Inflation and the effects of monetary tightening in the euro area
Abstract

After inflation in the euro area started to rise to unprecedented levels, the ECB has tightened monetary policy rapidly. We analyse the implications of high inflation and the effects of monetary policy tightening on the euro area economy. While financial conditions have already tightened significantly, the size and timing of the impact on the real economy is more difficult to assess. Distributional effects can be expected to be modest and should not be a major concern for monetary policy.

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**AUTHORS**
Klaus-Jürgen Gern, Kiel Institute for the World Economy
Nils Jannsen, Kiel Institute for the World Economy
Nils Sonnenberg, Kiel Institute for the World Economy

**ADMINISTRATORS RESPONSIBLE**
Drazen RAKIC
Giacomo LOI

**EDITORIAL ASSISTANT**
Adriana HECSER

**LINGUISTIC VERSIONS**
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**ABOUT THE EDITOR**
The Economic Governance and EMU Scrutiny Unit provides in-house and external expertise to support EP committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU internal policies.

To contact Economic Governance and EMU Scrutiny Unit or to subscribe to its newsletter please write to:
Economic Governance and EMU Scrutiny Unit
European Parliament
B-1047 Brussels
E-mail: egov@ep.europa.eu

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<tr>
<td>ECB</td>
<td>European Central Bank</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<td>NEIG</td>
<td>Non-energy industrial goods</td>
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<td>TLTRO</td>
<td>Targeted longer-term refinancing operations</td>
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<tr>
<td>TPI</td>
<td>Transmission protection instrument</td>
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<td>OIS</td>
<td>Overnight index swap</td>
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Inflation and the effects of monetary tightening in the euro area

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EXECUTIVE SUMMARY

- The increase in inflation in the euro area since 2021 has been driven by higher import prices for energy goods and food, as well as by domestic factors. While the contribution from energy has diminished, inflation is now mainly driven by domestic factors, which are reflected in high capacity utilisation. Capacity utilisation is high because both temporary and permanent factors have dampened production capacity and the post-pandemic recovery has boosted demand. Limited supply and robust demand have led to an increase in firms’ gross operating surpluses, while wages will only increase with some delay. Given the low level of real unit labour costs, higher wages will not necessarily lead to strong second-round effects on inflation from a cost perspective, but will stimulate demand and thus delay the deceleration of inflation.

- Individual inflation rates have been heterogeneous across households, but only provide an incomplete measure of hardship caused by high inflation. In most European countries, group-specific inflation rates have risen more for poor households because energy and food have higher weights in their consumption baskets. From a general perspective, hardship due to rising prices tends to be higher for poor households anyway, because they can rely less on savings and have less scope to adjust their consumption basket. For a more comprehensive picture of hardship due to higher prices, the drivers of inflation need to be taken into account, because a domestically-driven inflation may have different effects than an imported inflation.

- The normalisation of monetary policy of the ECB has led to a significant tightening of financial conditions. Government bond yields and lending rates for private households and firms have risen sharply. Credit standards of banks have also been tightened. As a result, the issuance of new housing loans has fallen sharply. The speed with which the tighter monetary policy is fully reflected in higher interest rate expenditures by governments and the private sector depends on the maturity and the proportion of outstanding debt with flexible interest rates.

- It is uncertain how large the impact of tighter monetary policy on the real economy will be and when it will reach its full effect. The steep decline in housing loans suggests that tighter monetary policy is already having a significant impact on construction investment. However, it is difficult to quantify the impact of monetary policy on the real economy and inflation due to varying time lags in the transmission channels and the relevance of the general economic environment for the effectiveness of monetary policy. In general, it seems easier for monetary policy to dampen economic activity than to stimulate it. However, specific economic conditions, such as labour supply shortages or the economic legacy of the pandemic, which is reflected in high extra savings of private households and high order backlogs at firms, may dampen the impact of tighter monetary policy. Fiscal policy could contribute to disinflation by pursuing an overall restrictive stance. The distributional effects of monetary policy can be expected to be modest and should not be a major concern in the assessment of the appropriate policy stance.
1. **INTRODUCTION**

After inflation in the euro area started to rise to unprecedented levels, the ECB has tightened monetary policy rapidly. Inflation started to rise in 2021 and has been additionally fuelled by surging energy prices after the start of the war in Ukraine in 2022. Although inflation has fallen somewhat from its record levels in recent months as the contribution of energy prices has diminished, it is still well above the inflation target of the ECB and is now mainly driven by domestic factors. The ECB started to increase interest rates in mid-2022 and has in the meanwhile raised its key interest rates more and faster than in previous hiking cycles. However, it is difficult to assess whether the current monetary policy stance is sufficiently restrictive to bring inflation back to target and when monetary tightening will take full effect.

It is important to identify the drivers of price increases in order to assess the economic implications of high inflation and the impact of monetary policy. High inflation is a symptom of the general economic environment and can be caused by several factors, such as rising demand, limited supply, or higher import prices. All of these factors can have different implications for real economic activity at the aggregate level, but also for the impact of high inflation on private households at the individual level. Identifying the drivers of inflation is also important for central banks when conducting their monetary policy. Central banks tend to be less concerned about inflation driven by temporary factors, which disappear relatively quickly, than they are about more long-lasting factors, which may cause inflation to deviate persistently from the inflation target and thereby risk destabilising inflation expectations. The drivers of inflation can also affect the impact of monetary policy on the real economy and inflation, which depends on the general economic environment and has varying time lags.

In this paper, we analyse the implications of high inflation and the effects of monetary policy tightening in the euro area. We start by analysing the drivers of the recent increase in inflation in the euro area (Chapter 2). In Chapter 3, we assess the heterogeneous impact of inflation on individual households. In Chapter 4, we analyse the impact of the ECB’s monetary policy tightening on financial conditions and economic activity and potential distributional consequences. Finally, we draw conclusions with a particular focus on the role of fiscal policy for central banks seeking to return inflation back to target (Chapter 5).
2. THE NATURE OF INFLATION IN THE EURO AREA SINCE THE BEGINNING OF THE PANDEMIC

The surge of inflation since 2021 was only initially driven by energy prices, but then quickly became broad-based across consumer goods. Euro area inflation started to increase in 2021 well above the inflation target of the ECB and reached unprecedented levels of more than 10% in 2022 (Figure 1: Contribution to headline inflation). The increase coincided with the sustained economic recovery from the COVID-19 pandemic. Initially the increase of inflation was mainly driven by energy prices, in particular when considering that higher energy prices also indirectly increase consumer prices via higher input costs for food, non-energy industrial goods (NEIG), and services. In 2022, the Russian war against Ukraine put additional upward pressure on energy prices, in particular on gas and electricity.

Recently inflation has declined somewhat, but is still far above the inflation target of the ECB. While the positive contribution of energy prices has faded out, inflation now is mainly driven by food prices and by core consumer prices (consumer price inflation excluding food and energy), which are still upward trending. It seems unlikely that indirect effects of energy prices are still an important factor behind high inflation as higher energy or producer prices are usually passed-through to other goods within a few quarters (Koester et al., 2021). Also, rising firm profits suggest that firms were able to increase prices beyond their higher input costs in an economic environment of robust aggregate demand (Arce et al., 2023). Granular consumer prices indicate that high inflation is broad-based across consumer goods.2 Taken together, this indicates that inflation in the euro area is predominantly driven by domestic factors.

The surge in energy prices has led to a pronounced deterioration of the terms of trade weighing on real economic activity. Increasing energy prices led to stronger increases in import prices than in export prices because the euro area is a net importer of energy, energy imports are only partly used for producing export goods, and the pass-through of energy prices to export prices can take some time or be incomplete if firms follow pricing-to-market strategies. The deterioration in the terms of trade due to the surge of energy prices peaked at more than 2% of GDP in the third quarter 2022 (Schnabel, 2023a). The energy price-induced worsening terms of trade was fuelled further by supply constraints due to the war in Ukraine and weighed on real economic activity. Higher energy prices dampened the purchasing power of disposable incomes of private households and thereby private consumption and production in consumer-related industries. Moreover, production in energy-intensive industries (such as the chemical industry, paper and paper products or basic metals) declined due to the huge increase in their production costs. Meanwhile, terms of trade have started to recover as oil prices have moderated and gas prices have declined from their peaks. Going forward, it is likely that the terms of trade—in line with their historical pattern after energy price shocks—will approach their former level so that burdens for the economy will further ease.

1 Sonnenberg (2023) points to the fiscal-monetary mix to stabilise aggregate incomes during the pandemic as a source of the robust demand and broadening of inflationary pressures.

2 See Figure 5 in Chapter 3.
Inflation and the effects of monetary tightening in the euro area

Figure 1: Headline inflation and components (left) and deflator of GDP and expenditure components (right) in the euro area

Source: Eurostat, own calculations.

Notes: Year-over-year inflation rates and contributions.

**Strong price increases have not only been observed for consumer goods but in the whole economy, indicating that they have been driven by domestic factors.** While the surge in consumer price inflation was at the beginning mainly driven by energy prices, domestic prices also started to pick up at about the same time. The GDP deflator, which abstracts from import prices and therefore measures domestic price pressure, started to increase in mid-2021, roughly at the same time when consumer price inflation started to increase. In 2022, the GDP deflator recorded with 4.6% its largest increase since the beginning of the euro area; in the fourth quarter 2022 it increased by 5.8% year over year (Figure 1: Deflators). The price increases were broad-based across expenditure components, such as private and public consumption or exports. The deflator of construction investment, which increased particularly strongly by about 10% in 2022 was already accelerating in the years before the pandemic to relatively high rates, stimulated by favourable financing conditions. The broad-based price increases indicate that already since 2021 domestic factors have contributed to the strong upward price pressures.

**Capacity utilisation in the euro area has been high despite the relatively low level of GDP and has fuelled price increases.** Firm survey data show that capacity utilisation in manufacturing and services industry has been above long-term averages since mid-2021 and approached levels in 2022 that have been observed before only in boom periods (Figure 2: Capacity utilisation). Potential output estimates, by contrast, suggest that the output gap (the difference between actual GDP and potential output) in 2022 was close to zero (European Commission and IMF) or even negative (OECD). One reason behind the differences between survey data and output gap estimates could be that output gap estimates are uncertain in real-time and can be strongly revised with incoming data, in particular around business cycle turning points or economic crisis (Ademmer et al., 2019; Mc Morrow et al., 2015). At the current juncture, it is uncertain to what extent the pandemic and the increase in energy prices have dampened potential output. Moreover, some factors are likely to have dampened production capacities temporarily so that capacity utilisation as measured by firm survey data has been increasing but potential output, which measures available production capacities in the long-run, has not been negatively affected. One of these temporary factors has been supply bottlenecks that increased according to survey data to record-high

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3 Output gap estimates of the European Commission, the IMF, and the OECD retrieved 15 May 2023 via Refinitiv.
levels in 2022 before they started to ease (Figure 2: Shortages in Equipment and Material). Another factor that points to high capacity utilisation is a shortage of labour supply that according to surveys is at record-high levels (Figure 3).4

**Robust demand has contributed to high capacity utilisation.** Nominal disposable income of private households remained stable in 2020—when the pandemic led to strong decline of real GDP—due to large fiscal transfers and increased strongly afterwards during the recovery from the pandemic. Moreover, private households have built up large extra-savings that amounted to EUR 900 billion or more than 10% of disposable income at the end of 2022 because consumption was restrained by public or private containment measures during the first waves of the pandemic (Figure 4: Savings). When the pandemic-related restrictions started to being eased high disposable income and the normalisation in the savings rate underpinned the strong recovery in the demand for consumer goods. High extra-savings presumably contributed to a relatively high willingness to pay of private households. The huge increase in delivery times, while industrial production remained stable or increased, suggests that also in the manufacturing industry demand has been relatively high.5 All of these factors—including factors that have dampened production capacities—did not only increase capacity utilisation and put upward pressure on prices in the euro area, but at the same time in the world economy at large.

**Figure 2: Capacity utilisation and material shortages in the euro area**

![Graph showing capacity utilisation and material shortages](image-url)

Source: European Commission, own calculations.

Notes: Survey data. Dotted lines: Mean values from 1999 to 2019. Equipment and Material shortages: Share of firms answering that shortages in equipment or material is limiting their production.

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4 Labour shortages due to demographic change dampen also potential output, but are probably not fully reflected in current estimates. Moreover, labour shortages could have increased temporarily due to increased sick leave. Numbers on sick leave from the Institute for Employment Research indicate that sick leaves approached very high levels in Germany in 2022 (Groll 2023).

5 While data for stock of orders are not available for the euro area as a whole, data for Germany indicate that stock of orders in manufacturing increased by more than 30% compared to the pre-pandemic levels, which equals more than 10% of an annual production.
Inflation and the effects of monetary tightening in the euro area

Figure 3: Labour shortages in the euro area

Robust demand and supply constraints have widened the scope for price increases and are reflected in increasing profits of firms. A decomposition of the GDP deflator into changes of components of the income side of GDP indicates that the strong price increase came along with a strong increase in gross operating surpluses of firms (Schnabel, 2023a). These increases in gross operating surpluses were unevenly distributed across firms and industries. In 2022, for example, the manufacturing industry and contact-intensive service industries exhibited strong increases, while increases in other service industries were relatively low (Arce et al., 2023). From an economic perspective, the increases in gross operating surpluses are not the cause of raising prices, but rather a symptom of robust demand meeting limited supply. Against this backdrop, upward price pressure should ease when temporary supply constraints subside or demand declines, for example, due to restrictive monetary policy or the loss of purchasing power of disposable incomes caused by high inflation.

Strong wage increases will delay the deceleration of inflation. Wages react usually with some delay to changes in the economic environment, for example, because collective wage agreements usually apply for longer periods. The current economic environment of high labour supply shortages and high inflation implies strong wage increases going forward (Schnabel, 2023a). From a cost perspective the scope for large second-round effects of increasing wages on prices—in the sense of further increasing prices—seems to be limited for the time being. The strong price increases—with only sluggishly adjusting wages—have resulted in a decline in real unit labour costs, which reflect the compensation of employees relative to their productivity measured by nominal GDP. In 2022, real unit labour costs in the euro area approached low levels in historical comparison (Figure 4: Real unit labour costs). Therefore, increasing wages can be met by many firms without further prices increases and would lead for given prices first of all to a normalisation of real unit labour costs. However, increasing wages will also lead to

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To decompose changes in the GDP deflator into changes of the components of the income side of GDP, changes in nominal income side components are related to changes in real GDP. This purely statistical decomposition does not reflect causal relationships as income side components and prices are influenced by underlying economic factors. In the System of National Accounts gross operating surplus corresponds to the renumeration of the production factor capital. This implies that firm must service capital costs, such as consumption of fixed capital, from gross operating surpluses. Recently, capital costs measured by interest rates or prices of capital goods have increased so that gross operating surpluses in the System of National Accounts may have increased stronger than profits that are adjusted for capital costs in firm accounts.
increasing disposable incomes of private households and thereby fuel demand for consumer goods. This will lead to additional upward price pressure and could thereby delay the deceleration of inflation.

**Figure 4: Extra savings and real unit labour costs**

<table>
<thead>
<tr>
<th>Savings</th>
<th>Real unit labor costs</th>
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<tbody>
<tr>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>2010</td>
<td>10</td>
</tr>
<tr>
<td>2014</td>
<td>14</td>
</tr>
<tr>
<td>2018</td>
<td>18</td>
</tr>
<tr>
<td>2022</td>
<td>20</td>
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Extra savings: Euro 900 billion

Source: Eurostat, own calculations.

Notes: Extra savings are calculated as the cumulative difference from 2020 to 2022 between actual savings and savings if the savings rate would have remained constant at the pre-pandemic rate of the year 2019. Real unit labour costs measure compensation of employees per employee (nominal) in relation to GDP per employee (nominal); 2023,2024: Forecast of the European Commission.

*Given that high inflation is predominantly driven by domestic factors, monetary policy has the tools to dampen inflation, even though the current economic environment differs from previous high inflation periods.* Usually high inflation coincides with high capacity utilisation. However, previously high capacity utilisation was mainly driven by increasing demand. At the current juncture, declining production capacities probably contributed considerably to the increase in capacity utilisation. It is uncertain to what extent production capacities are permanently reduced, for example due to the economic consequences of the pandemic or the energy crisis, and to what extent they are temporarily reduced, for example due to supply bottlenecks or labour shortages, which will fade out after some time. Moreover, while capacity utilisation approached levels similar to previous boom periods, inflation by far exceeded levels observed before in the euro area suggesting that the Phillips curve relationship between the output gap and inflation has changed recently (Beningo and Eggertson, 2023). Reasons behind this phenomenon could be unusually strong labour shortages or the specific economic consequences of the pandemic, particularly the large amount of extra-savings which probably has raised the willingness to pay of private households. All of this makes it more difficult for central banks to assess the impact of its monetary policy on real economic activity and inflation.
3. HETEROGENEOUS EFFECTS OF INFLATION ON HOUSEHOLDS

As the inflation dynamics are broad-based, all households experience a loss in purchasing power, but especially poorer households experience hardship. In principle all households suffer from rising prices, but the extent is unevenly distributed and depends on household characteristics, such as their income dynamics, specific consumption patterns, and savings. A disaggregated view reveals that inflation dynamics are broad-based across consumer goods (Figure 5). The distribution of sub-group inflation rates of 101 categories shows a strong upward shift, which has not been observed before in the euro area. During previous phases of increasing oil prices, e.g. 2008 and 2011, the distribution of prices shifted, but only a limited number of goods were affected (75 and 90% quantile). The median inflation, i.e. half of all goods experience either a higher or lower inflation rate, fluctuated only to a limited degree around its long-term average of 1.6%. In the current inflation process, the median inflation rate increased to a maximum rate of 6.3% in January 2023. Recently, the rate decreased somewhat to 5.9% in February and then 5.4% in March, but still remains at a historically high level. Also, the other distributional statistical measures, such as the 10, 25, 75, 90% quantile, still point to a broad-based inflationary process. The broad-based price increases affect all households with their different consumption baskets. However, the household-specific inflation rates depend on the weight of certain goods in the consumption basket and hence can deviate strongly.

Figure 5: Distribution of sub-group inflation rate for the euro area

![Graph showing distribution of sub-group inflation rates](image)

Source: Refinitiv, ECB, own calculations.

Notes: The figure shows the distribution of sub-group inflation rates for the euro area. In total 101 sub-groups (4-digit level) are considered in the calculation of the distributional measures.

Poor households that either receive social transfers or have a low wage income are most affected by inflation. Essential products, such as food, energy and rent, have a particularly high weight in their consumption baskets (Charalampakis et al., 2022). Especially food and energy prices increased at higher rates than other core goods and services in all euro area countries since 2021 (Figure 6 a, b, c). Thus, the specific inflation rate for poor households is higher than the national inflation rate published by the statistical authorities, which is based on the aggregate consumption pattern of all households.

The difference in inflation rates between low- and high-income households reached a historical maximum in the euro area since mid-2021. Charalampakis et al. (2022) report that the difference in inflation rates between the lowest and highest income quantile reached a historical high of almost 2 percentage points in the euro area. Before the pandemic, the difference in inflation rates was zero, i.e.
low- and high-income households experienced basically the same inflation rates. In the recent past, differences widened in times of high oil prices. Charalampakis et al. (2022) decompose the difference that has emerged since mid-2021 into its drivers. In particular, food and energy prices drive this difference as these categories account for a larger share in the consumption baskets of poorer households. Claeyts et al. (2023a) have created a database, where they regularly publish updates on the evolution of inflation rates for the bottom and top income quantile for each Member State of the European Union. The different weights used to calculate the consumption baskets of poor and rich households are based on household budget surveys. The difference between these inflation rates faced by poor and rich households defines a measure of “inflation inequality”. Claeyts et al. (2023a) show that EU countries with particularly high inflation rates also have a relatively high inflation inequality.

While inflation rates based on different consumption baskets are indicative of distributional aspects of the inflation process, they cannot provide a complete indication of the hardship faced by households. Claeyts et al. (2023b) find that, for Germany, high income households actually faced a higher inflation rate than poor households between January 2021 and September 2022. This is mainly due to high price increases of some non-essential goods, which have a relatively higher share in the consumption baskets of richer households. This result shows that this approach does not provide a full picture of the hardship due to high inflation, as wealthier households can draw on higher incomes and have more scope to adjust their consumption basket to mitigate the impact of high inflation than poor households. However, for most EU countries this measure based on different consumption baskets indicates that poor households experienced higher inflation.

A more complete view of household hardship due to high inflation needs to include household characteristics, such as income and savings. Particularly in the period when the incomes or transfers of poor households do not increase, but prices rise at a high rate, these households experience hardship as they have to adjust their consumption pattern or even reduce their consumption of essential goods. Charalampakis et al. (2022) report that the share of households expecting to pay their utility bills late has increased since mid-2021. While the share increased for almost all household income quantiles, the percentage point increase was particularly high for low income households (1st quantile). This is an indication that the living standard of low households has come under significant pressure in this period. As wages tend to adjust only slowly and decisions to increase transfers take time in the political process and are rarely automatic, these households are prone to experience severe hardships.

Middle- and high-income households have several buffers in order to cope with rising prices. These households have more scope to adjust their consumption baskets by quantity and quality, than poor households, in particular when prices of essential goods are increasing. For example, these households are more likely to be able to switch from high quality (such as organic) products to regular food products. Moreover, these households can rely on their higher income or their higher savings if they do not want to adjust their level and structure of consumption.

While food inflation is still very high, energy inflation decreased significantly. While most agricultural commodity prices already declined from their recent peaks, a slowdown of consumer food inflation is not yet materialising (Figure 6a). In addition to commodity input prices, energy costs also play an important role for production and processing of food. However, recent surveys of food retailers’ price expectations point to a slowdown in food price inflation in addition to falling agricultural and food commodity prices. While price increases may slow, the price level is likely to remain elevated. Energy prices in some euro area countries have started to decline at the consumer level (Belgium, Greece, Sweden, Denmark, France, Finland, Netherlands and Spain (Claeyts 2023 a)).
Luxembourg, Netherlands, Portugal and Spain). While this is partly a base effect, i.e. reaction to the elevated price level after the onset of the war in Ukraine, there is also an additional contribution of lower energy input costs. In other euro area countries energy prices are still increasing, but the dynamic slowed down significantly. (Figure 6b). Going forward, the hardship of high price increases, in particular for food and energy, could ease somewhat, but current forecasts suggest that the price level will remain considerably higher than expected before 2021.

In order to analyse the heterogeneous effects of inflation more comprehensively, the drivers of inflation have to be considered. The heterogeneous impact of high inflation on households may be different when it is caused by price increases in imported energy or food prices than when it is caused by domestic factors. Moreover, high inflation due to domestic factors could coincide with higher property and entrepreneurial income, higher wages or higher social transfers, implying heterogeneous effects for households. The increase in inflation since 2021 was due to both higher import prices and domestic factors. While social transfers have mitigated the negative impact on the purchasing power of many households, wages have so far not kept pace with the high inflation, whereas property and entrepreneurial income has increased relatively strongly. Going forward, however, it seems likely that wage growth will be stronger and will, at least partly, offset the loss of purchasing power experienced by many households due to high inflation. In this respect, the general economic environment is also important for the impact and the consequences of high inflation on households. The widespread labour shortages will contribute to stronger wage increases. In the United States, the wage growth tracker of the Federal Reserve Bank of Atlanta (2023) provides insights into the wage dynamics of households across several household characteristics. Wage growth has been higher for households with a relative low skill level, a relatively low level of education and a relatively low income (1st and 2nd income quantile), recently.
Figure 6: Inflation rates for food, energy and core goods and services in the euro area

a) Food inflation

b) Energy inflation

c) Core inflation

Source: Refinitiv, Eurostat.

Notes: The figures show the inflation rate of the categories food, energy and core goods and services for all euro area members for each month since 2021. The last data point is March 2023. Core inflation refers to the inflation rate, which excludes the dynamics of the categories food and energy.
4. IMPACT OF THE MONETARY TIGHTENING IN THE EURO AREA

Monetary policy can affect real economic activity by various transmission channels. We first describe relevant transmission channels and empirical results on the impact of monetary policy on real economic activity from a general perspective (Section 4.1), before analysing in detail the impact of the recent monetary tightening by the ECB on financial conditions and economic activity (Section 4.2). Finally, we assess whether the monetary tightening may have heterogeneous effects on private households (Section 4.3).

4.1. The impact of monetary policy on economic activity: Transmission channels and empirical evidence

Monetary policy can affect economic activity via several transmission channels. For example, an increase in interest rates leads to increasing costs of capital, which dampens investments of firms and households. Higher interest rates also reduce cash flow available for spending of indebted firms and households or of fiscal authorities. The strength of this channel depends not only on the speed at which higher interest rates are transmitted to firms and consumers but also on the extent to which higher interest revenues of interest-bearing assets counteract this effect. Tighter monetary policy can also lower the risk appetite and thereby lead, for example, to a reduction of the supply of bank loans and tightening credit standards (Bauer et al., 2013). By influencing the exchange rate, monetary policy can have a direct effect on prices to the extent that changes in the exchange rates are passed through to import prices or affect prices by import substitution. Other transmission channels include wealth effects and intertemporal substitution that influences saving and investment decisions due to changes in the interest rates. Some theories stress the relevance of indirect effects of monetary policy via general labour market conditions or fiscal policy, which in turn can influence disposable incomes of private households and thereby private consumption (Kaplan et al., 2018). Via these channels monetary policy can influence real economic activity, which in turn affects – by changes in economic slack – prices. All of these transmission channels work through the impact of monetary policy on financial markets so that changes in the stance of monetary policy are reflected in financial conditions. By influencing financial conditions monetary policy can have particularly strong effects on long-run investment decisions, i.e. on the housing market or fixed investments of firms (Corsetti et al., 2022; Miranda-Agrippino and Ricco, 2021). Another important transmission channel of monetary policy works via inflation expectations. Well-anchored inflation expectations at the inflation target reduce the risk for persistent deviations of inflation from the target and could thereby lower the need for monetary policy interventions.

The impact of monetary policy on the real economy and on inflation depends on the general economic environment. There are several factors related to the transmission channels of monetary policy that can influence its impact on real economic activity or prices. For example, expansionary monetary policy could have larger effects in periods of high financial distress—when it is able to lower distress considerably—compared to periods in which financing restrictions do not play a major role for investment decisions of firms or households. There is extensive empirical evidence that the impact of monetary policy is indeed state-dependent. For example, there is evidence that monetary policy is more effective in recessions than in expansions (Bruns and Piffer, 2022; Lo and Piger, 2005; Santoro et al., 2014; Weise, 1999). With regard to the direction of monetary policy intervention more recent studies find that contractionary shocks have larger effects on real economic activity, including unemployment, than

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8 For a more detailed description of the transmission channels of monetary policy, see for example Lane (2022).
9 However, some results point into the opposite direction (Alpanda et al., 2021; Tenreyro and Thwaites, 2016) indicating that the results can crucially depend on the methodology or the economic area and the period investigated.
expansionary shocks (Angrist et al., 2016; Barnichon and Matthes, 2018; Debortoli et al., 2020; Tenreyro and Thwaites, 2016). Some of these studies, however, suggest that the opposite is true for prices, namely that expansionary monetary policy has larger effects on prices and vice versa. One theoretical rationale behind this finding could be downward rigidity of wages so that the impact of a contractionary monetary policy shock on wages (and prices) is smaller and the impact on quantities larger compared to an expansionary shock. In view of the period after the global financial crisis, one additional reason why it could be more difficult for monetary policy to stimulate rather than to dampen economic activity could be the zero lower bound, which makes it more difficult for central banks to further stimulate the economy if unconventional monetary policy measures are less effective or have other effects than conventional monetary policy.

**Monetary policy can have unintended side-effects that can influence its impact on the economy.** Expansionary monetary policy leads to increasing risk-taking, as this is one transmission channel of central bank interventions (Drehmann et al., 2012; Rajan, 2005, Maddaloni and Peydro, 2011). As a consequence, prolonged periods of expansionary monetary policy could lead to excessive risk-taking and thereby create financial imbalances and increase financial fragility (Jorda et al., 2023). These findings could also support the hypothesis that contractionary monetary policy can have larger effects when it is conducted after a prolonged period of expansionary monetary policy, when asset prices have completely adapted to low interest rates and financial imbalances may have increased. Moreover, there is evidence that low real interest rates can contribute to a misallocation of resources and thereby dampen productivity (Cette et al., 2016; Monacelli et al., 2023). To the extent that monetary policy leads to prolonged periods of low real interest rates this could therefore dampen productivity and in turn potential output so that increases in demand have ceteris paribus larger effects on inflation.

**Uncertainty about the timing and the size of the effects of monetary policy makes it difficult for central banks to conduct their policy.** There is a consensus that the transmission of monetary policy works with long time lags (Havraneka and Rusnak, 2013). These time lags are variable because the effects of monetary policy depend on the general economic environment. Some studies find that monetary policy can have meaningful quantitative effects already in the short-run (Miranda-Agrippino and Ricco, 2021). One reason behind could be that if monetary policy is able to reduce financial distress and uncertainty in periods of financial turmoil, it may mitigate immediate declines in output. However, longer-lasting time lags are plausible as monetary policy usually can only influence output and economic slack indirectly by changing financial conditions, which in turn influences prices. In this regard, the relationship between economic slack and inflation that can be measured via the Phillips curve is relevant for central banks to conduct their policy. Estimates of the Phillips curve suggest that this relationship has weakened in recent decades, implying that a one-percentage-point decline in the output gap only dampens inflation less proportionally (BIS, 2017; Blanchard et al., 2015; IMF, 2013; Eser et al., 2020). To the extent that the estimated weak relationship is mainly due to an effective monetary policy that was successful in offsetting demand shocks or in stabilising inflation expectations this might be less of a concern for central banks than if it is mainly due to structural factors, such as increasing globalisation. However, taken literally such estimates suggest that monetary policy has to engineer a strong decline in the output gap to bring inflation back to target given the high inflation rates. However, the increase in inflation since 2021 far exceeded the increase in capacity utilisation and the output gap pointing to a potential non-linear relationship between inflation and the output gap that may also work in the opposite direction (Benigno and Eggertsson 2023). Uncertainties about the appropriate stance of monetary policy arise also due to the question, how expansionary or restrictive the current stance of monetary policy is. Theoretically, the natural interest rate (the real interest rate that prevails if GDP equals potential output and the inflation rate equals the inflation target) provides information about the impact of monetary policy. For example, the more interest rates are above the natural interest rate, the more
restrictive is monetary policy. However, the natural interest rate cannot be observed but has to be estimated. In practice, estimation uncertainty in real-time is so large that estimates of the natural interest rate contain only little information for central banks to conduct their monetary policy (Fiedler et al., 2018). Therefore, incoming data is likely to play an important role for central banks in adjusting their policy stance.

4.2. Impact of monetary tightening on governments, households and corporations

The ECB raised interest rates for the deposit facility within 11 months from -0.5 to 3.25%. The ECB prepared markets for an interest hiking cycle since December 2021, when the Governing Council announced the intended ending of net purchases under the large-scale asset purchase programmes. The pandemic purchase programme ended in March 2022 and the regular purchase programme (APP) ended in June 2022. The main refinancing rate, which approached the zero lower bound in March 2016, and the deposit facility rate, which had been steadily lowered into negative territory since June 2014, were raised by the ECB for the first time in July 2022 (Figure 7a). The ECB started with large steps of 0.5 percentage points, then switched to two steps of 0.75 percentage points in the face of rapidly accelerating inflation, before returning to 0.5 percentage point steps. In May 2023, the ECB raised interest rates only by 0.25 percentage points suggesting that for the time being interest rates might be close to the peak of the hike cycle. However, further monetary policy decisions of the ECB will depend on whether incoming data indicate that monetary policy is sufficiently restrictive to bring inflation back to target. In historical comparison, the ECB increased interest rates more strongly and much faster compared to previous interest rate hike cycles even though the interest rate levels are still below historical peaks.

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10 Vice-President De Guindos (2023) classifies interest rate hike sizes of 0.5 to 0.75 percentage points as “extraordinary steps” as the size is unusual with respect to past tightening cycles, but also acknowledged that they were warranted because of “extremely high inflation”. The ECB in May 2023 returned to a 0.25 percentage points hike size as the ECB has “now entered the home stretch” of the monetary tightening cycle.
Figure 7: Key interest rate corridor and term structure of interest rates  
a) Key interest rate corridor  
b) Term structure of interest rates (OIS)

Source: Refinitiv, ECB, own calculations.

Notes: The interest rate corridor consists of the marginal lending facility (MLF), main refinancing operations (MRO) and deposit facility rate (DFR). Panel b depicts the risk-free term structure of interest rates derived from overnight index swaps (OIS). Here the average of the daily data is calculated for the month April in 2020, 2021, 2022 and 2023 in order to track the evolution of the whole term structure over time. Overnight index swaps mostly depict the financial market expectations on the evolution of the path of short-term interest rates. Additionally, a term premium affects the yields of longer maturities. In contrast to yield curves derived from sovereign bonds, the OIS term structure is not affected by a credit or default risk premium (Bundesbank 2023).

Medium- to longer-term interest rates along the yield curve started to rise before the ECB raised key interest rates. With the announcement of the end of the large-scale asset purchases in December 2021, market expectations about the path of short-term interest rates started to adjust (Figure 7b). Medium- to long-term yields theoretically can be decomposed into expectations of the future prevailing short-term interest rate and a term premium.\textsuperscript{11} The increase in yields along the term structure was driven by expectations about the path of the short-term interest rates and only partly by an increase in the term premium. The term premium was dampened by large-scale asset purchases. The maximum effect on 10-year government bonds is estimated to be in the order of 180 basis points and depends on the total stock of bonds on the balance sheet of the ECB (Schnabel, 2021). The ECB reduces the size of its bond holdings only slowly by not reinvesting the money received from maturing bonds (passive approach of quantitative tightening). Therefore, the half-life of the dampening effect on the term premium is often estimated to be long (Eser el al., 2019). In May 2023 the ECB adjusted the pace of quantitative tightening as the phase-in period of EUR 15 billion per month from March 2023 to June 2023 will be increased to roughly EUR 30 billion from July 2023 onwards (ECB, 2023 a). In theory, an adjustment in the amount of quantitative tightening shortens the half-life of the dampening effect on the term premium and thus leads to an upward adjustment in medium- to long-term yields. In practice, however, this effect should have already materialised in recent months as financial markets are forward-looking and formed

\textsuperscript{11} The term premium compensates for the risk, which is due to the longer maturity and increasing uncertainty of the future. One risk premium for example is related to the risk of an interest rate change (also called duration risk), which leads to an abrupt devaluation of the price of bonds (Figure 16).
expectations of this policy adjustment. In the process of adjusting the monetary policy stance quantitative tightening supports the brake intensity of interest rate hikes (Sonnenberg, 2023).

10-year government bond yields have risen sharply since December 2021, largely in line with expectations about the path of short-term interest rates. The rise in government bond yields is mostly in line with the rise in the 10-year overnight index swap, i.e. the adjustment in yields is in line with the change in the expectations of the future path of short-term interest rates. The spread between the 10-year government bond yields and the 10-year overnight index swap serves as an indication of the extent to which other components like credit, default, and re-domination risk premia drive government bond yields. In particular, the spread for Italian and Spanish government bonds widened during the euro sovereign debt crisis (Figure 13 Appendix). In the current tightening cycle, which was initiated in December 2021, the spread widened only for Italian bonds. It rose from a level of roughly 0.8 percentage points to 1.6 percentage points. In contrast, the spread on Spanish bonds remained constant. In July 2022, the ECB introduced the Transmission Protection Instrument (TPI), which aims to ensure a smooth transmission of the monetary tightening cycle in all euro area member countries (ECB 2022). It can be shown that prior to the introduction of the TPI the spread widened, when financial markets expected a stronger interest rate response to the inflationary dynamics by the ECB. After its introduction, the spread remained constant, although the expected interest rate peak increased (Schnabel 2023b).

The average maturity of government debt in the euro area, which determines the speed of the transmission of higher interest rates to an actual increase in interest payments, is distributed around 8 years. Given the upward adjustment along the whole yield curve, fiscal authorities in the euro area are facing rising interest payments on their debt. The longer the average maturity of the outstanding debt stock the longer it takes that the roll-over of debt leads to rising interest payments. In addition, net lending increases the interest expenditure of the fiscal authorities. The absolute amount of debt, which needs to be rolled-over, depends also on the size of the outstanding stock of government debt and it can be approximated by combining the average maturity of the debt with the outstanding debt stock. The average maturity surpasses 10 years in Austria, Belgium, Ireland and Slovenia (Table 1 column 3). In the other euro area countries, the average maturity is roughly between 7 and 8 years. As the debt-to-GDP ratio differs strongly in the euro area (Table 1 column 1), the amount of roll-over in relation to GDP is distributed diversely. For example, Italy, Spain and Portugal must roll-over debt in the order of 20%, 15% and 16% relative to GDP, respectively (Table 1 column 5). The rise in the interest payments also depends on the yield of the outstanding debt stock and the new yield level. However, as the yield on new issues has risen rapidly, the downward trend in interest payments should be reversed for all euro area countries.

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12 In a recent interview the Vice-President of the ECB Luis De Guindos (2023) responded that the ECB estimates the effects of quantitative tightening on 10-year government bond yields to be in the order of 60 to 70 basis points.

13 From overnight index swaps (OIS) of different maturity a risk-free yield curve for the euro area can be constructed (Figure 7b). The yield curve derived from OIS only consist of the expectations on the future path of short-term interest rates and a term premium. Yield curves derived from government bonds additionally can include risk and liquidity premia.

14 For German bonds a special characteristic leads to a disproportionate increase in the yields relative to overnight index swaps, i.e. the spread is actually negative (Figure 13 Appendix). German bonds serve as a risk-free collateral in many financial market transactions and generally serve as a safe haven in times of market stress. These specific demand characteristics, coupled with limited supply, result in a convenience yield that rationalises the negative spread. (Deutsche Bundesbank, 2023).

15 If the average maturity of the debt stock was equal to one year, then within one year the whole debt stock would have to be rolled over. If the average maturity was equal to two years, then within one year only half of the debt stock would have to be rolled over. This can serve as an approximation, but in practice the maturity profile is more complex and deviations from this simple rule of thumb can arise.
Table 1: Government debt statistics for euro area Member States

<table>
<thead>
<tr>
<th>Country</th>
<th>Debt level (% of GDP)</th>
<th>Debt level (EUR billion)</th>
<th>AVG maturity debt (Years)</th>
<th>Annual roll-over (EUR billion)</th>
<th>Annual roll-over (% of GDP)</th>
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<tr>
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<td>8</td>
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<td>4</td>
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<tr>
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<tr>
<td>Spain</td>
<td>113</td>
<td>1,503</td>
<td>8</td>
<td>193</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Refinitiv, ECB, Eurostat, own calculations.

Notes: The debt level (% of GDP and EUR billion) refers to the Q4 2022 values. The average maturity of debt is equal to the 12-month average from the monthly statistic from March 2022 until March 2023. The annual roll-over (EUR billion) is approximated by combining the average maturity of debt with the total debt stock.

In the fourth quarter of 2022, aggregate interest payments of euro area governments were already 51% higher than the 2020-2021 average (Figure 18 Appendix). The interest payments of euro area governments are available in the sectoral accounts. Although only a fraction of the outstanding debt stock has been rolled-over, interest payments in the fourth quarter of 2022 are already significantly higher than the average interest payments in 2020 to 2021, which represents a trough for almost all euro area Member States. For France and Italy, the increase was 81% and 70%, respectively. For Germany and Spain, the increase was lower at around 45%. In the Netherlands the increase was only 20%. While this statistic is only published with a time lag one can assume that the interest payments will continue to rise.

The change in the interest rate environment also led to adjustments in the financing conditions of the private sector. In order to make financing conditions in the euro area comparable, the ECB has developed indicators that represent the composite cost of borrowing for households and corporations. Compared with the larger role of capital markets in the United States, the financing conditions for the private sector in the euro area depend more on bank lending conditions. The composite cost of
borrowing indicators combine interest rates on new short- and long-term loans either for house purchases of private households or loans to corporations. To compile an indicator, the interest rates on short- and long-term loans are weighted by their volumes.\textsuperscript{16} The indicators show that the steep rise in short-term interest rates and the adjustments along the yield curve had a significant impact bank lending conditions for corporations and households (Figure 8). The bank lending conditions reached historical low levels before the outbreak of the pandemic in 2020. In the face of the monetary tightening cycle, the current interest rate level has returned to the level in 2003 when the indicators were introduced.

**Figure 8:** Composite cost of borrowing for non-financial companies and households in the euro area

![Composite cost of borrowing](image)

Source: Refinitiv, ECB, own calculations.

Notes: The cost of borrowing indicator is based on a harmonisation approach by the ECB. It combines the evolution of short and long-term interest rates by the respective lending volume of outstanding credits. The volume applied in the weighting is based on a 24-month moving average.

**Interest rates for housing loans rose sharply and the demand for housing loans corrected by -40% year-on-year for the euro area (Figure 9).** Faced with higher interest rates on housing loans, households reacted by sharply reducing their demand. New housing loans with a long-term fixed interest rate of more than 10 and 5-to-10 years corrected by -50% while loans with a fixed interest rate of 1-to-5 years corrected by -25%. Loans with an initial rate fixation of less than 1 year increased by 4%. Since 2015, the issuance of new housing loans was rising driven by a steady decline in interest rates (Figure 9). This ended abruptly with the sharp rise in financing costs. While the correction in Germany with -53% is even more pronounced than for the euro area as a whole, the correction in France with -40% is in line with the general trend in the euro area. Since 2015, Germany and France have each accounted for about 25% of the total new issuance of the euro area. The next most important housing market is the Netherlands, which also corrected by -50%. The correction in the demand for loans in Italy (the fourth largest market) was more muted with only -5%. The role of the Spanish housing sector has changed sharply since the beginning of the currency union. While it accounted for almost 20% of all new loans from 2003 to 2008, its share fell to around 5% after the housing boom ended in 2008. From this lower level the demand corrected by -20% from a year ago. In the other euro area Member States of the euro area the correction

\textsuperscript{16} However, in order to abstract from short-term volatility, the volume is smoothed by a 24-month moving average.
was -40%. In the euro area bank lending survey, most of the reduction in demand is due to the “general level of interest rates”, but also the categories “housing market prospects” and “consumer confidence” play an important role (ECB, 2023b). In addition to adjusting lending conditions with regard to the interest rates, banks have also tightened credit standards. The tightening in credit standards is mainly driven by “risk perceptions” and the “banks risk tolerance”, but recently also “cost of funds and balance sheet constraints” play a role. In this context, banks have mentioned in the survey that the adjustment in TLTRO-III conditions and asset purchases also contributed to a tightening of lending standards. For the second quarter of 2023, banks expect a further tightening of credit standards.

Figure 9: New business volume of housing loans with initial interest rate fixation and country share (euro area)

a) New business volume of housing loans with initial interest rate fixation

b) New business volume of housing loans per country

Source: Refinitiv, ECB, own calculations.

Notes: Panel a shows the new business volume of housing loans. The total volume can be separated into 4 categories indicating the length of initial interest rate fixation. Panel b separates the total volume of new housing loans into the absolute contribution of Germany, France, Italy, Spain and other euro area countries.

There are signs of a house price stagnation or decline in some euro area countries.17 The change in the interest rate environment has led to a repricing of many assets. Since 2020 the yields on German government bonds of different maturity (2Y, 5Y, 10Y, 30Y) have increased by 2 to 3 percentage points (Figure 16 Appendix). The corresponding price correction for German government bonds since 2020 has been more pronounced the longer the maturity of the bonds. The 30-year government bond since 2020 has lost almost 45% of its value. For a 10-year bond the correction was equal to -20%. In principle, this effect due to the change in the interest rate environment should also be reflected in other asset markets.18 The correction in the bond market was rapid as it is very liquid with high trading volumes. The liquidity in the housing market and the daily trading volumes are very different. Affordability of house purchases

17 For an overview on the development of house prices in the euro area, see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Housing_price_statistics_-_house_price_index#Annual_and_quarterly_growth_rates. Schnabel (2023b) also provides an overview of monthly indicators of the biggest housing markets in the euro area.

18 For the housing market, however, different dynamics are in place. Rents are currently also rising. If a persistent change in the expected future cash flows occurred, this could stabilise prices and dampen the price effect by a change in the interest rate environment. Also, supply is limited in the housing market and demand was high, hence if the supply can be fully absorbed by the remaining demand, then the price correction can also be limited.
Inflation and the effects of monetary tightening in the euro area is low with “old” peak prices and the current high interest rates.\textsuperscript{19} Hence, the loan demand of households has declined sharply. On the other hand, the willingness of sellers to accept lower prices seems to be limited. As a result, the housing market is currently characterised by a mismatch between supply and demand with transactions at a low level. Against this backdrop, available indicators suggest that the tightening of monetary policy has already had a significant impact on the housing market and will weigh on construction investment. The European Commission (2023) expects a decline in construction investment in the euro area in 2023.

**Financial conditions for new housing loans reacted quickly to the rise in interest rates, but the full impact has not yet reached all households.** The new issuance of housing loans before the interest rate tightening cycle represented around 1.5 to 2\% of the outstanding stock of housing loans since 2015. During the property boom in Spain and Ireland in the early phase of the currency union, the level ranged even higher between 2 and 2.5\%. With the correction triggered by the current monetary tightening cycle the share of the new issuance to the outstanding stock dropped to 1\%. A similar correction was observable in the period after the great financial crisis and euro crisis. The full impact of the new interest level has not yet reached the outstanding stock of housing loans. This effect becomes obvious when one compares the average interest rate of the stock of outstanding loans (Figure 10a) and the newly issued loans (Figure 10b). The interest rates on new housing loans went from a level of 1.5\% in the beginning of 2022 to an interest level of 3 to 4\% depending on the initial rate fixation. For the stock of outstanding loans however the rise is more benign. Loans with an original maturity of more than one year and up to 5 years and longer than 5 years were less affected. This suggests that most of these loans have not yet been rolled-over. On the other hand, loans with an original maturity of less than one year were similarly affected by the rise in interest rates, as they had already been rolled-over.

\textsuperscript{19} One indicator pointing in the same direction is that the rejected loan applications reported by banks increased sharply since the first quarter of 2022 (ECB 2023b).
The speed and timing with which households are fully affected by the new interest rate environment depends on the extent to which interest rates on housing loans are fixed. Table 2 shows the percentage of all new housing loans with a variable interest rate over the period 2003 until March 2023. The pass-through of an increase in the interest rate level is immediate with variable interest rates. Households in Germany, France, Slovakia and the Netherlands seem to be relatively well shielded as the percentage of variable interest rate loans is low over the whole time period. In Spain, Portugal, Finland, Estonia, Latvia, Lithuania and Ireland variable interest rate loans are more common and hence in these countries households should be already facing a higher interest payment burden. It can be expected that in these countries the dampening effect on household consumption should be relatively higher than in countries with a higher share of fixed interest rates. For the euro area as a whole, the importance of variable interest rates decreased over time, but until 2011 it was the most important product and it represented more than 40% of all new loans (Figure 14 Appendix, Table 2). Since 2011, housing loans with a fixed interest rate for more than 10 years gained in importance. From 2016, this category represents more than half of all new housing loans. This can also be associated with the timing of the housing booms in the euro area. Until the global financial crisis a boom took place mainly in Spain and Ireland, where the share of loans with a variable interest rate is higher. Since 2010 a boom has mainly taken place in Germany, France and the Netherlands, where housing loans with long fixed interest rates are more common. However, the longer the current interest rate level persists the greater will be the exposure of all households to the new interest rate environment.

20 The shares of the categories with an initial rate fixation of 1 to 5 and 5 to 10 years is relatively constant over time and they represent between 10 and 20%.
Table 2: Share of variable interest rates in new housing loans (in %)

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Source: Refinitiv, ECB, own calculations.

Notes: The table shows the averages of the relative share (in %) of new housing loans with variable interest rates for the time period 2003-2023. The colours indicate if the relative share is unusually high (red) or unusually low (green) for all members of the euro area.

Corporate bond yields have risen in line with government bonds since December 2021, and the new issuance has fallen sharply as a result. Since the start of the currency union the outstanding stock of corporate debt securities rose steadily, but the trend reversed since the fourth quarter of 2021. With the change in the interest rate environment, the new issuance dropped heavily. In the fourth quarter of 2022 it was down 10% from a year ago (Figure 17a Appendix). In comparison, during the global financial crisis and the euro crisis the issuance fell by 2 and 4%. During the phase of the taper tantrum in 2015, when bond yields rose rapidly around the world, the decline was 6%. The current steep rise in interest rates hence led to the strongest drop in the new issuance of corporate bonds since the start of the currency union. Since 2020 the yields on corporate bonds with a rating of AAA and BBB rose by 2.8 and 3.5 percentage points respectively (Figure 17b Appendix). The spread between the AAA and BBB bonds also widened since the beginning of the monetary tightening. It averaged roughly 0.6 percentage points between 2015 and 2020 and currently is equal to 1 percentage point, while it reached its local maximum of 1.5 percentage points at the end of 2022. The spread at that point was even higher as compared to the early phase of the pandemic, when bond yields rose quickly. Anyhow, the current spread is of a different magnitude than during the great financial and euro crisis, when it reached levels above 3 percentage points.

Bank lending conditions to non-financial corporations were also tightened. Outstanding loans to non-financial corporations are at a level of EUR 5,000 billion in March 2023, while the outstanding corporate bonds reached a level of EUR 1,600 billion in the fourth quarter of 2022. Therefore, the developments regarding bank lending rates is an important aspect to evaluate the financing conditions
for corporations in the euro area. Since 2022, the interest rates on new loans to non-financial corporations rose by 3.5 percentage points (Figure 11b). There is no big difference observable for loans with different initial interest rate fixation. The average interest rates on the outstanding stock of loans to non-financial corporations is shielded to a certain degree by fixed interest rates. While outstanding loans with an original maturity of less than one year experienced the same interest rate adjustment as new loans, the loan categories with an original maturity of 1 to 5 and more than 5 years increased less (Figure 11a). This points to a significant degree of interest rate fixation also regarding corporate loans. The new business volume of loans to corporations did not contract like in the case of households (Figure 12a). The bank lending survey shows that corporate demand for loans during 2022 rose because firms needed funds to finance inventories and working capital, this demand somehow stabilised the loan demand in general (ECB, 2023b). The categories “general level of interest rates” and “fixed investment” however led to a lower demand for loans. In combination with these aspects, the historical decline in the new issuance of debt securities on the side of non-financial corporations suggests that partly a shift from bond funding to bank funding took place. This might constitute another reason why the new business statistic until now is relatively stable. In contrast to housing loans the original maturity of corporate loans is shorter (Figure 15). From the category of loans with an original maturity of less than one year at least partly a demand for roll-over results. This also becomes obvious by the share of new business loans to the outstanding stock of corporate loans which lies quite constant at 10% since 2010. For households the share is significantly lower at 1-2%.

Bank lending conditions to corporations are well aligned across euro area countries. For corporations, the interest rates reached a level of 4.2% for the euro area aggregate in March 2022 (Figure 8a). The interest rates in the 20 Member States of the euro area distribute closely around this value. The 25 to 75% quantile ranges from 4.1% to 5.2%. While the percentage point increase in the current monetary tightening cycle is comparable for the countries, even before the start of the monetary tightening cycle the level of interest rates was higher in Estonia, Cyprus, Greece, Ireland, Lithuania and Latvia. During the euro crisis the financing conditions especially in crisis countries were affected by an increase in risk factors and widening spreads in bond markets (ECB, 2023d). As mentioned before the recent increase in the spread of Italian bonds over the overnight index swaps hints at an increase in risk premia, but until now financing conditions for Italian corporations seem to be well aligned with the developments in other euro area countries.
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**Figure 11:** Interest rates on loans to non-financial companies - outstanding stock and new business

a) Interest rates on outstanding loans to non-financial companies w.r.t. original maturity profile

b) Interest rates on new loans to non-financial companies w.r.t. initial interest rate fixation

Source: Refinitiv, ECB, own calculations.

Notes: Panel a shows the increase of interest rates of the outstanding stock of loans to non-financial companies for three categories since 2022. The categories indicate the original maturity of the loans. Panel b shows the increase of interest rates of new loans of non-financial companies for three categories since 2022. The categories indicate the length of initial interest rate fixation.

**Figure 12:** New business volume and outstanding stock of loans to non-financial companies

a) New business volume of loans to non-financial companies w.r.t. initial interest rate fixation

b) Outstanding stock of loans to non-financial companies w.r.t. original maturity profile

Source: Refinitiv, ECB.

Notes: Panel a shows the new business volume of loans to non-financial companies. The total volume can be separated into 3 categories indicating the length of initial interest rate fixation. Panel b shows the outstanding stock of loans to non-financial companies. The total stock can be separated into 3 categories indicating the original maturity of the loans.

**As the general interest rate environment adjusts, the interest expenses for debtors increase, but at the same time interest income for creditors also increases.** Fiscal authorities are mostly net debtors. Hence an increase in interest rates leads to an increase in interest payments, but not in interest receipts (Figure 18 Appendix). However, the full impact of higher interest rates does not materialise immediately.
as the debt maturing and being rolled-over only represents a small share of the outstanding debt stock. While the interest expenditures increase slowly, they increase steadily the longer the higher interest rate level prevails. The distribution of companies and households, who either face higher payments or receive a higher interest income, is complex and heterogeneous. Companies and households face rising interest payments on their debt, while they also receive higher interest income on their financial assets. Therefore, the net effect of rising interest rates on individual companies and households can vary. For the euro area as a whole, non-financial corporations pay more interest than they receive (Figure 18 Appendix). However, households in the euro area as an aggregate receive more interest payments than they pay out (Figure 18 Appendix). This is due to the fact that, since 2015, the euro area as a whole receives more interest payments from the rest of the world, than it pays to the rest of the world.

4.3. Distributional effects of monetary policy

Heterogeneity of households is a long-neglected dimension in the analysis of monetary policy. The effects of monetary policy on the real economy have traditionally been discussed in terms of macroeconomic aggregates such as consumption, GDP, inflation and employment, based on models populated by a representative household, with interest rates and asset prices being important elements in the transmission (Gali, 2015). However, as in reality, the quantity and structure of financial assets widely differs across households and they are differently attached to the labour force, effects of monetary policy on households will be heterogeneous.

Various channels can be identified that lead to heterogeneity in the effects on household consumption. Standard monetary policy works through variation of interest rates and affects household consumption directly and indirectly (Kaplan et al. 2018). It directly affects the household’s saving decision and its net financial income. In response to a rise in the interest rate the household will shift consumption into the future and increase savings. At the same time, higher policy rates will raise interest payments for outstanding debt (to the extent that lending rates are variable) and increase interest income on short-maturity assets. The net effect depends on the composition of the household’s portfolios with respect to financial assets and liabilities. In addition, indirect effects occur through adjustments of wages, prices and economic activity in reaction to the initial adjustment of consumption and the response of corporate investment. Lower aggregate demand will lead to a decline in output and reduce employment and wages relative to a situation with unchanged monetary policy. Households will be differently affected by these indirect effects depending on how exposed employment and income are to fluctuations in economic activity. Typically, low-income households tend to have higher cyclical income risks (Guvenen et al., 2014). Another source of heterogeneity is the effect of monetary policy on asset prices, which tend to fall in response to a tightening of monetary policy. Although the change in asset prices primarily redistributes wealth between the holders of the assets – those who plan to sell the asset lose out, whereas those who plan to buy gain –, there is empirical evidence that there is also a wealth effect on consumption both for stocks and for housing (McKay and Wolf, 2023).

Different transmission channels dominate in different income groups of households, but overall the effect on consumption is relatively even. While the dampening impact on labour incomes through downward pressure on wages and employment is particularly important for households with low net worth and low income, households with higher net worth are disproportionately affected by higher mortgage rates and asset depreciation. The direct effect of higher interest rates on consumption is large for households with high spending commitments relative to income and liquid assets (“hand-to-mouth” households). For households with higher net worth, higher interest income works in the opposite direction. On balance, McKay and Wolf (2023) find for the US that the consumption changes in response to a monetary policy innovation (in that case, a reduction of interest rates) are relatively even. Results in Ampudia et al. (2018) for the euro area, who also account for the effects of unconventional monetary
policy in the form of asset purchase programmes, go in the same direction, although they conclude that expansive monetary policy, both standard and non-standard, tends to reduce income and wealth inequality. This is because the indirect effects are relatively more important for poor households and hand-to-mouth households are concentrated in this group. However, the size of the effects of monetary policy is small relative to other determinants of the distribution of wealth and income, with the possible exception of the effect of the sharp recession in the early 1980s in the United States (Coibon et al., 2012). Thus, at the current juncture, the distributional effects of monetary policy should not be a major concern in the discussion about the appropriate policy stance. In any event, other policy areas such as fiscal, labour market or income policies would be better equipped to correct any distributional outcomes of the current tightening cycle deemed to be unacceptable.
5. CONCLUSION

The increase in inflation in the euro area since 2021 has been driven by higher import prices for energy goods and food, as well as by domestic factors. While the contribution from energy has diminished, inflation is now mainly driven by domestic factors, which are reflected in high capacity utilisation. Capacity utilisation is high because both temporary and permanent factors have dampened production capacity and the post pandemic recovery has boosted demand. Limited supply and robust demand have led to an increase in firms’ gross operating surpluses, while wages will only increase with some delay. Given the low level of real unit labour costs, higher wages will not necessarily lead to strong second-round effects on inflation from a cost perspective, but will stimulate demand and thus delay the deceleration of inflation. Individual inflation rates have been heterogeneous across households, but only provide an incomplete measure of hardship caused by high inflation. In most European countries inflation rates measured by individual consumption baskets have risen more for poor households because prices for energy and food, which have higher weights in their consumption baskets, have increased particularly sharply. From a general perspective, hardship due to rising prices tends to be higher for poor households anyway, because they can rely less on savings and have less scope to adjust their consumption basket. For a more comprehensive picture of hardship due to higher prices, the drivers of inflation need to be taken into account, because a domestically driven inflation may have different effects than an imported inflation.

The tightening of monetary policy has materialised in financial conditions, but its quantitative impact on the real economy is uncertain. Financial conditions as measured by long-term yields, lending rates or credit standards, have tightened significantly since the ECB began its monetary policy normalisation at the end of 2021. The sharp decline in housing loans suggests that tighter monetary policy is already having a strong impact on the housing market and is dampening real economic activity by restraining construction investment. However, given the varying time lags in the transmission channels of monetary policy and the relevance of the general economic environment for the effectiveness of monetary policy it is uncertain how large the impact of the tightening will be and when it will reach its full effect on the real economy. Model-based assessments suggest a potentially large impact of the monetary policy tightening on real GDP growth in the euro area of about 2 percentage points per year on average between 2022 and 2025 (Darracq-Paries et al., 2023). According to these estimates GDP growth in 2022 was dampened by about 2 percentage points on average across different models. The impact on inflation is somewhat smaller and takes place somewhat later with an average impact across models of about 2 percentage points per year between 2023 and 2025, with a relatively small impact on inflation in 2022. Given the current macroeconomic projections for the euro area, which expect annual GDP growth rates of 1% or more from 2023 onwards (ECB, 2023c; European Commission, 2023), such a strong impact of monetary policy suggests that either the euro area would have experienced an exceptional boom period or that the projections do not fully take into account the dampening effect of monetary policy, for example due to the uncertainties about monetary transmission. There is also uncertainty about the appropriate stance of monetary policy and the extent to which the current stance is restraining economic activity given the uncertainty about the natural interest rate that defines a neutral stance of monetary policy. Given that inflation expectations are by and large close to the inflation target of the ECB, it seems plausible that the current stance of monetary policy is restrictive. However, it is uncertain whether monetary policy is sufficiently restrictive to bring inflation back to target.

Fiscal policy should be aware of the current constraints on output and aim to contribute to disinflation by pursuing an overall restrictive stance. In an environment of high capacity utilisation and tight labour markets, and with ample extra savings available for private households to finance consumption, a fiscal policy stimulating aggregate demand would lead to further upward pressure on
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prices. Rather a policy that contributes to reducing demand pressure would assist monetary policy in its pursuit to re-establish price stability. It would thus reduce the degree of monetary tightening necessary to achieve this goal and the risks for financial stability associated with large swings in the monetary stance. Given that automatic stabilisers should be allowed to fully work in order to limit the negative consequences of the potential fallout from monetary restriction in terms of growth and employment on households and firms, other spending and tax measures should be reviewed carefully.

Broad-based emergency measures should be wound down and any further support to firms and households needs to be strictly targeted. Last year’s initial responses of governments in the euro area were predominantly consisting of general tax cuts or subsidies, or caps on energy prices affecting everyone (Schnabel, 2023). These measures were effective in stabilising demand, also for fossil energy, and thus fuelled the inflationary process. Fading them out will result in a restrictive impulse that is appropriate from a macroeconomic perspective in order to bring inflation down. While the lifting of energy price caps could mean upward pressure on inflation in the very short term, the outlook for inflation going forward would improve as purchasing power is restrained and incentives to reduce energy consumption are increased. Continued support of low-income and liquidity-constrained households may, however, remain appropriate on distributional grounds, but any such measures should be strictly targeted and temporary.

Striking a balance between policies to cope with longer-term issues and cyclical requirements is a challenge. Governments need to respond to numerous challenges with potentially large budgetary impacts. The war in Ukraine has raised awareness of a need to increase military spending; the energy crisis that followed Russia’s invasion of Ukraine is an impetus to achieve energy independence and accelerate the energy transition; migration and refugees are putting increasingly strain on public services, including education, and housing, at least in some countries; digitalisation and European networks remain on the agenda; measures to reduce dependencies in critical sectors are gaining ground in the context of increasing geopolitical uncertainties and rising risks to the multilateral trading system; structural reforms designed to raise potential growth and mitigate the impact of the demographic change may involve additional fiscal resources, at least in the short term. While the Next Generation EU programme provides a source of funds that is particularly welcome in high-indebted countries, the problem remains that aggressive public investment programmes put additional demands on the economy that is still recovering from global supply chain disruptions and experiencing labour shortages in many sectors. In this environment, there is a risk that governments delay disinflation and crowd out private expenditures, with potentially negative effects on potential output growth. Governments should thus carefully review fiscal initiatives with respect to size and timing in order to minimise the potential conflict with monetary policy.

Fiscal policy needs to be sustainable in order to preserve the necessary room to manoeuvre for the central bank. The independence of the central bank is a cornerstone of modern macroeconomic management, with price stability assigned as the primary goal in the case of the ECB. While de jure independence is not disputed, de facto independence may be at risk when central banks have to worry about the impact of interest rate decisions on the financial position of government and the possibility of a sovereign debt crisis (Brunnermeier, 2023). The spectre of fiscal dominance – the central bank is prevented to pursue its goals efficiently due to concerns about fiscal implications – remains present in the euro area given that public debt has increased to very high levels in response to the recent crises and the absence of credible fiscal rules or a credible sovereign default mechanism (Fiedler et al., 2020). From this perspective too, fiscal consolidation is an appropriate strategy in the current environment.
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ANNEX

**Figure 13: 10-year government bond yields and 10-year overnight index swap (OIS)**

a) 10-year government yields and 10-year overnight index swap (OIS)

![Graph showing 10-year government bond yields and 10-year overnight index swap (OIS) for Spain, France, Germany, Italy, and the Netherlands.]

b) Spread between 10-year government yields and 10-year overnight index swap (OIS)

![Graph showing the spread between 10-year government yields and the OIS for Spain, France, Germany, Italy, and the Netherlands.]

Source: Refinitiv, own calculations.

Notes: Panel a shows the yields of 10-year government bonds of Spain, France, Germany, Italy and the Netherlands. Additionally, the yield of the 10-year overnight index swap (OIS) is shown, which serves as an indicator for financial market expectations on the future path of short-term interest rates. Panel b shows the spread between the government bond yields and the OIS, which serves as an indicator if the rise in government bond yields is in line with the expectations on the future path of short-term interest rates. If the spread widens it is a sign of that risk premia are driving bond yields.
**Figure 14: Share of variable and fixed interest rates of new housing loans in the euro area**

Source: Refinitiv, ECB, own calculations.

Notes: The figure shows the relative share of the different categories of new housing loans in the euro area. The categories refer to the initial interest rate fixation. In total there are 4 categories depending on the length of initial interest rate fixation.
Figure 15: Original maturity profile of outstanding loans to households and non-financial companies

a) Original maturity profile outstanding stock of housing loans

b) Original maturity profile outstanding stock of loans to non-financial companies

Source: Refinitiv, ECB.

Notes: Panel a shows the outstanding stock of housing loans in the euro area with its original maturity profile. Panel b shows the outstanding stock of loans to non-financial companies in the euro area with its original maturity profile.

Figure 16: German government bond yield and price adjustment since 2020

a) Rise in yields on German government bonds since 2020

b) Price correction of German government bonds since 2020

Source: Refinitiv, own calculations.

Notes: Panel a shows the percentage point increase in yields for 10-year German government bonds from January 2020 to April 2023. Panel b shows the respective correction in the prices of 10-year government bonds from January 2020 until April 2023.
Figure 17: New issuance of debt securities of non-financial companies and yields on corporate bonds

a) Outstanding debt securities of non-financial corporations
b) AAA and BBB corporate bonds

Source: Refinitiv, ECB, IBOXX, own calculations.

Notes: Panel a shows the absolute and percent change (YoY) for each quarter from Q1 1999 until Q4 2022. Panel b shows the yields on European corporate bonds with the rating AAA and BBB and the spread between both series.
Figure 18: Interest paid and received by sectors in the euro area (sectoral accounts)

Source: Refinitiv, Eurostat.

Notes: Interest paid and received for different sectors of the euro area derived from the sectoral accounts for the time period Q1 1999 until Q4 2022.
After inflation in the euro area started to rise to unprecedented levels, the ECB has tightened monetary policy rapidly. We analyse the implications of high inflation and the effects of monetary policy tightening on the euro area economy. While financial conditions have already tightened significantly, the size and timing of the impact on the real economy is more difficult to assess. Effects on distribution can be expected to be modest and should not be a major concern.

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