. for households in capital cities that are the most representative consumer. The data takes into account both existing and new customers.
([50]) We use wholesale electricity prices from the energy think tank Ember (www.ember-climate.org): wholesale day-ahead electricity price data for European countries, sourced from the European Network of Transmission System Operators and cleaned; hourly data is then aggregated to produce average monthly values per country, weighted by load.
([51]) 'Supplier' is understood as the operator that supplies electricity to the consumer on the retail market (also called retailer).
([52]) Portugal and Spain implemented a cap on gas-fired power plants in order to lower the electricity bill in 2022.

they were higher than pre-crisis levels or almost double in others (NL, IT, and IE). In most Member States, the change in retail electricity prices between April 2021 and April 2023 was smaller than the change in wholesale prices. Changes in retail prices can also vary within countries – for example, in Sweden, the retail price increase was much bigger in the southern regions compared to the north. The rest of this sub-section analyses the pass-through in the different Member States and also identifies some of the factors that can explain the differences.

Graph II.2: **Percentage change in wholesale and retail prices of electricity (April 2021 to April 2023)**



Data for wholesale prices for Ireland, Cyprus and Malta are missing. Wholesale electricity prices are spot prices traded on the day-ahead market.
Source: VaasaETT (via DG ENER) and Ember.

The ability of suppliers to pass changes in wholesale prices on to final consumers may depend on several factors, and pre-crisis estimates show that pass-through used to be limited. The factors include the degree of regulation and competition in the retail market as well as the use and duration of fixed-price contracts on producer-supplier and supplier-consumer levels respectively. These are elaborated on in the following sub-sections. Earlier studies show limited pass-through: for example, a 2016 study (53) found that an increase of 1 cent per kWh in wholesale prices increased the energy component of the electricity retail price (54) by only 0.05 cent on average the following month. The study suggests that the small coefficient is explained by market regulation, competition and contract length in the Member States. The Commission's Winter Economic Forecast from January 2022 found that on average only about 4% of the change in wholesale gas prices is passed on to consumer electricity prices after 12 months (55).

There is sufficient reason to investigate the pass-through in the current energy context, which has been characterised by record-high prices and uncertainty about future market conditions. Graph II.I shows that the historical relationship between wholesale and retail prices no longer holds in the current market situation. Against the backdrop of sharp price increases and high uncertainty, pass-through can be expected to be higher than the empirical results referred to above as suppliers may rapidly need to cover their costs when wholesale prices steadily increase. On the other hand, different factors may be at play during sharp and persistent decreases in wholesale prices, where suppliers could be less eager to adjust retail prices downward, and the pass-through will depend on whether market conditions allow them to

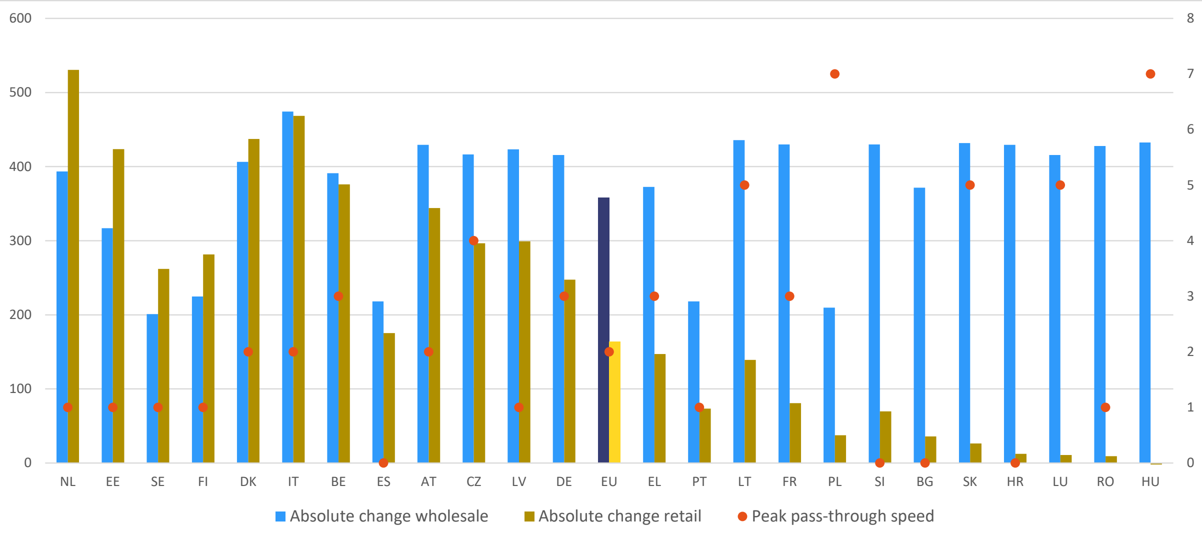
(53) Grave et al. (2016), Prices and costs of EU Energy, European Commission.
(54) The energy component is one of the multiple components of the electricity retail price – the one that is, in the absence of price regulation, directly linked to the cost of electricity production (as opposed to taxes and levies). Sub-section 0 includes a discussion on the retail price composition and how it affects the pass-through.
(55) European Commission (2022). European Economic Forecast Winter 2022, Box 1.2. This analysis uses the wholesale gas price as the proxy for the wholesale electricity price, which may explain the low coefficient.

delay the adjustment. The rest of this sub-section therefore examines the pass-through in two steps: first, the pass-through of wholesale price increases (until prices peaked), and second, the pass-through in the post-peak period (from August 2022 for most Member States), when prices were on a decreasing path.

II.2.1. Pass-through of the wholesale price peak

The magnitude and speed of pass-through of the wholesale price peak differs across Member States. For most Member States, the wholesale electricity price peaked in August 2022, after which there has been a sharp decrease (56). On the other hand, subsequent retail price peaks occurred at different points in time across Member States. Graph II.3 shows the absolute increase of prices between April 2021 and the wholesale and retail price peaks respectively, together with the number of months that occurred between those peaks. It shows that the wholesale price peak was followed by an even larger increase in retail prices in some Member States (NL, EE, SE, FI, DK). In Belgium and Italy, retail prices increased in step with wholesale prices.

Graph II.3: **Absolute change in wholesale and retail electricity prices (April 2021 to peak)**



Absolute difference in wholesale (blue bars) and retail (brown bars) electricity prices between April 2021 and the month of the peak in wholesale and retail prices respectively. Prices in EUR/MWh (left axis). Pass-through speed shows the number of months between the peaks in wholesale and retail prices on the right axis. Data for CY, IE and MT are missing.
Source: Commission staff calculations, data source: VaasaETT (via DG ENER) and Ember.

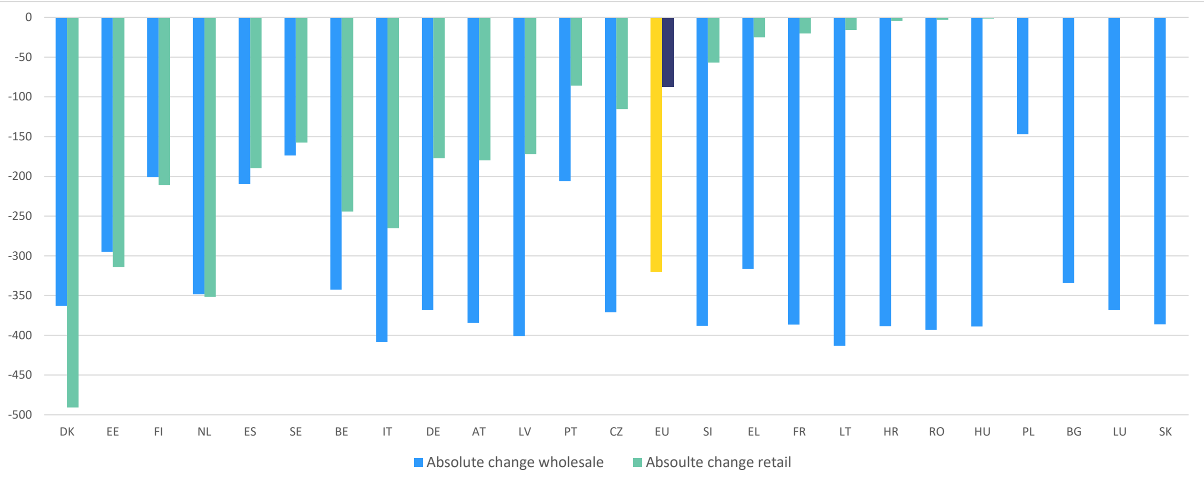
On the other hand, consumers in Hungary, Romania, Luxembourg, Croatia and Slovakia were almost fully protected from the price increases. The speed of pass-through also differs: in Spain, the retail price peak occurred in the same month as the wholesale price peak. In others (NL, EE, SE, FI, LV, PT), it took retail prices 1 month to reach their peak after the wholesale price peak, while it took longer in e.g. Austria, Italy, Denmark, France, Greece, Germany and Belgium (57). No conclusions should be drawn on the number of months between the price peaks in Member States that observed very little or no pass-through (HU, RO, LU, HR, SK). Wholesale electricity prices increased by EUR 358/MWh on average in the EU between April 2021 and their peak. This was followed by an average increase in electricity retail prices of EUR 164/MWh 2 months later. This means that the increase in retail prices corresponded to 46% of the increase of wholesale prices on average, from April 2021 until their peak. This share was highest in the Netherlands, where it reached 135%, while it was -1% in Hungary.

(56) The exceptions are Spain, Portugal and Sweden, where the peaks occurred in March (ES & PT) and December (SE) of the same year.
(57) In this section, the changes in wholesale prices are compared with the changes in total retail prices. The pass-through will partly depend on the retail price composition. The effect of the retail price composition on the pass-through is discussed at length in the next sub-section.

II.2.2. Pass-through in the post-peak period

Member States with a high and speedy pass-through of the wholesale price increase also experienced higher pass-through in the post-peak period. In April 2023, wholesale prices had fallen 77% on average in the EU, compared to their peak. Graph II.4 shows the absolute change in wholesale and retail prices since their peak. In Denmark, Estonia, Finland and the Netherlands, retail prices decreased more than wholesale prices during the period. Member States in which consumers were protected from the wholesale price peak also did not experience retail price changes in the post-peak period. Between their peak and April 2023, electricity retail prices decreased by EUR 87/MWh on average in the EU. This corresponds to 27% of the reduction in wholesale prices, which decreased by EUR 320/MWh during the same period. The EUR 87/MWh reduction in retail prices can be compared to their EUR 164/MWh increase in the preceding period (see above). Considering that full pass-through may not have happened yet and that wholesale prices are still on a declining path, further reductions in retail prices can be expected in the coming months.

Graph II.4: **Absolute change in wholesale and retail electricity prices (peak to April 2023)**



Absolute difference in wholesale (blue bars) and retail (green bars) prices of electricity between the peak of prices until April 2023. Prices in EUR/MWh.
Source: Commission staff calculations, data source: VaasaETT (via DG ENER) and Ember.

II.2.3. Factors influencing pass-through

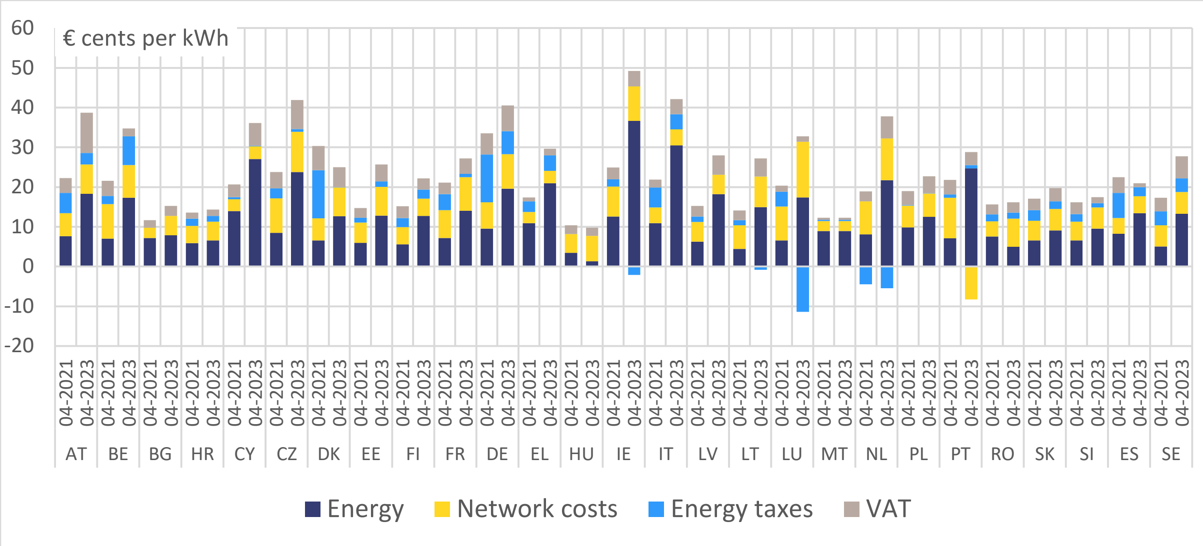
The factors that influence pass-through can be found on both the supply and the demand side. The supply side factors include retail price composition, price regulation, level of competition in the market and the type of contracts offered. The main factors on the demand side include consumer switching and choice of contract. This section describes qualitatively how these factors influence pass-through and how they differ across Member States.

Electricity retail price composition

The electricity retail price has three main components: energy and supply, network charges, and taxes. First, the energy component is linked to the wholesale market and is therefore dependent on the production cost of electricity. It reflects the functioning of the wholesale market and its price, but can also be influenced by different contracts between the supplier and producer. Its level can also be influenced by price regulation. Second, the network component consists of charges related to investment, management, maintenance and balancing of the grid. These charges are set by the electricity market regulator. The last component consists of VAT, energy taxes and other types of levies and charges, and is determined by the government and/or the regulator.

The wholesale price affects the retail price through the energy component. Graph II.5 compares the composition of electricity retail prices in the Member States in April 2021 and in April 2023. The wholesale price increase led to a significant increase in the energy component of retail prices in most Member States. In others, it remained unchanged or even decreased (e.g. HU, MT, RO), which left households' retail prices unaffected by the wholesale price surge. This was the result of price regulation (see next sub-section).

Graph II.5: **Electricity retail price components per Member State (April 2021 and April 2023)**



Source: VaasaETT (via DG ENER).

The other components also influence the pass-through. The authorities can limit the effective pass-through by adjusting the other two components of the price. This has been done extensively in the past year: by 31 October 2022, 23 Member States (58) had reduced indirect taxation (VAT and excise duties) and 25 Member States (59) had reduced levies or introduced subsidies on energy products. The overall budgetary cost of support measures was estimated at 1.5% of GDP for 2022 (60) with a net cost of 1.2%, taking into account levies on windfall profits. Graph II.5 shows that some Member States (IE, LU, NL, PT) introduced negative taxes or network tariffs to compensate for the high energy prices (61). Without policy intervention, VAT and network costs, which are price based, would mechanically increase together with an increase in the energy component of the retail price. This might explain why a change in wholesale price can lead to an even bigger change in retail prices in absolute terms.

Price regulation

Whether an electricity market is regulated or liberalised affects the pass-through. Depending on what price choice the regulator in regulated markets makes, pass-through can happen fast and be high or muted if the regulator opts to keep retail prices decoupled from wholesale prices. The magnitude of the pass-through also depends on whether the regulated prices apply to the whole population or just to a share of it, such as vulnerable households. Indeed, Member States that showed no or very limited pass-through in Graphs II.3 and II.4 have price regulations that decouple retail prices from changes in wholesale prices.

(58) Except LU, LV, RO, SK.
(59) Except SE, SK.
(60) Based on Commission estimates.
(61) The Netherlands has electricity taxes as well as a lump-sum tax credit that is deducted from the electricity bill. Its tax credit is larger than the electricity tax for the representative consumer shown in the graph. The tax credits were increased and the energy taxes lowered in 2022 to reduce energy bills for SMEs and households. Source: Energy tax in the Netherlands | Business.gov.nl; Energy tax | Environmental taxes | Government.nl.

Despite the limitations set in the Common Rules for the Internal Market for Electricity Directive (62) on the regulation of electricity markets, 18 Member States had some type of electricity price regulation in place for customers in 2021 (63). The Directive allows public interventions in price setting for the supply of electricity to help protect consumers. Such interventions should not override the principle of open markets, should be reserved for defined circumstances and beneficiaries and be limited in duration and proportion (64). However, it might be justified exceptionally, for example where supply is severely constrained. In response to the energy crisis, a number of Member States (65) introduced various forms of price caps in their electricity markets as an emergency intervention (66).

Untargeted price measures entail various problems in the long term. Price measures reduce incentives to lower energy consumption. As such, they reinforce the reliance on fossil fuel imports, and work against achieving the climate targets of the European Green Deal. The introduction of price caps can also have a detrimental effect on economic efficiency by hampering competition in the retail market and restricting new players from entering the market. In addition, the overall budgetary costs of these measures, especially when prices are set below cost, can become very high. Lastly, price caps may also be difficult to reverse if energy prices remain elevated for a long period of time. Box II.1 explains how the introduction of a price cap affects price formation in the retail and wholesale markets, as well as its implications on public expenditure.

The role of competition and active consumers

The degree of competition in the market and consumer responsiveness can also influence the magnitude and speed of pass-through. The theoretical evidence of competition's effect on pass-through when wholesale prices change depends on the characteristics of the market and on the assumptions made (67). Several studies point to pass-through being asymmetric: the speed of pass-through is higher when prices increase than when they decrease (68). This can be explained by the fact that retailers are more eager to pass through cost increases to consumers than cost decreases. However, the possibility for them to maintain retail prices at a high level following a reduction in the wholesale price can be limited by a competitive market with active consumers that face low barriers to switching between suppliers. In that case, consumers can put pressure on retailers to pass through wholesale cost reductions to retail prices (69).

Empirically, some of the Member States that showed the highest pass-through in Graphs II.3 and II.4 are also those with the most competitive markets (DK, SE, FI, NL) (70) and active consumers (NL, BE, ES) (71).

The crisis has resulted in structural changes in electricity retail markets, leading to further concentration. Suppliers with insufficient hedging and limited ability to pass on price increases, for example due to a high level of fixed-price contracts, faced difficulties. This led to an increase in the number of bankruptcies and of suppliers exiting the market.

(62) Electricity Market Directive (Directive (EU) 2019/944).
(63) BE, BG, CY, EE, ES, FR, EL, HR, HU, IT, LT, LV, MT, NL, PL, PT, RO, SK. Source: ACER (2022), Figure 48.
(64) Member States can apply public interventions in the price setting for the supply of electricity to energy poor or vulnerable household customers, or for a transition period to household customers and to microenterprises. In the latter case, the price must be set above cost.
(65) Including AT, CZ, DE, EE, FR, HR, LU, LV, NL, PL, RO, SI.
(66) Council Regulation (EU) 2022/1854 provides a temporary possibility to set electricity prices below cost to all households as part of a transition period, provided some conditions are fulfilled. Prices regulated below cost should cover only a limited amount of consumption and retain an incentive for demand reduction.
(67) Theoretical results of the relationship between competition and pass-through depend on assumptions made, including relating to the shape of the marginal cost curve, convexity of demand, and relative elasticity between supply and demand. For an overview, see RBB Economics (2014), 'Cost pass-through: theory, measurement, and potential policy implications', Section 1.5.1.1.
(68) See e.g. Mirza & Bergland (2012), 'Pass-through of wholesale price to the end user retail price in the Norwegian electricity market', Energy Economics, Vol 23 (6); Zachmann & von Hirschhausen (2008), 'First evidence of asymmetric cost pass-through of EU emissions allowances: Examining wholesale electricity prices in Germany', Economic Letters, Vol 99 (3); and ACER (2022).
(69) On the effect of competition and switching costs on pass-through, see e.g. Duso & Szucs (2017), 'Market power and heterogeneous pass-through in German electricity retail', Vol 98.
(70) Most competitive meaning least concentrated markets. Market concentration source: ACER (2022).
(71) Active consumers measured by their switching between suppliers. Source: ACER (2022).

Box II.1: The effect of price caps on wholesale and retail prices

This box shows a stylised representation of the impact of a supply shock in the wholesale market on the electricity wholesale and retail market, followed by the introduction of a price cap in the retail market.

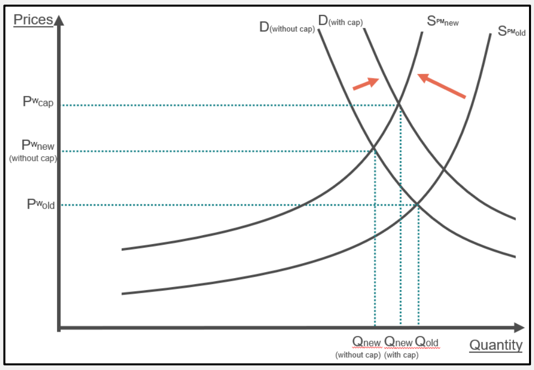
1. **Wholesale market**: The increase in the gas import price (P^M) due to lower gas supplies from Russia shifts the supply curve to the left, resulting in a lower Qnew (without cap) and higher P^Wnew (without cap).

2. **Retail market**: Those who demand in the wholesale market supply in the retail market. Given the higher wholesale price (cost to retailers), the supply curve shifts to the left, resulting in a lower Qnew (without cap) and higher P^Rnew (without cap).

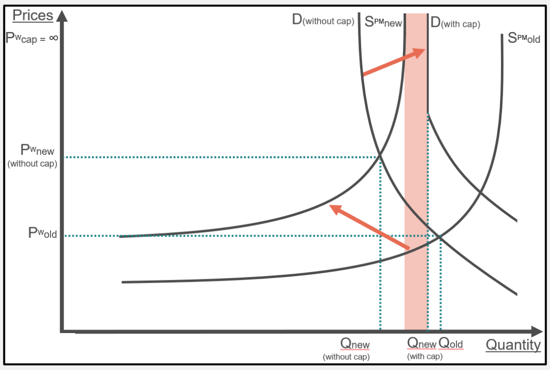
3. **Retail market**: In response, the government introduces a price cap to lower the price in the retail market to P^Rcap (consumers pay). At this price, consumers demand Qnew (with cap). To meet the demand, suppliers require a higher price than before P^Rcap (suppliers receive). To maintain the price cap and the balance in the electricity market, governments must compensate suppliers (shaded area). The more inelastic the supply is, the higher the price and with it the fiscal costs. If the supply is too inelastic, the price cap can result in shortages due to the high demand sustained by the price cap. The price required by suppliers becomes very high, and so does fiscal expenditure. The bottom row figures on the next page show the effect of the price cap on the retail market and how it differs for different elasticities of supply.

4. **Wholesale market**: The higher price that suppliers receive following the price cap means that they can charge a higher price for every unit sold in the retail market. Their demand for electricity in the wholesale market will therefore shift to the right. This will generate higher prices in the wholesale market as well: Qnew (with cap) at P^Wnew (with cap). With too inelastic supply and demand, they will never meet and generate a shortage in the wholesale market. The top row figures on the next page show the effect on the wholesale market for different elasticities.

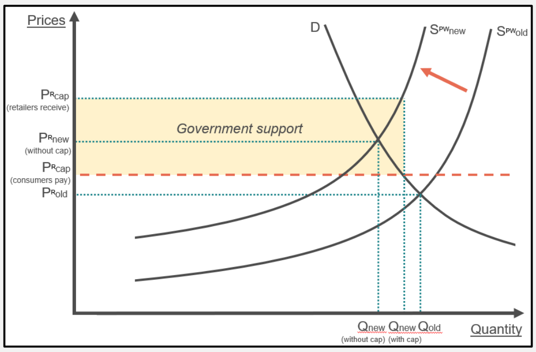
Wholesale market *(with more elastic supply)*



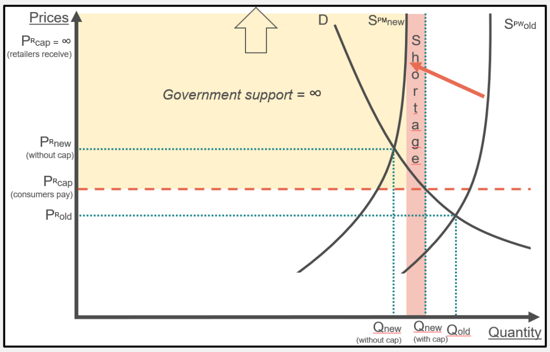
Wholesale market *(with more inelastic supply)*



Retail market *(with more elastic supply)*



Retail market *(with more inelastic supply)*



Nine Czech electricity suppliers went bankrupt between October 2021 and January 2022, resulting in a large share of households being transferred to a supplier of last resort (10% of households for gas and electricity combined). In Germany, 950 000 households had their electricity or gas contracts terminated by suppliers that became insolvent when prices surged, as they were constrained by a large share of fixed-price contracts without sufficient hedging (72). The implications of these changes for the competitive situation in the markets is not yet clear.

Contract behaviour

Suppliers and electricity producers can hedge against wholesale spot price volatility through future contracts. This makes them less sensitive to spot price fluctuations, limiting an immediate pass-through from wholesale spot prices to retail prices. The non-storability of electricity, combined with varying supply and demand factors such as weather and seasonality, leads to highly volatile spot prices in the wholesale electricity market (73). Electricity suppliers and producers can therefore hedge risks through future contracts that fix the prices ahead of the delivery period. These prices are made up of the expectation of the spot price plus a risk premium, where the risk premium can be seen as part of the wedge between the spot price and retail prices. The differences in risk premiums across countries depend among others on the market power of participants (generators in competitive markets can accept lower risk premiums) and the electricity mix (renewable electricity generation leads to more volatile spot prices, which could imply an upward pressure on risk premiums) (74).

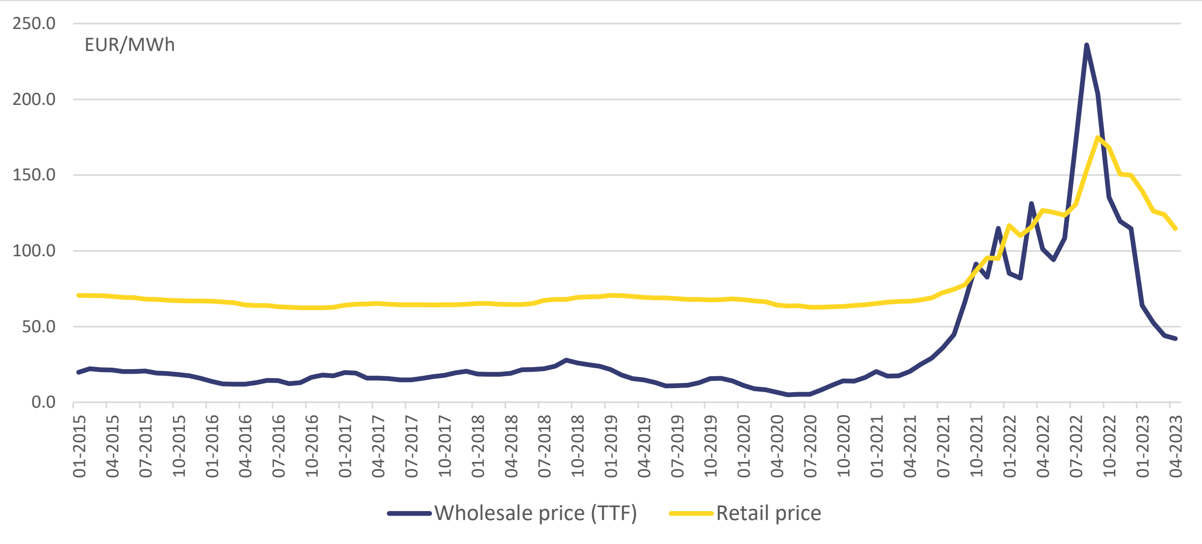
This is also true for consumers: firms and household consumers that have fixed-price electricity contracts will be protected for at least some time against electricity price surges – leading to a lower pass-through in the short term. On the other hand, consumers with variable contracts avoid paying risk premiums and can better exploit price fluctuations – leading to a higher immediate pass-through. The energy crisis has shown the risk that suppliers face when entering into long-term contracts with consumers – leading to higher levels of bankruptcies and market exits. Given the increased risk of major price movements, suppliers are currently turning away from fixed-price contracts, forcing consumers into variable price or short-term contracts (75). This is expected to lead to higher pass-through rates. Lacking comparable data on newly signed contracts across Member States, anecdotal evidence indicates a trend towards an increased use of variable price contracts already before the energy crisis. In Sweden, the share of consumers with variable price contracts increased from 36% in 2013 to 56% in 2022, and another 10% of consumers have one-year contracts (76). In the Flemish region in Belgium, around 40% of contracts are variable, up from 28% last year (77). Also in Spain, most small consumers have variable price contracts (78).

II.3. Pass-through in gas markets

Graph II.6 shows the average price developments for retail and wholesale gas prices in the EU since 2015. As for electricity, wholesale gas prices started to increase around April 2021, peaked sharply in August 2022, and then decreased but remain well above their pre-crisis levels. Gas retail prices has a more direct link to gas wholesale prices than the corresponding link between wholesale and retail electricity prices. This could be observed as the energy component accounts, on average, for a higher share of the final retail price for gas as compared to electricity (49% compared to 45% of the retail electricity price in 2021) (79). The wholesale price of gas has a strong link to the supply of gas, which reflect a single input. The electricity wholesale prices, on the other hand, reflect the price of the marginal unit of power production, which varies between the different sources and time of production.

(72) ACER (2022).
(73) Falbo et al. (2015), 'Electricity futures' in A. G. Malliaris & W. T. Ziemba (ed.) *The World Scientific Handbook of Futures Markets*.
(74) Bonaldo et al. (2021), 'The relationship between day-ahead and futures prices in the electricity markets: an empirical analysis on Italy, France, Germany and Switzerland', Marco Fanno Working Papers No 272.
(75) ACER (2022).
(76) Statistics Sweden.
(77) VREG (2023). 'Produktaanbod – elektriciteit'.
(78) CEER (2019). 'Monitoring Report on the Performance of European Retail Markets in 2018'.
(79) Data based on VaasaETT and the most representative consumer price band.

Graph II.6: **Gas prices (EU unweighted averages)**



Wholesale gas price is TTF month-ahead price traded on the futures market.
Source: VaasaETT (via DG ENER) and ICE.

II.3.1. Pass-through of the wholesale price peak

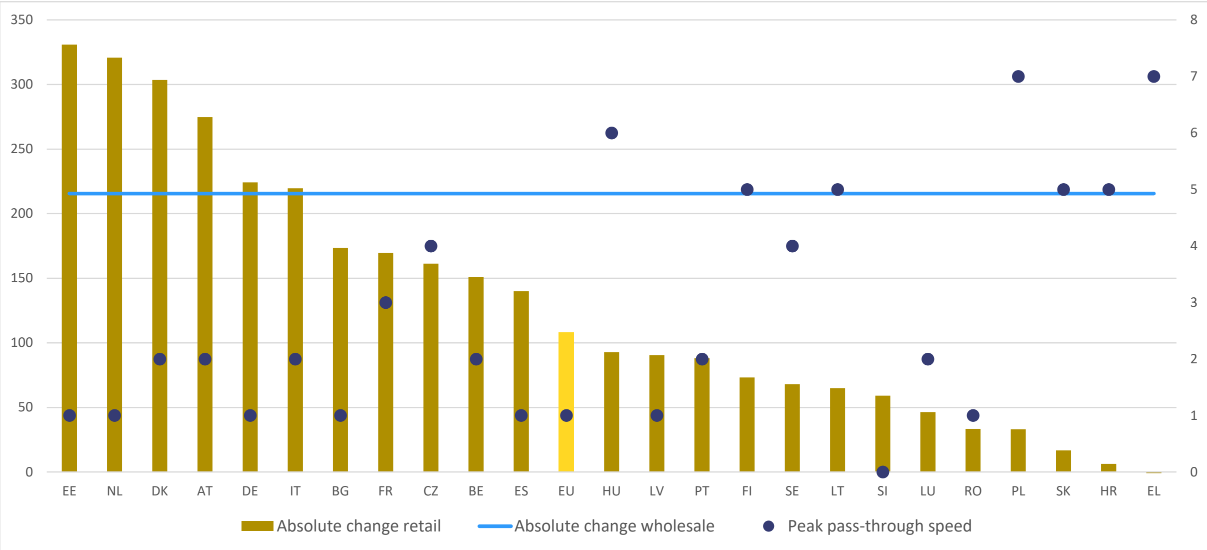
Graph II.7 shows the increase in gas prices across Member States between April 2021 and their peak. The wholesale price of gas ([80]) increased by EUR 216/MWh from April 2021 to its peak in August 2022. This was followed by retail prices increasing by EUR 108/MWh on average, which occurred 1 month later. The retail price increase therefore corresponds to 50% of the increase in wholesale prices. As for electricity prices, some Member States saw their retail prices increase more than the wholesale price (EE, NL, DK, AT), some around the same (DE, IT), while retail prices in other Member States were almost unaffected (EL, HR, SK). The highest pass-through was seen in Estonia, where the retail price increase corresponded to 153% of the wholesale price increase.

II.3.2. Pass-through in the post-peak period

Graph II.8 shows the change in prices in the post-peak period. From August 2022 until April 2023, the wholesale price of gas decreased by EUR 194/MWh, while retail prices decreased on average by EUR 60/MWh since their peak, ranging from EUR 305/MWh in Estonia to no change in Slovakia, Lithuania, Hungary, Croatia and Poland. The impact of the price changes on total energy prices paid by consumers depends on the energy mix; consumers in Member States with a higher share of gas in the energy mix have been more exposed to energy price fluctuations. The natural gas share of the energy mix ranges from 0% in Cyprus to 41% in Italy. The rest of this section describes some of the factors that determine the pass-through of gas prices to consumers, and how they differ across Member States.

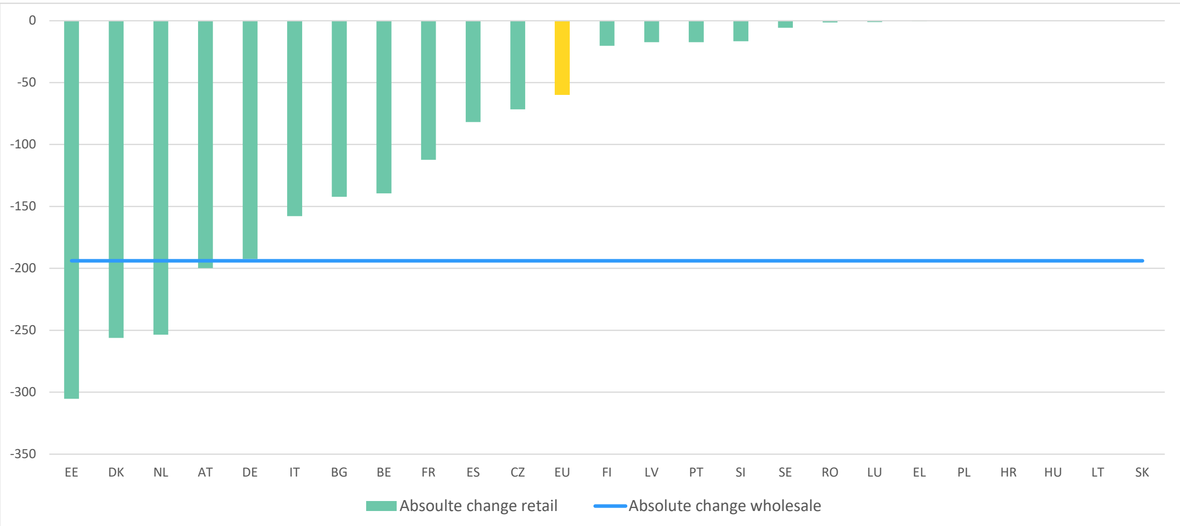
([80]) The TTF month-ahead price is used as a benchmark for the wholesale price of gas. It is the same across all Member States.

Graph II.7: **Absolute change of wholesale and retail gas prices (April 2021 to peak)**



Absolute change in wholesale (blue line) and retail (brown bars) prices of gas between April 2021 and the peak of wholesale and retail prices, respectively. Wholesale gas prices are TTF month-ahead prices traded on the futures market (EUR/MWh). Pass-through speed shows the number of months between the wholesale price peak in August 2022 and the retail price peak in each Member State.
Source: VaasaETT (via DG ENER) and ICE.

Graph II.8: **Absolute change of wholesale and retail gas prices (peak to April 2023)**



Wholesale gas prices are TTF month-ahead prices traded on the futures market.
Source: VaasaETT (via DG ENER) and ICE.

II.3.3. Factors that influence pass-through

As for electricity prices, policy measures, including long-term price regulations as well as temporary emergency measures, counteract the pass-through. In 2021, 14 Member States had some kind of price intervention for household gas prices (81) and 6 had specific measures to protect vulnerable

(81) BE, BG, EE, FR, EL, HR, HU, IT, LT, LV, NL, PL, RO, SK. Source: ACER (2022), Figure 48.

households ([82]). In response to the energy crisis, several Member States then introduced various forms of price caps in their gas market as an emergency intervention ([83]).

Retail gas markets are generally more concentrated than electricity markets, and their concentration increased further during the crisis. In 2021, most Member States had highly concentrated retail gas markets ([84]). As was the case for electricity, the crisis has further increased market concentration due to bankruptcies and market exits – most notably in Czechia, where 15 suppliers exited the market, and the Netherlands, where 6 suppliers left ([85]). The effect that this will have on pass-through is yet to be seen, but as for electricity, more competitive markets should have relatively faster pass-through when prices fall.

Fixed-price contracts have become less prevalent in most Member States, following the energy price surge. As for electricity, the offer of fixed-price contracts for gas decreased during the crisis. As a result, retail prices will follow wholesale prices more closely: a recent study found that the correlation between retail and wholesale prices was significantly higher in 2020-2022 than in 2016-2019 ([86]). The move towards more variable contracts will continue to produce retail prices that are more reflective of wholesale price fluctuations.

II.4. Conclusions

The energy crisis has affected consumers differently across the EU. While wholesale electricity and gas prices increased significantly in all Member States over the past 2 years, the effect on retail prices differs. In some Member States, consumers have almost been entirely protected from the wholesale price surge due to price regulation ([87]), while consumers in other Member States have seen their energy bills soar. Factors that influence this pass-through include the retail price composition, level of regulation and competition in retail markets, as well as different contract offers in each Member State. This section has outlined some of these factors. More detailed country-specific and quantitative analysis is needed to further understand the drivers, speed and magnitude of these effects.

([82]) BE, EE, HU, PT, RO, SK. Source: ACER (2022), Figure 48.
([83]) Includes AT, CZ, DE, EE, FR, LU, LV, NL, RO, SI.
([84]) ACER (2022). In 2021, out of 19 EU Member States, all except Italy and Slovenia had highly concentrated markets (highly concentrated being defined in the Herfindahl–Hirschman Index (HHI) as above 2 000). Electricity markets are generally less concentrated, with five Member States (DK, SE, FI, AT and SI) having a HHI score of below 2 000.
([85]) ACER (2022), paragraph 331.
([86]) VaasaETT (2022). Provision of Retail Energy Market Data and Analysis for ACER.
([87]) This implies that others carry the impact of the energy cost increase rather than consumers – normally the government or the supplier, depending on the regulatory framework.

III. Corporate vulnerability and the energy crisis

By Elizaveta Archanskaia, Plamen Nikolov, Wouter Simons, Alessandro Turrini and Lukas Vogel (88)

Abstract: *Energy costs have soared in the EU since summer 2021, linked to the post-pandemic recovery, the disruptive behaviour of Russia as supplier of gas, and the subsequent full-scale invasion of Ukraine by Russia. This energy cost shock has raised challenges for the European corporate sector. Member States have deployed support in various forms. The current support provided by Member States, however, raises concerns about fiscal costs, incentives for achieving climate goals and ensuring a level playing field. This chapter discusses challenges to the corporate sector's balance sheets. It reviews changes in energy prices paid by corporations and the implications of these changes on production costs. Simulations are carried out to assess differences across sectors in corporations' increased financial vulnerability under a (hypothetical) worst-case scenario in which firms do not adjust final prices. Results indicate that in this scenario, on aggregate, the increase in the share of financially vulnerable firms was similar to that associated with the COVID-19 pandemic, albeit with a different sectoral pattern: energy-intensive manufacturing and service industries were the most affected by high energy prices, with some impact also on food, accommodation, and retail. Available evidence, however, indicates that firms were generally able to charge higher final prices, including in less energy-intensive sectors, thus recouping higher energy costs. Overall, the analysis supports the phasing out of the existing support according to the plans, provided that there are no further energy price spikes, and ensuring that new support measures remain targeted and temporary.*

III.1. Introduction

In autumn 2021 energy prices started to rise considerably after the drop recorded during the global recession linked to the COVID-19 outbreak. After Russia's invasion of Ukraine, gas prices skyrocketed, which also drove up electricity prices, as indicated in Chapter 2 of this edition of the QREA. Oil prices also increased substantially. Member States helped to alleviate the distress felt by households and corporations by introducing transfers, reduced VAT rates, price caps, and regulatory measures to limit the increase in the cost of energy or mitigate its impact. The European Commission mobilised resources and adapted legislation and surveillance frameworks in order to diversify oil and gas imports, accelerate the transition to renewable energy and increase energy efficiency (89). The Commission has also provided Member States with guidance on possible measures to address household and corporate distress (90).

Since autumn 2022, energy prices have started to level out and current wholesale prices are well below the peak of August 2022. Nonetheless, energy retail and wholesale prices remain above those seen in the years preceding the pandemic, and there is substantial uncertainty as to future trends in wholesale prices, not least because of current geopolitical tensions.

This chapter aims to assess the impact of the energy cost shock on the financial health of the EU corporate sector, based on a sectoral disaggregation that enables us to assess to what extent corporate performance depends on energy intensity (91). Implications of the energy cost shock for corporate balance sheets are assessed using simulations with firm-level data. These simulations evaluate the effect of higher energy costs (modelled as production cost shocks), without taking into account changes in other costs, the existence of support measures, changes in energy demand or changes in output. Moreover, for tractability, the final prices of goods are assumed to remain unchanged. The simulations can therefore be interpreted as providing a hypothetical worst-case scenario for the impact of the energy crisis on corporates' financial health. The results of these simulations indicate that, on aggregate, the increase in the number of financially vulnerable firms associated with the energy cost shock would be similar in magnitude to the

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(88) Comments from Thomas Auger, Giuseppina Cannas, Leonor Coutinho, Geraldine Mahieu, Eric Ruscher, Matteo Salto, and Magdalena Spooner are gratefully acknowledged. The views expressed in this article are those of the authors and do not represent necessarily those of the European Commission.

(89) European Commission(2022): Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions - REPowerEU Plan, COM/2022/230 final.

(90) European Commission (2021): Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions - Tackling rising energy prices: a toolbox for action and support, COM/2021/660 final.

(91) Throughout this study, energy intensity is defined as the share of expenditure on energy inputs out of the total value of output (i.e. direct use of energy inputs). Eurostat structural business statistics (SBS) data is used to compute the energy intensity of a given industry.

increase associated with the legacy of the COVID-19 pandemic ([92]). However, although the COVID-19 legacy is mainly confined to a small subset of service industries – notably hospitality - the energy cost shock is felt the most in energy-intensive manufacturing. Clearly, relatively energy-intensive service industries such as hospitality and transport are also negatively affected due to their weak legacy balance sheets.

Available evidence indicates that firms were generally able to charge higher output prices, although the extent of pass-through has differed across industries and across firms within industries. Combined with the result of our simulations, evidence of pass-through would suggest a likely milder impact of the energy cost shock in terms of corporate vulnerability as compared to the COVID-19 legacy. However, the level of State aid approved for mitigating the energy crisis was above that granted for COVID-19. This higher level of approved State aid may in part reflect a pre-emptive strategy, given the systemic relevance of the shock (including a stronger impact on upstream industries). It could also be linked to relatively more support being channelled through State aid to COVID-19 support schemes. Another important factor is the historical gap between the aid approved and the aid finally disbursed. Overall, the analysis supports the March 2023 Eurogroup statement in favour of phasing out existing support, provided there are no further energy price spikes, and ensuring that any new support measures that may be necessary remain targeted and temporary, focused on the most vulnerable households and viable firms, while preserving incentives to limit energy consumption and increase energy efficiency.

The analysis includes all EU countries for which information is available. Restricting the sample to the euro area yields the same qualitative results ([93]). The analysis consists of four steps. First, the implications of the surge in energy prices for production costs are documented - both direct cost increases and indirect effects via input-output linkages. Second, the results of the micro-simulations are presented, aimed at assessing financial vulnerability in different industries due to higher energy-related production costs, under the assumption of no change in other input costs and no change in output prices (zero pass-through to output prices). Third, preliminary trends in 2022 price-cost margins are presented, based on the available quarterly data. Finally, the policy implications of the results are discussed.

III.2. Energy prices and production costs

Since summer 2021, gas, electricity, and oil prices have surged in light of growing demand, linked to the post-COVID-19 recovery, the disruptive behaviour of Russia as supplier of gas and - most importantly the full-scale invasion of Ukraine by Russia. Wholesale prices for energy have been particularly volatile. Retail prices paid by households and corporations have also soared in most Member States, broadly reflecting the wholesale price dynamics with some delay. The weighted-average pre-tax gas price for household users in the EU peaked in October 2022, having more than tripled compared to early-2021 levels; that for electricity more than doubled over the same period; and the price of refined oil products, such as gasoline and diesel, doubled at its peak in June 2022 (Graph III.3) ([94]). A substantial reduction in wholesale gas and electricity prices has been recorded after the peak in August 2022; wholesale prices have decreased since December 2022. This was largely the result of higher-than-expected storage, linked to energy savings, the diversification of gas supply and a relatively mild winter. However, uncertainty remains about possible future increases in wholesale gas prices in case of stronger-than-expected drops in storage

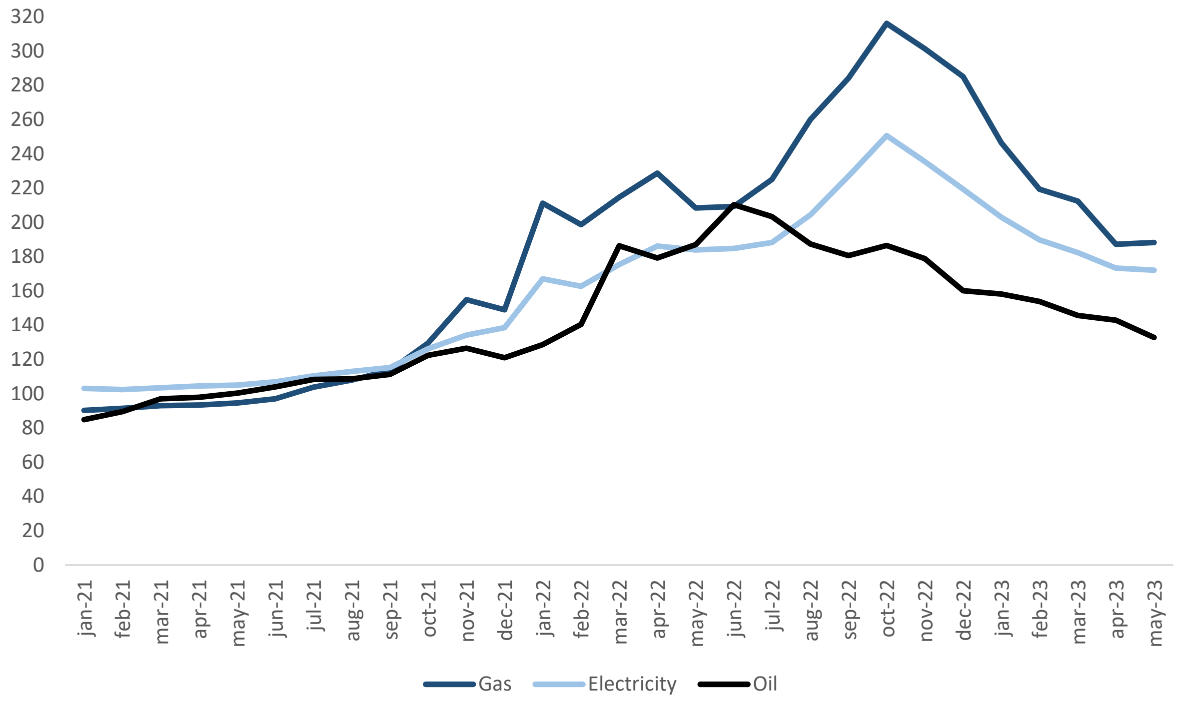
([92]) The simulations carried out for COVID-19 partially consider public support. In particular, short-time work schemes, deferrals of interest and tax payments, and reduced cost of borrowing are considered, whereas grants to firms are not. The methodology for assessing the COVID-19 shock and its impact on corporate balance sheets is discussed in Archanskaia, L., P. Nikolov, and W. Simons (2022): Estimates of corporate cleansing during COVID-19 using firm-level data to measure its productivity impact, QREA 21(2): 7-18. For the energy cost shock, it is assumed that firms can obtain the necessary financing (similar to loan guarantees), but that their borrowing costs are gradually increasing in line with monetary tightening and there are no payment deferrals.

([93]) As shown in the companion analysis restricted to euro area countries: European Commission, 'Corporate vulnerability and the energy crisis: challenges and policy responses.' Technical note to the 18 April 2023 meeting of the Eurogroup Working Group.

([94]) Energy price changes displayed in Graphs 1 and 2 are pre-tax and therefore do not account for the tax measures taken in response to the crisis. Changes in taxes over the period displayed in the two graphs contributed to reducing the effectively paid prices of gas and electricity for both household and non-household users. Yet, as such measures were largely temporary, volatile, and country-specific, their inclusion would have complicated cross-country and time comparisons. All interventions taking place before the taxation stage, such as price caps for certain types of users in some Member States, are accounted for.

in a context of reduced supply from Russia ([95]). Consequently, a reduction in household retail prices of gas and electricity can be observed after October 2022, largely linked to this decline in wholesale prices. Yet, according to the latest available data, pre-tax household retail prices for both gas and electricity in April-May 2023 remain significantly above the levels observed in the same months of 2021 (twice as high for gas, and 65% higher for electricity) ([96]). Moreover, retail prices appear to have stabilised at this higher level.

Graph III.1: **EU27 household pre-tax retail prices of energy products (2019 average=100)**



Source:

Energy prices paid by corporations in 2021-2022 also increased substantially, with significant variations between countries (with greater variations for retail prices than wholesale prices)**.** The average (pre-tax) retail price for gas for non-household users more than doubled in most EU Member States between 2019 and 2022, and more than tripled in some of them (Graph III.2) ([97]). Price increases for electricity also varied widely between countries, while price increases for refined petroleum products were more uniform. Differences between countries in pre-tax energy price developments can be traced back to differing generation and distribution methods, different contract types and duration (affecting the extent to which wholesale prices feed into the retail prices effectively paid by users), and to regulatory measures and policies other than taxation for non-household users ([98]).

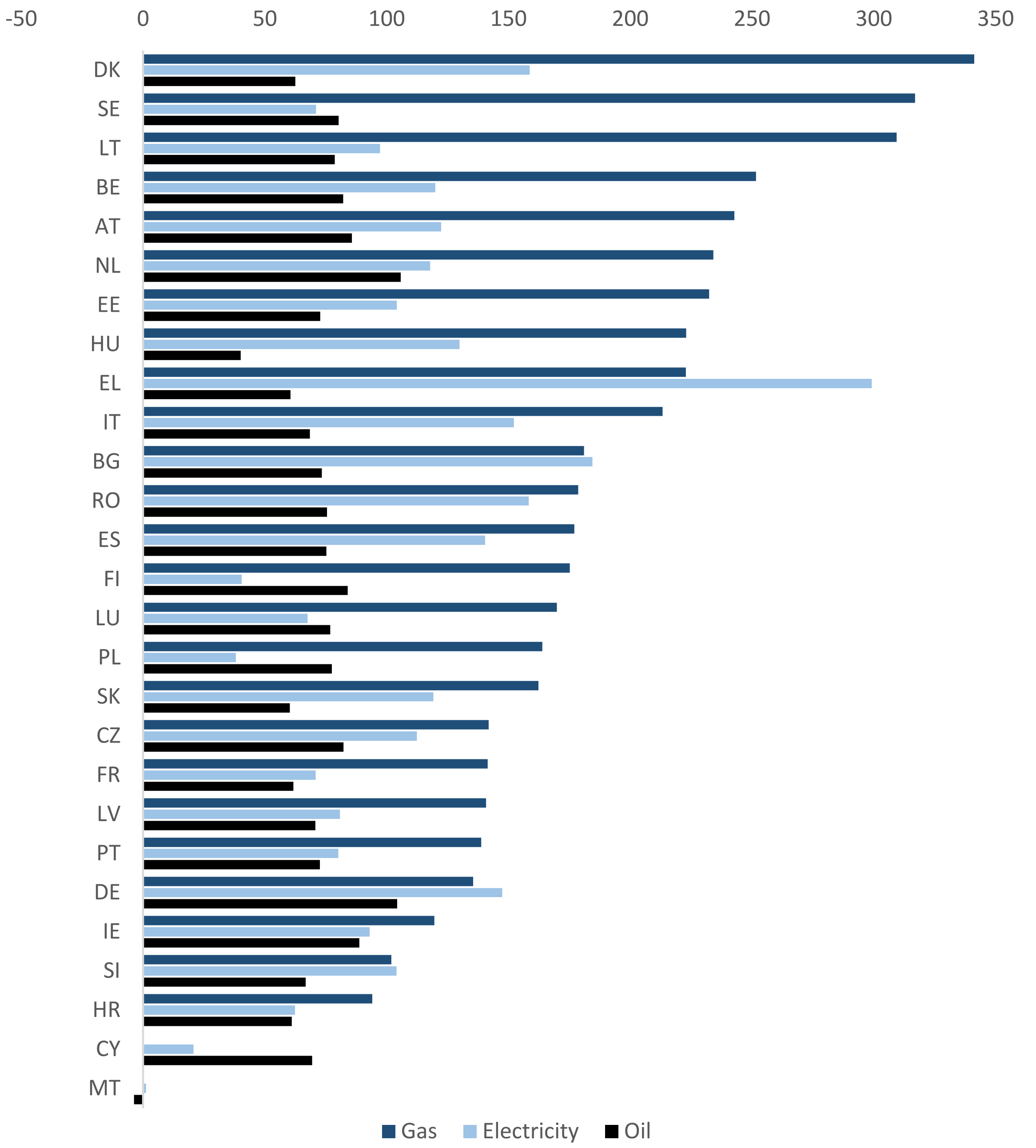
([95]) Wholesale gas and electricity prices are available from S&P Global Platts. As of June 2023, gas (electricity) *wholesale* prices are 7% (28%) higher, and crude oil prices are 30% above the pre-crisis levels (January-June 2021). As shown in the projections reported in Annex 7 of the Implementing REPowerEU Plan SWD, wholesale gas prices over the medium to long term are expected to remain at levels above those observed pre-crisis, with the price converging towards the global LNG price. Retail prices are expected to remain at a higher level in the medium term, also because they are expected to incorporate the cost of investment (e.g., additional gas terminal infrastructure). Yet, wholesale electricity prices are likely to fall in the long term, as the share of renewables grows and the role of gas as price-setter is reduced.

([96]) See Chapter II in this issue of the QREA for a more detailed discussion of pass-through in electricity and gas markets in the EU.

([97]) Graph 2 shows changes since 2019, i.e. a pre-COVID-19 average as benchmark for energy prices in light of the sizeable and temporary drop in energy prices observed in 2020, after the recession that followed the COVID-19 outbreak.

([98]) Ari, A., N. Arregui, S. Black, O. Celasun, D. Iakova, A. Mineshima, V. Mylonas, I. Parry, I. Teodoru, and K. Zhunussova (2022): Surging Energy Prices in Europe in the Aftermath of the War: How to Support the Vulnerable and Speed up the Transition Away from Fossil Fuels, IMF Working Paper 22/152; European Central Bank (2022): Economic Bulletin 4/2022; World Bank (2022): Energy Crisis: Protecting Economies and Enhancing Energy Security in Europe and Central Asia, Policy Note.

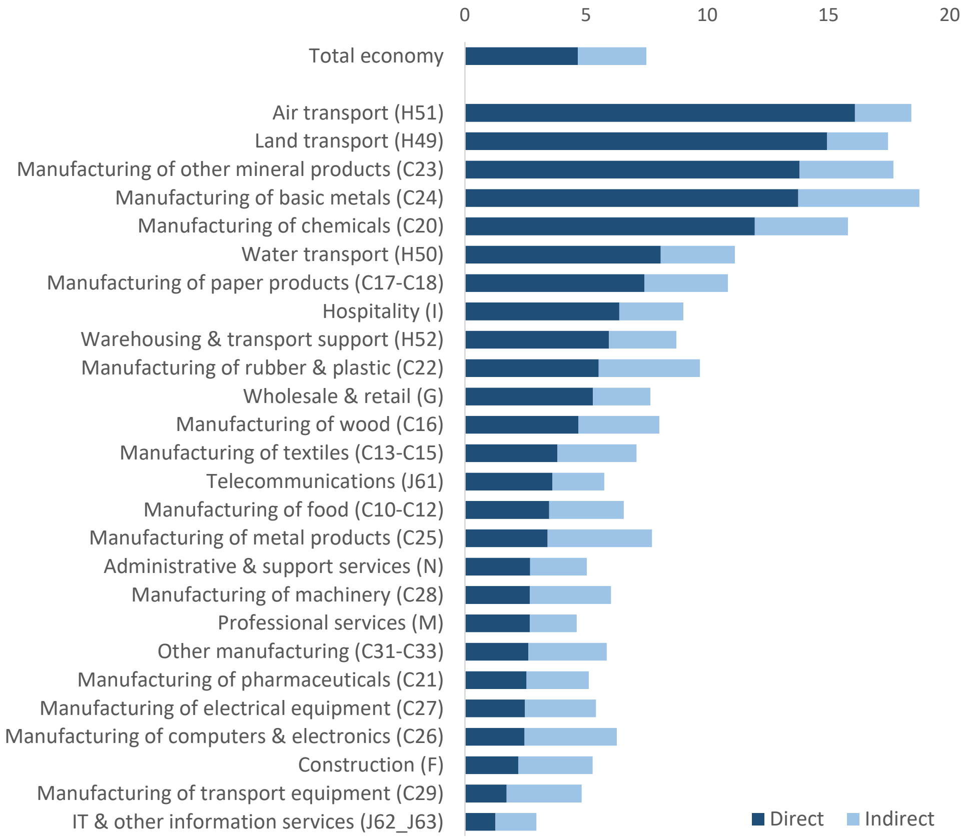
Graph III.2: **Change (%) in EU-27 non-household pre-tax retail prices of energy inputs (2019-2022).**



The non-household pre-tax prices include network and distribution costs but exclude taxes and excise duties. The label 'oil' refers to refined petroleum products. Data for gas and electricity are provided biannually and are reported until end-June 2022. The change is computed as the difference between the average price over 2019 and the price in S1-2022, and as such it excludes the price peak in the second half of 2022.
Source: Eurostat for gas and electricity prices; European Commission's Weekly Oil Bulletin for prices of refined petroleum products.

Graph III.3 shows for each industry the increase in material costs per unit of output, resulting from the increase in pre-tax retail energy prices between 2019 and 2022**.** Material costs increased most in industries with a strong direct reliance on energy. Such industries are found not only in manufacturing (mineral products, metals and chemicals), but also in a number of services, notably transport (especially air and land transport, but also water transport).). Firms also use energy indirectly, as it is incorporated in other inputs

Graph III.3: **Change (%) in material costs linked to changes in energy prices, EU27 (S1-2019 - S1-2022)**



The graph shows the percentage change in the cost of the input bundle (material costs) as a consequence of higher energy prices, with the magnitude of the energy cost shock reported in Graph III.2. Material costs include all inputs used in production, whether primary (raw materials) or secondary (goods and services). The direct channel corresponds to the percentage change in total material costs associated with the direct use of energy in the industry, i.e. the energy cost shock weighted by the share of energy in material costs. The indirect channel corresponds to the percentage change associated with the indirect use of energy in the industry, i.e. through the use of energy in all the industries, of which the output is used as input in the production process of the industry considered. The latter channel is silent under zero pass-through (see footnote). Sectoral data are aggregated across countries according to the country-sector size (value added).
Source: Commission calculations based on Eurostat data and OECD (2021) Inter-Country Input-Output Database.

used in the production process. This indirect reliance on energy can be computed from input-output tables [99]. As shown in Graph III.3, indirect reliance is on average smaller and more uniform across industries. It exceeds direct reliance in a subset of relatively downstream manufacturing industries (e.g. computers and cars).

(99) The computation combines the country-specific price increases (Graph III.2) with the country-industry-specific input shares of gas, electricity and refined petroleum products to obtain country-industry-specific energy cost shocks. Graph 3 aggregates the country-industry shocks to an EU aggregate by industry. The assumption of full pass-through is used to compute the magnitude of the indirect effect. Specifically, it is assumed that energy cost shocks translate into proportional increases in the price of each intermediate input (based on the share of energy in the material cost in the production process of that particular input), thereby increasing the price of each intermediate input used in a given industry. By contrast, under the zero pass-through assumption, only the direct effect is active. Under full pass-through, the sum of the direct and indirect effects gives the total change in the cost of the input bundle, and it provides an upper bound for the impact of the energy shock on material costs in each industry.

III.3. Impact on financial vulnerability: assessing a "worst-case" scenario through micro-simulations

Higher energy costs, if persistent and not (fully) matched by higher output prices, reduce profitability and can translate into losses, depletion of firms' equity, an increased debt burden, and ultimately a higher risk of insolvency. Simulations of the impact of the energy cost shock on firm profitability and balance sheets were carried out using firm-level information from the ORBIS database ([100]). The results represent the highest possible potential increase in financial vulnerability in the EU corporate sector, or a worst-case scenario for the impact of the energy cost shock, because it is assumed that firms do not increase final output prices (i.e. zero pass-through) and do not reduce their demand for energy ([101]). Public support is not considered in the simulation. Moreover, aside from soaring energy prices, the corporate sector has been affected by additional cost-raising factors, notably higher financing costs and tightened lending conditions, labour shortages and accelerating wages, higher prices of selected non-energy raw materials, and the persistence of post-COVID-19 bottlenecks affecting input prices, which are also ignored in the micro-simulations. The simulations do take account of the impact of COVID-19, however, because the 2022 baseline used to simulate the energy cost shock takes into account 2 years of the simulated effect of the pandemic on firm balance sheets ([102]).

The simulations suggest that:

- For the economy as a whole, in this scenario in which firms do not adjust output prices and quantities, an additional 4% of firms would become financially vulnerable by end-2024, compared with a counterfactual scenario in which there is no increase in energy costs compared to the baseline (Graph III.4). This figure is comparable to the increase in the number of financially vulnerable firms associated with the COVID-19 legacy. Specifically, by end-2024 an additional 4% of firms are deemed financially vulnerable due to COVID-19, compared with a counterfactual scenario in which neither the COVID-19 nor the energy cost shocks occur (Graph III.5) ([103]). A specific characteristic of the COVID-19 legacy is that smaller firms are more likely to remain financially vulnerable. For the economy as a whole, the share of turnover associated with financially vulnerable firms is about 2% in connection with the COVID-19 legacy, and about 4% in connection with the energy cost shock, which, therefore, tends to affect average-sized firms.

- Highly energy-intensive industries are most affected by the energy cost shock, both in the manufacturing (e.g. basic metals, other mineral products, chemicals and pharma) and the services (e.g. transport services, hospitality, wholesale and retail trade) industries. For services, the relatively weak

([100]) The simulation of the energy cost shock is carried out in the ORBIS database through the increase in firm-specific material costs, under the assumption of zero pass-through (i.e. only the direct channel is active). The country-industry-specific energy cost shock is computed as the increase in the pre-tax retail energy prices for non-household users between the first semester 2022 and the average price in 2019 (Graph 2), weighted by the share of energy inputs in production (Graph 3, direct effect). More precisely, the country-specific energy price shock together with the country-industry-specific share of energy inputs in total material costs (from input-output tables) is applied to the material cost bill of firms in ORBIS. Given that the share of material costs in total production costs varies across firms, the country-industry-specific material cost shock leads to firm-specific changes in overall production costs. The cost is assumed to remain at this level up to the end of 2024, which we consider as an approximation of the higher expected retail price in the medium term. The simulations assess the evolution of firms' profits, liquidity positions, and balance sheets up to the end of 2024, under the restrictive assumption that sales and costs other than energy mimic firm-level outcomes observed before COVID-19. In the counterfactual scenario, the energy shock does not materialise, and firms revert to their pre-COVID-19 outcomes.

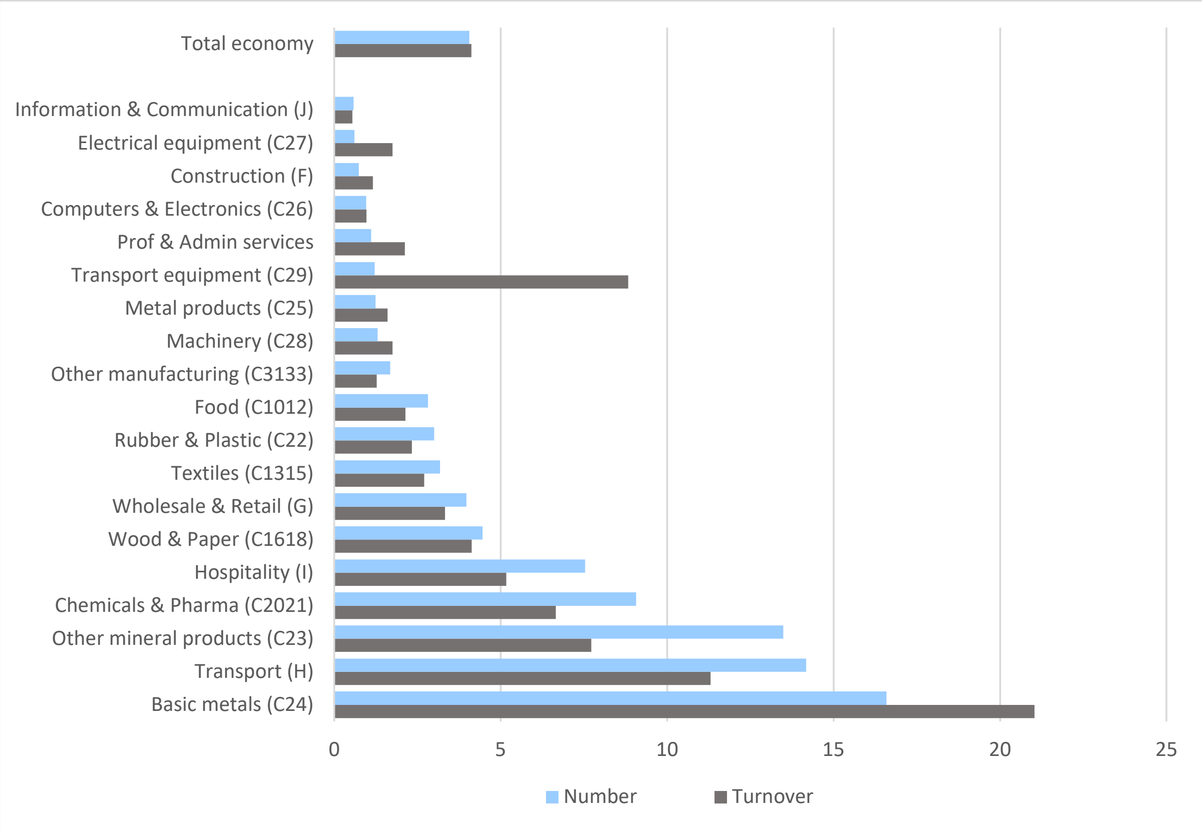
([101]) Firms are identified as financially vulnerable if they have negative equity and/or a high debt burden (i.e. the firm is unable to cover debt servicing costs with operating profits and, on top of that, the firm is highly leveraged), by end of 2024. To be considered vulnerable, firms are also required to display a high risk of default by the end of 2024, according to a statistical criterion based on firms' expected leverage, capitalisation, liquidity, and profitability (Altman Z-score model). See Archanskaia, L., P. Nikolov, and W. Simons (2022), op. cit.

([102]) The use of pre-COVID-19 balance sheets is due to the lag in the availability of firm-level data, i.e. 2021 balance sheet information is incomplete at the time of writing. Further, the approach of simulating the two crises sequentially, on the basis of one set of firms, enables us to compare the magnitudes of the COVID-19 and the energy cost shocks in a controlled environment. For the description of the dataset, see Archanskaia L., E. Canton, A. Hobza, P. Nikolov, W. Simons (2023), The Asymmetric Impact of COVID-19: A novel approach to quantifying financial distress across industries, European Economic Review, forthcoming.

([103]) Therefore, compared to a hypothetical situation without the COVID-19 pandemic and without the energy cost increase, an additional 8% of firms are vulnerable by end-2024 as result of the pandemic and the energy crisis, adding to vulnerabilities (entry-exit dynamics) occurring in normal times.

starting level of balance sheets after the pandemic is also likely to play a role ([104]). When measured in terms of their share in total sales of the industry, additional financially vulnerable firms in these service industries appear relatively small, whereas the opposite holds true for a subset of heavily affected manufacturing industries, e.g. in basic metals and in the manufacturing of transport equipment ([105]).

Graph III.4: **Increase (pp) in the share of financially vulnerable firms out of total firms in response to the energy price shock (by end-2024) - aggregate for available EU countries**



The graph plots the share, by December 2024, of EU firms by sector that become financially vulnerable due to the energy cost shock, compared to a counterfactual with COVID-19 but without the energy cost shock. The blue bars display the number of additionally vulnerable firms relative to the total number of firms. The grey bars display the number of additionally vulnerable firms weighted by size (firm turnover) relative to the sectoral or economy-wide turnover. The sample covers 20 EU countries (AT, CY, DE, IE, LI, MT and NL are missing given data constraints).
Source: Commission calculations based on ORBIS database.

III.4. Changes in price-cost margins

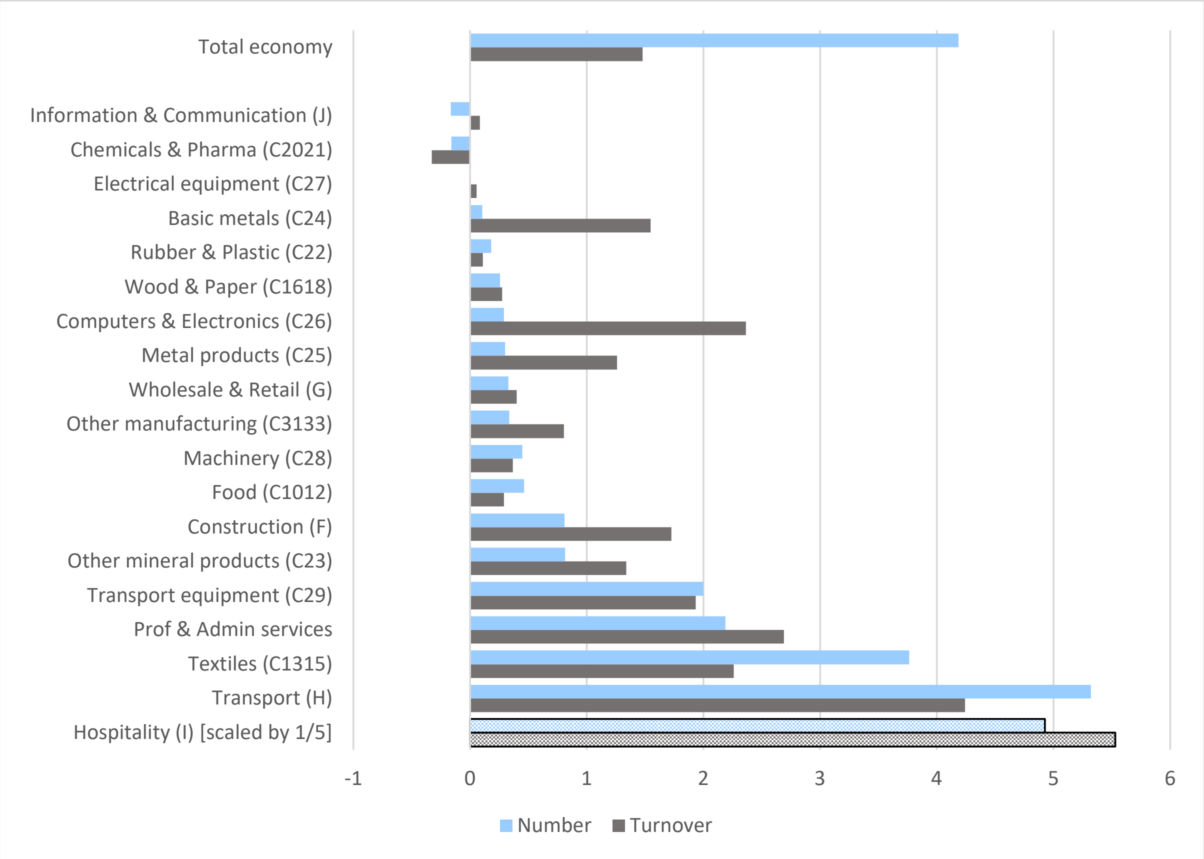
In contrast to the zero pass-through assumption underpinning the micro-simulations discussed above, the evidence suggests that firms were generally able to pass on - at least partially - the increase in production costs to output prices, although the extent of the pass-through appears heterogeneous across industries

([104]) In the hospitality industry (I), e.g. after 2 years of the COVID-19 pandemic an additional 39% of firms appear financially vulnerable. In the absence of the energy cost shock, this share is reduced to 25% (-14 pp) by the end of 2024, whereas with the energy cost shock included the share stands at 33% (-6 pp).

([105]) Following a similar approach, the EIB has analysed the impact of doubling corporate energy bills across the board. Assuming zero pass-through, this leads to an increase by 7 percentage points (pp) of the share of firms with negative profits, and by 2 pp of the share of firms with negative equity. See European Investment Bank (2022): How bad is the Ukraine war for the European recovery? Economics - Thematic Studies. The German Council of Economic Experts published simulations for an increase in gas (150-400%) and electricity (300%) prices, equally with a zero pass-through assumption, showing that this could imply negative profits for half of the firms in metals, and smaller increases in other sectors in Germany. See German Council of Economic Experts (2022): Annual Report 2022/23 - Managing the energy crisis in solidarity, shaping the new reality, Chapter 5. In early 2022, the Bank of Spain published simulations for the impact of an energy price increase by 25%, showing that the share of firms with negative profits would raise by less than 10 pp. See Banco de España (2022): Financial Stability Report Spring 2022, Box 1.4

and may also be heterogeneous across firms within industries ([106]). This study uses quarterly data on output deflators and labour costs in each country and industry, available from Eurostat short-term business statistics (STS), to evaluate the extent to which cost increases appear to have led to, or cover, price increases in 2022 ([107]).

Graph III.5: **Increase (pp) in the share of financially vulnerable firms (by end-2024) in response to the COVID-19 pandemic - aggregate for available EU countries**



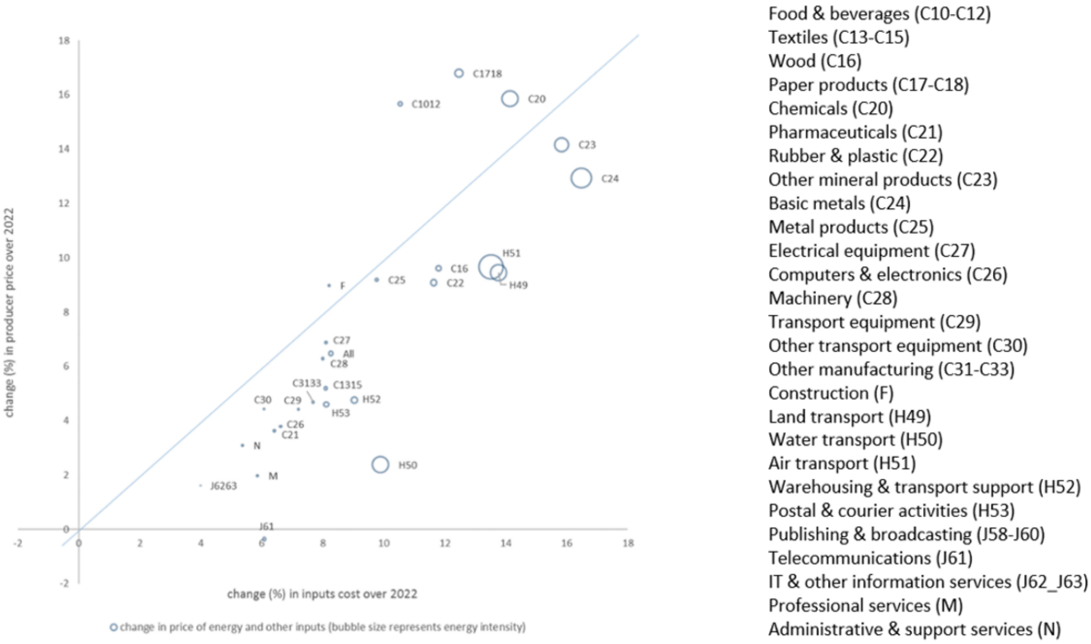
The graph plots the share, by December 2024, of EU firms by sector that become financially vulnerable in connection to the COVID-19 pandemic and remain financially vulnerable after three years of 'normal times' activity, compared to a counterfactual in which neither the COVID-19 nor the energy cost shock materialise. Blue bars display the number of additionally vulnerable firms relative to the total number of firms; grey bars display the number of additionally vulnerable firms weighted by size (firm turnover) relative to the sectoral or economy-wide turnover. The sample covers 20 EU countries (AT, CY, DE, IE, LU, MT and NL are missing given data constraints).
Source: Commission calculations, based on ORBIS database.

Graph III.6 plots the observed change in output prices against the computed increase in total material costs in 2022 for each industry. In energy-intensive industries both material costs and output prices have increased more strongly than in less energy-intensive industries. However, changes in output prices vary significantly even between the relatively energy-intensive industries, suggesting that the pass-through of input cost increases into output prices is heterogeneous across industries.

([106]) The evidence presented in this subsection refers to industry averages, i.e. averages across all firms within an industry. Firm-level evidence for Belgium indicates that costs were the main contributing factor of increasing prices, with margins contributing negatively in 2022, and relatively more so for bigger firms. See, e.g. Bijnens G., Duprez C., and J. Jonckheere (2023): Have greed and rapidly rising wages triggered a profit-wage-price spiral? NBB Blog. Heterogeneity across firms, notably with respect to their size, may potentially be important and deserves further investigation in future analyses.

([107]) Information on input deflators is not available. The increase in total material costs in each country-industry is computed by combining the available information on energy cost shocks and on output deflators from Eurostat STS with information on the shares of each country/industry in the total material cost of each country and industry, taken from input-output (IO) tables. The computed increase in material costs is given by the weighted average of price changes of energy and non-energy inputs. While being consistent with the approach used to compute the implied direct and indirect change in material costs discussed above, here there is no assumption on pass-through: the available information on output deflators is a sufficient statistic of pass-through.

Graph III.6: **Producer price change (%) versus cost change for material inputs (%) - EU average (value-added-weighted average across countries), average change Q1-2022 relative to Q4-2021**



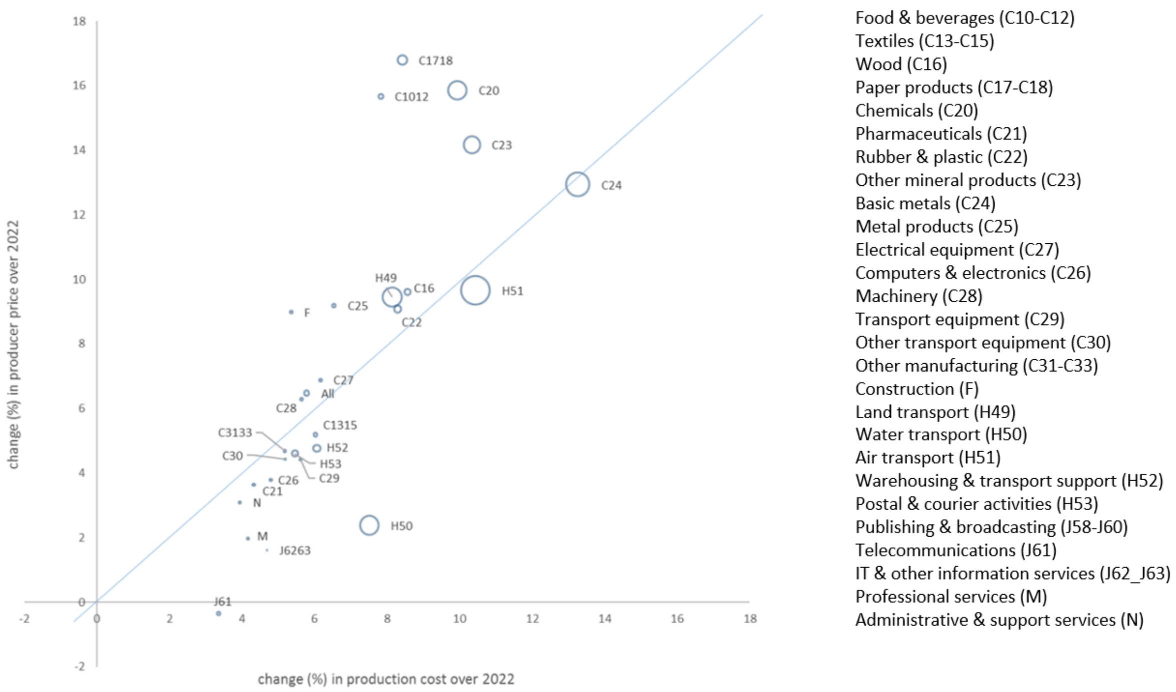
The x-axis shows the cost change in per cent for the country-sector specific bundle of energy and non-energy inputs, which overall is largely driven by changes in the price of energy. The y-axis shows the producer price increase over the same timeframe. The change in material input covers direct reliance on energy, as well as indirect reliance via non-energy inputs produced with energy. Bubble sizes indicate the energy intensity (direct exposure) of the respective sector. All EU-27 countries are covered except for CY, LU, MT and SE. Sectors G, I, K and L are excluded due to data availability constraints.
Source: Commission calculations based on OECD (2021) ICIO, Eurostat short-term business statistics, Eurostat for gas and electricity prices, European Commission's Weekly Oil Bulletin for prices of refined petroleum products.

Graph III.7 provides stylised evidence on the extent of price-cost pass-through for each industry, by plotting the observed change in output prices against the computed increase in total production costs. The total change in production costs is computed as the weighted average of changes in material costs (plotted in Graph III.6), of labour costs (taken from Eurostat STS), and of capital costs (for which prices are assumed unchanged), weighted by the cost shares of each input in total costs ([108]). The increase in prices and in this broader index of costs appears relatively aligned, with industries exhibiting relatively stronger price growth compared to cost growth (i.e. being located above the 45-degree line) becoming more common. Energy-intensive industries generally display stronger dynamics in both costs and prices. It is only the few industries with the highest energy intensity (transport sectors, metals) that display stronger production cost dynamics compared to output price dynamics. The difference compared to the evidence in Graph III.6 suggests relatively muted wages compared to prices, evidenced by the negative real wage growth across the EU in 2022. This evidence is broadly consistent with national account data reporting an average increases in the profit share across the euro area and the EU, as well as for broadly defined industries ([109]).

([108]) In Graph III.7, the difference between the change in final prices and in the cost index does not fully correlate with the change in profits, as residual costs (including capital, rent, and some overhead costs) are not included in the cost index. The price of this residual category is difficult to quantify at industry level. Assuming no change therefore appears to be the most transparent and prudent approach.

([109]) See e.g. ECB (2023): Economic Bulletin Issue 2/2023. For the U.S., see e.g. Glover A., Mistre-del-Rio J, and J. Nichols (2023): Corporate profits contributed a lot to inflation in 2021 but little in 2022 – A pattern seen in past economic recoveries, FED Economic Bulletin (May).

Graph III.7: **Producer price change (%) versus change in material and labour cost (%) - EU average (value-added weighted average across countries), average change Q1-2022- relative to Q4-2021**



(1) The x-axis shows the cost change in per cent for the country-sector specific bundle of energy and non-energy inputs and labour. The y-axis shows the producer price increase over the same timeframe. The change in material input costs covers direct reliance on energy, as well as indirect reliance via non-energy inputs produced with energy. Bubble sizes indicate the energy intensity (direct exposure) of the respective sector. All EU-27 countries are covered except for CY, LU, MT and SE. Sectors G, I, K and L are excluded due to data availability constraints. Observations below (above) the 45-degree line would be suggestive of imperfect (excessive) pass-through, unless they are the result of residual cost changes (including capital) over the same timeframe.

Source: Commission calculations based on OECD (2021) ICIO, Eurostat short-term business statistics, Eurostat for gas and electricity prices, European Commission's Weekly Oil Bulleting for refined petroleum products.

Overall, the evidence suggests that after the energy crisis firms were generally able to absorb the rise in energy costs through higher output prices. In turn, higher output prices protected profit margins, but apart from in a few sectors, did not increase them. However, this evidence is suggestive only, as the fact that cost increases are matched by increases in final prices is not a sufficient indication that the increase in prices is a response to the cost shock to output prices (causality). Moreover, a full-fledged analysis of the extent of pass through of energy cost shocks to output prices needs to take the different margins of adjustment available to firms into account, which, in addition to output prices, include energy demand, output volumes and production techniques ([110]). With those caveats in mind, the evidence nonetheless suggests that pass-through has taken place.

This contrasts with the assumption underlying the micro-simulations reported in this article, which represent a worst-case scenario. The extent of pass-through of energy prices to output prices may vary considerably across sectors. The above evidence suggests that energy intensity may play a role. Moreover, recent evidence on price-cost margins may not be representative of future dynamics. Price and cost growth appear to be decelerating after a strong pick-up in 2021. Price increases were generally steeper than cost increases in 2021, but since 2022 both price and cost growth have been decelerating. This is especially the case for prices in most sectors. The narrowing of price cost margins reflects, on the one hand, the

([110]) Preliminary evidence from an attempt to structurally estimate pass-through from energy costs to prices, taking into account the various margins of adjustment, based on historical (pre-2021) data from French firms finds pass-through from energy costs to output prices to be nearly complete, on average. See Fontagné, L., Ph. Martin, and G. Orefice (2023): The many channels of firm's adjustment to energy shocks: evidence from France, CEPR Discussion Paper 18262.

easing of temporary demand overhang in the post-COVID recovery, underpinning output price growth, and, on the other hand, persistent growth in production costs linked notably to the lagged reaction of wages to the inflation environment ([111]).

III.5. Policy considerations and concluding remarks

The energy crisis linked to the war of aggression against Ukraine triggered prompt action at EU level, and received attention by the Eurogroup.

In the emergency phase, the EU has mobilised funds and introduced regulatory measures to address the implications of Russia's war of aggression against Ukraine on the energy system (REPowerEU) ([112]). It has also given guidance to Member States on national support to address the energy crisis, recommending that the support be temporary, targeted and compatible with incentives to save energy ([113]). The Eurogroup issued a statement in October 2022, reaching similar conclusions on support measures.

Since the start of the war, support to corporations has been guided by the EU Temporary Crisis Framework (TCF) for State aid (see Box 2). The amount of State aid approved under the TCF during the first 11 months of the war has been substantial (Graph III.8), notably provided in the form of credit guarantees and subsidised loans.

More recently, EU initiatives focused on making sure that the energy crisis is addressed on a durable basis via structural measures (e.g. aspects of the Green Deal industrial plan ([114]) and the Regulation on electricity market design ([115])), and in its fiscal guidance for 2024, the Commission recommended phasing out the existing support in line with the relevant plans.

Since the onset of the energy crisis, EU Member States have taken a variety of measures to mitigate the impact of higher energy prices. In line with EU and euro area guidance, most of those measures were intended as temporary. However, only a minority of measures aimed at reducing the actual cost of energy ('price measures') were targeted to households ([116]).

Challenges to addressing corporate distress due to the energy crisis have an EU and euro area dimension and require a coordinated response. Appropriate policy responses were discussed by the Eurogroup on 15 May 2023 ([117]). The main goal for policy is to ensure that structural measures to foster the energy transition, enhance energy efficiency, and reduce energy dependency are taken in an effective and timely fashion. Challenges ahead also relate to the need to ensure that the support is phased out in line with the Eurogroup's 13 March statement. The support should also be increasingly targeted, compatible with

([111]) See, e.g. Arce, O., E. Hahn, and G. Koester (2023): How tit-for-tat inflation can make everyone poorer. The ECB Blog, 30 March 2023. The European Commission Spring Forecast 2023 projects an increase in real unit labour costs in the euro area and the wider EU starting in 2024, which is indicative of productivity-adjusted wages increasing more than prices, implying a reduction in the profit share if not accompanied by a reduction in other production costs.

([112]) European Commission (2022): Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee, and the Committee of the Regions: REPowerEU Plan, 18/05/2022, COM(2022) 230 final.

([113]) Guidance on Member State support to cushion the energy crisis was provided already in the October 2021 Communication (toolbox). The country-specific recommendations issued in May 2022 specified that budgetary objectives would also consider the need to mitigate the impact of high energy prices on vulnerable households and firms, and promoted a temporary approach to support, targeted at vulnerable households and firms, while maintaining incentives to save energy. The 2023 Council Recommendation on the economic policy of the euro area recommends targeting fiscal support to address the impact of high energy prices on vulnerable households and companies, and in particular replace broad-based price support measures by a cost-efficient two-tier energy pricing that ensures incentives for energy savings.

([114]) European Commission (2023): Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee, and the Committee of the Regions: A Green Deal Industrial Plan for the Net-Zero Age, COM(2023) 62 final.

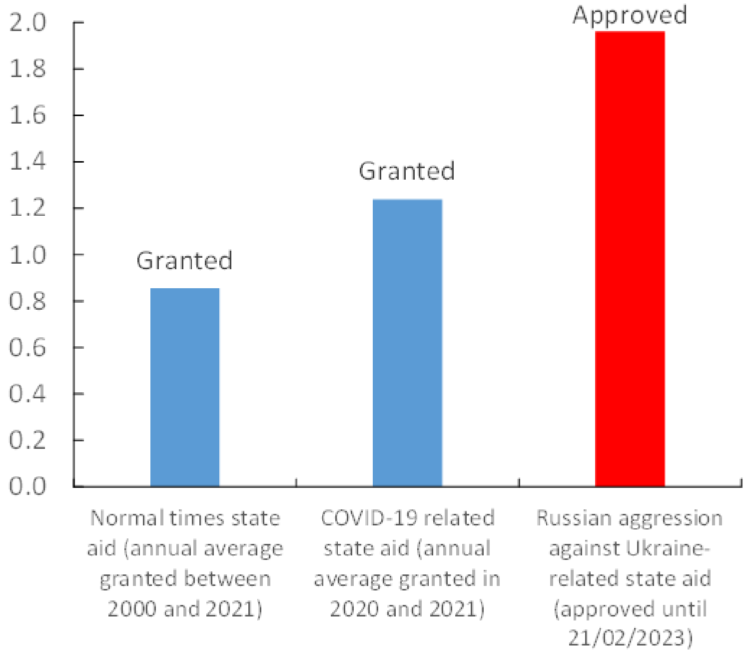
([115]) European Commission (2023): Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design, 14/03/2023, COM(2023) 148 final, 2023/0077 (COD).

([116]) European Commission (2022): Measures to mitigate the impact of the high energy prices on households and firms and their fiscal costs: Note to the Economic and Financial Committee, 06/05/2022; European Commission (2022): Fiscal measures to counter high energy prices: Note to the Eurogroup Working group, 24/06/2022.

([117]) The discussion took place on the basis of a technical note by the Commission: 'Corporate vulnerability and the energy crisis: challenges and policy responses',https://www.consilium.europa.eu/media/64262/e.g.-note-corporate-vulnerability.pdf.

preserving the single market, with incentives to save energy and, where possible, with promoting the move towards cleaner forms of energy ([118]). Support should be designed in ways that prevent an excessive growth in corporate debt, and insolvency frameworks may need to be adapted to alleviate debt distress. Measures to address corporate distress may need to be accompanied by flanking measures to address employment and social implications. The challenges have implications for economic activity and inflation developments. Addressing them in a coordinated way, notably with commonly agreed criteria, may contribute to developing an appropriate macroeconomic policy mix.

Graph III.8: **State aid, EU-27, various periods**



Source *Data on granted State aid come from the European Commission State Aid scoreboard (covering 1 January – 31 December 2020). The data are based on annual State aid expenditure reporting by Member States in line with Article 6(1) of Commission Regulation (EC) 794/2004. Data on the approved State aid after the Russian aggression against Ukraine (TCF context) are available in the State aid registry* (https://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id=1,2,3

([118]) See European Commission, 'Corporate vulnerability and the energy crisis: challenges and policy responses', Commission, https://www.consilium.europa.eu/media/64262/e.g.-note-corporate-vulnerability.pdf.

Box III.1: **The EU Temporary Crisis Framework (TCF) for state aid**

Support to corporations has been guided by the provisions of the EU Temporary Crisis Framework (TCF) for State aid. The TCF, adopted on 23 March 2022 and amended on 20 July 2022, 28 October 2022 and 9 March 2023, sets out the criteria for assessing the compatibility of State aid with the single market. In doing so, it takes account of the impact of Russia's war of aggression against Ukraine.

According to the TCF, up to 31 December 2023, subject to certain conditions, Member States are allowed to:

(i) grant limited amounts of aid to companies;
(ii) ensure sufficient liquidity;
(iii) compensate for exceptionally high gas and electricity prices;
(iv) accelerate the roll-out of renewable energy, storage and renewable heat relevant for REPowerEU;
(v) decarbonise industrial production processes; and
(vi) incentivise additional reductions of electricity consumption.

The criteria for granting aid to compensate for high gas and electricity prices is based on a two-tier approach:

- the eligible costs that can be compensated through State aid cannot exceed 50% of the increase in the price of energy compared with the average price in 2021, and
- it cannot cover more than 70% of the energy consumption recorded in 2021.

The TCF further specifies the upper limits for the total amount of admissible aid. These limits depend on earning losses incurred by the firm compared to 2021, the energy intensity of the firm, and whether it operates in sectors with a high risk of losses in competitiveness ([1]).

([1]) On 9 March 2023, amendments were made to the TCF to: (a) prolong to 31 December 2023 the possibility to introduce measures under points (iv) and (v) above and ease conditions; and (b) introduce new measures, applicable until 31 December 2025, notably to further accelerate investments in key sectors to support the transition towards a net-zero economy.

Annex. The euro area chronicle

The Commission, the Economic and Financial Affairs Council and the Eurogroup regularly take decisions that affect how the Economic and Monetary Union works. To keep track of the most relevant decisions, the QREA documents major legal and institutional developments, presented in chronological order with references. This issue covers developments between mid-March and end-June 2023.

Reform of bank crisis management and deposit insurance framework. On 18 April 2023, the European Commission adopted proposals to adjust and further strengthen the existing EU bank crisis management and deposit insurance (CMDI) framework. ([119]) The proposals will enable authorities to organise an orderly market exit for failing banks of any size and business model, including smaller players. Overall, the proposal is designed to preserve financial stability, protect taxpayers and depositors, and increase the efficiency of the crisis management framework for the economy.

New economic governance rules fit for the future. On 26 April 2023, the Commission presented legislative proposals to implement a comprehensive reform of the EU's economic governance rules. ([120]) The central objective of these proposals is to strengthen public debt sustainability while promoting sustainable and inclusive growth in all Member States through reforms and investment. In particular, the Member States' fiscal strategy would be based on a medium-term net expenditure path anchored on debt sustainability. The proposals take into account the need to reduce the high public debt levels, build on the lessons learned from the EU policy response to the COVID-19 crisis, and prepare the EU for future challenges by supporting progress towards a green, digital, inclusive and resilient economy and making the EU more competitive.

Economic and fiscal policy guidance. On 24 May, the Commission adopted the European Semester package providing guidance to Member States to build a robust and future-proof economy that secures competitiveness and long-term prosperity for all in the face of a challenging geopolitical environment. This year, the country-specific recommendations include: i) a fiscal policy recommendation, including, where relevant, fiscal-structural reforms; ii) a recommendation to continue or accelerate the implementation of RRPs, including their revisions and the integration of REPowerEU chapters, and to swiftly implement the adopted cohesion policy programmes; iii) an updated and more specific recommendation on energy policy in line with the REPowerEU objectives; and iv) where relevant an additional recommendation on outstanding and/or newly emerging structural challenges. As regards fiscal policy, the Commission provided quantified and differentiated recommendations for 2024 as the period of activation of the general escape clause ends at end-2023. ([121]) These recommendations establishe the maximum growth rates for net primary expenditure. The Commission also called on Member States, to i) preserve nationally financed public investment and ensure the effective absorption of grants under the RRF and other EU funds; and ii) wind down the energy support measures in force by the end of 2023 unless renewed energy price increases require support measures. For the period beyond 2024, Member States should continue to pursue a medium-term fiscal strategy of gradual and sustainable consolidation, which, combined with investments and reforms conducive to higher sustainable growth, allows to achieve a prudent medium-term fiscal position. In the context of the same package, the Commission also assessed the existence of macroeconomic imbalances for 13 euro-area Member States. ([122]) The Commission concluded that, after experiencing excessive imbalances until 2022, Cyprus is now experiencing imbalances, as vulnerabilities related to private, government and external debt remain a concern even if overall they have declined. Germany, Spain, France, Portugal, and the Netherlands, continue to experience imbalances. Vulnerabilities are receding in Germany, Spain, France, and Portugal to the extent that a continuation of these trends next year would provide ground for a decision of no imbalances. Greece and Italy continue to experience excessive imbalances, but their vulnerabilities appear to be receding also due to policy progress. Estonia, Latvia, Lithuania, Luxembourg, and Slovakia are not found to be experiencing

([119]) https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2250
([120]) https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/economic-governance-review_en
([121]) https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2872
([122]) https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/macroeconomic-imbalance-procedure/depth-reviews_en

imbalances as their vulnerabilities seem overall to be contained at present. Finally, the latest post-programme surveillance reports for Ireland, Greece, Spain, Cyprus and Portugal, conclude that all five Member States retain the capacity to repay their debt. ([123])

After Estonia, five other euro area Member States submitted the REPowerEU chapters to add to their RRPs. Following **Estonia (on 9 March ([124]),** France submitted its REPowerEU chapter on 20 April, covering measures related to energy efficiency in buildings, the net-zero industry and non-fossil hydrogen. ([125]) On 26 April, Slovakia and Malta submitted a similar request. ([126]) Slovakia's updated plan includes in particular reforms in support of renewable energy sources, including geothermal energy and the hydrogen sector, transformative investments in the electricity grid and energy efficiency, as well as in support for transport sector and households at risk of energy poverty. For Malta, the REPowerEU chapter includes a reform aiming at accelerating the permitting of renewable energy projects and introducing an obligation to install rooftop solar panels on new buildings, and an investment targeted at upgrading and expanding the electricity grid's capacity. On 26 May, Portugal submitted its REPowerEU chapter, with reforms and investments focusing on energy efficiency in buildings, renewables and biogas, sustainable transport, the electricity grid and green industry. ([127]) A transformative REPowerEU chapter was also submitted by Spain on 6 June, covering both reforms and investments, aimed at further weaning the country off Russian fossil fuels. ([128])

Disbursements under the Recovery and Resilience Facility to Slovakia and Luxembourg. On 22 March, €709 million of grants under the RRF were disbursed to Slovakia, following a positive preliminary assessment adopted by the Commission on 8 February. ([129]) This pertains to a payment request submitted by Slovakia on 25 October 2022 concerning the second instalment. It covers reforms and investments regarding the circular economy, in the education and healthcare systems, in the governance of Research & Innovation activities, in schemes to attract skilled workers, as well as in the digital economy, public procurement and the fight against corruption. This second payment request also covers investments aimed at the protection of nature and biodiversity and at improving digital skills. On 16 June, €20.2 million of grants under the RRF were disbursed to Luxembourg, after a positive preliminary assessment adopted by the Commission on 28 April. ([130]) This concerns a payment request submitted by Luxembourg on 28 December 2022 regarding the first instalment. It includes a reform aimed at increasing the supply of affordable rental housing, the digitalisation of the public sector and green mobility measures. The milestones and targets also confirm progress towards the completion of investment projects related to ultra-secure communication, the upskilling of the workforce and the digitalisation of health. By the end of June, about €99 billion of grants and €44 billion in loans were disbursed under the RRF to euro area Member States. ([131])

The Commission adopted legislative proposals to support the use of cash and to propose a framework for a digital euro. On 28 June, the Commission put forward a legislative proposal on the legal tender of euro cash to safeguard the role of cash, to ensure it is widely accepted as a means of payment and remains easily accessible for people and businesses across the euro area. ([132]) In addition, the Commission proposed the legal framework for a possible digital euro as a complement to euro banknotes and coins. The digital euro would ensure that people and businesses have an additional choice – on top of current private options – that allows them to pay digitally with a widely accepted, cheap, secure and

([123]) https://commission.europa.eu/publications/2023-european-semester-spring-package_en
([124]) https://ec.europa.eu/commission/presscorner/detail/de/mex_23_1590
([125]) https://ec.europa.eu/commission/presscorner/detail/en/mex_23_2406
([126]) https://ec.europa.eu/commission/presscorner/detail/en/mex_23_2483
([127]) https://ec.europa.eu/commission/presscorner/detail/en/mex_23_2945
([128]) https://ec.europa.eu/commission/presscorner/detail/es/mex_23_3123
([129]) https://ec.europa.eu/commission/presscorner/detail/en/mex_23_1821
([130]) https://ec.europa.eu/commission/presscorner/detail/en/mex_23_3322
([131]) Including prefinancing.
([132]) https://ec.europa.eu/commission/presscorner/detail/en/ip_23_3501

resilient form of public money in the euro area, complementing the private solutions that exist today. This proposal establishes the r the digital euro and regulates its essential aspects, including establishment and issuance, legal tender, financial stability, privacy, international use, distribution and compensation. However, it will ultimately be for the European Central Bank to decide if and when to issue the digital euro.

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