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The Impact of the Cost-of-Living Crisis on European Households

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Abstract

We study the impact of the recent cost-of-living crisis on European households using detailed data on individual consumption, income and wealth. We account for the various channels through which inflation affects individual households, and for the monetary and fiscal policy responses to the inflationary shock. Our results indicate that the effects of inflation through the revaluation of nominal wealth and income are one order of magnitude larger than the effect arising from differences in individual consumption patterns. On average, the effect of inflation is regressive, with lower income households suffering the biggest losses. Among population subgroups, young individuals and households with mortgage debt are the biggest winners of the inflation surge, while older individuals with large nominal net savings positions are the main losers. Fiscal policy measures, especially those targeted towards low-income households, were successful in dampening the negative and regressive impact of inflation.

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Executive Summary

Policy context

The paper discusses the impact of the recent inflation surge on Eurozone households, a phenomenon driven by the COVID-19 pandemic's supply disruptions and the Russian invasion of Ukraine. The increased cost of living, particularly due to spikes in energy prices, has caused one of the most severe financial strain on households in the developed world in decades, with varying effects on individuals depending on the composition of their consumption baskets, income, and wealth. Governments in the Eurozone have responded to the crisis with fiscal measures estimated to cost around 2% of GDP. Some of these measures were particularly designed to shield vulnerable groups from the impact of inflation. Meanwhile, the European Central Bank has raised interest rates to historical highs, affecting both borrowers and lenders.

Main analysis

This paper aims to analyse the impact of inflation on Eurozone households through three primary channels, as identified in previous research: the Fisher channel (influencing net creditors and debtors differently due to nominal contracts), the relative consumption channel (due to heterogeneous consumption patterns affecting individual exposures to inflation), and the nominal income channel (addressing the devaluation of sticky nominal incomes). By utilizing various data sources, including the Household Finance and Consumption Survey (HFCS) and the EUROMOD microsimulation model, the paper quantifies these effects across the income distribution and population subgroups.

The analysis also incorporates the effects of monetary and fiscal policy responses. The monetary policy impact is examined through the 'Unhedged Interest Rate Exposure' (URE), which measures financial gains or losses following interest rate changes depending on households' net financing needs, which are influence by their portfolio compositions. Fiscal policy effects are assessed using microsimulation techniques to estimate the cushioning effects of government measures, including both price and income-side interventions.

The paper positions itself within the literature that examines the heterogeneous effects of inflation on households and contributes to a better understanding of the impact of the recent cost-of-living crisis. While related studies have explored various aspects in isolation, this paper provides a comprehensive assessment by considering the direct effects of inflation together with effects arising from fiscal and monetary policy responses. It extends previous research by employing a multi-country approach, offering a broader Eurozone perspective, and by highlighting the importance of characteristics like home ownership in driving the heterogeneous effects of the crisis on European households.

Key conclusions

The findings suggest that the effects of inflation through the revaluation of nominal wealth and income are one order of magnitude larger than the effects arising from differences in consumption patterns. Looking at the impact of the crisis across income decile groups, we find that the overall impact is regressive, hitting on average the lower-income households the hardest. The relationship between individual income and the URE is positive, indicating that interest rate hikes benefit high-income households while disadvantaging those at the lower end. Fiscal measures have generally succeeded in mitigating the regressive effects of inflation.

The paper extends its findings to different population subgroups beyond income, considering wealth, age, home ownership, and mortgage status. It reveals considerable differences in the inflation and policy impact across these groups, with older individuals, outright homeowners, and non-homeowners being the most negatively affected by the cost-of-living crisis.

The Impact of the Cost-of-Living Crisis on European Households*

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Abstract

We study the impact of the recent cost-of-living crisis on European households using detailed data on individual consumption, income and wealth. We account for the various channels through which inflation affects individual households, and for the monetary and fiscal policy responses to the inflationary shock. Our results indicate that the effects of inflation through the revaluation of nominal wealth and income are one order of magnitude larger than the effect arising from differences in individual consumption patterns. On average, the effect of inflation is regressive, with lower income households suffering the biggest losses. Among population subgroups, young individuals and households with mortgage debt are the biggest winners of the inflation surge, while older individuals with large nominal net savings positions are the main losers. Fiscal policy measures, especially those targeted towards low-income households, were successful in dampening the negative and regressive impact of inflation.

Keywords: Inflation Heterogeneity, Monetary and Fiscal Policy, Euro Area.
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1 Introduction

The recent surge in inflation – the result of post-pandemic supply disruptions and the Russian invasion of Ukraine – has had a profound impact on household finances across many regions of the globe. Households in the Eurozone were particularly affected by the underlying shocks to energy prices and the ensuing price rises, posing substantial challenges to their financial well-being in what has become the most severe cost-of-living crisis in the developed world since decades. The crisis affected households in a heterogeneous way. In particular, differences in consumption patterns, sources of income, and the level and composition of wealth implied substantial heterogeneity in the way households were affected by inflation.

Moreover, the inflationary shock triggered a bold policy response. Governments across the Eurozone adopted measures to protect households against the effects of inflation, especially the most vulnerable population groups. These fiscal measures are estimated to have cost some 2% of GDP (Bańkowski et al., 2023). On the monetary policy side, the European Central Bank raised interest rates to unprecedented levels, with implications for both creditors and debtors. Hence, any analysis that disregards those policy responses can only provide a partial assessment of the impact of the cost-of-living crisis on households.

In this paper, we study the impact of the inflationary shock on Eurozone households. As discussed in Cardoso et al. (2022), inflationary shocks have an immediate effect on households through three main channels: (i) *the Fisher channel*, due to the fact that some households are net creditors and others are net debtors in contracts denominated in nominal terms; (ii) *the relative consumption channel* due to differences in consumption patterns across households, which gives rise to differences in effective individual inflation rates; and (iii) *the nominal income channel*, that describes the devaluation of nominal incomes in the presence of nominal rigidities. We quantify the effects of those channels on households in the Eurozone across the income distribution, using data from the Household Finance and Consumption Survey (HFCS), combined with consumption and income information from the Household Budget Survey (HBS), EUROMOD (the micro-simulation framework for European countries) and its underlying EU-SILC data.

We complement our analysis by considering the impact deriving from the monetary and fiscal policy responses to the shock. On the monetary policy side, we know from Auclert (2019) that interest rate increases impact households' balance sheets through the so-called 'Unhedged Interest Rate Exposure' (URE). The URE provides a measure of the financial gain/loss that

households suffer following an increase in the interest rate, depending on their net financing needs. These losses depend on the exact composition of households' portfolios and the maturity of their assets and liabilities. We construct the URE at the household-level using HFCS data to quantify the impact of the monetary policy response within various subgroups of the population. On the fiscal policy side, we draw from the recent work of Amores et al. (2023) to quantify the extent of the cushioning effects of fiscal measures adopted by governments in the Eurozone, considering both price and income-side measures, which are estimated using microsimulation techniques.

We find that the impact of inflation through the Fisher and nominal income channels are an order of magnitude higher than the relative consumption channel, which has been the focus of most of the literature evaluating the impact of the recent crisis so far. The impact of all channels is regressive in most of the countries we analyse, with households in low income deciles suffering the most from the effects of inflation. Moreover, among the countries we analyse, there is a clear positive relationship between individual income and the URE, and we therefore find substantial gains (losses) from increasing interest rates for households at the top (bottom) of the income distribution. With respect to the fiscal policy side, we find that the extraordinary measures taken to mitigate the effects of the crisis on households were in general successful in dampening the negative and regressive impact of inflation through the other channels. The effects were particularly successful in countries relying more on income measures, which are more targeted towards households at the bottom of the income distribution.

Finally, we extend our results to consider the impact of inflation on various population subgroups, going beyond the income dimension. In particular, we report results for households along the wealth and age distribution, and across home ownership and mortgage statuses. We find strong heterogeneity in the effect of inflation and the policy response on the revaluation of wealth across those subgroups. Older individuals, outright home owners and non-home owners are the biggest losers of the cost-of-living crisis.

Related literature Our paper is related to the literature studying the heterogeneous effects of inflation on households (see Doepke and Schneider (2006); Adam and Zhu (2016); Auclert (2019); Jaravel (2021); Pallotti (2022); Del Canto et al. (2023) and references therein).

A growing literature studies the impact of the recent cost-of-living crisis on households. While many papers document the heterogeneous impact of price surges in European countries (for

recent contributions see, e.g., Menyhert (2022), Sologon et al. (2022), Basso et al. (2023), Curci et al. (2022)), these analyses have typically focused on the consumption and income channels in isolation, falling short of providing an overall assessment of the crisis. Moreover, with the exception of Dao et al. (2023), Amores et al. (2023), Curci et al. (2022) and Langot et al. (2023), who document the impact of fiscal adjustments, the effect of the policy response to the crisis have not been considered in the aforementioned papers.[1]

The two papers most closely related to ours are Cardoso et al. (2022) and Pallotti et al. (2023), who study the effects of inflation on European households through the various channels we also consider. Cardoso et al. (2022) make use a proprietary dataset by BBVA, a private bank, to assess the impact of inflation on households in Spain. Our study extends the scope of their analysis by using a multi-country approach, to draw results for the Eurozone as whole, and by accounting for the effects of fiscal and monetary policy measures, which allows us to provide an assessment of the mitigating effects of the policy response to the crisis.

Our paper is closely connected to the recent work of Pallotti et al. (2023), who analyse the effect of the inflationary shock and the fiscal response on households in France, Germany, Italy and Spain. While there are many similarities between our papers, our methodology is different, and in addition to Pallotti et al. (2023) we shed light on the importance of characteristics such as the home ownership status in driving the heterogeneous effects of the crisis on European households.[2] We therefore see our respective approaches and results as complementary.

The remainder of the paper is structured as follows. In Section (2), we present the theoretical framework underpinning our analysis throughout the paper. Section (3) describes the strategy we use to assess the cost-of-living crisis using various datasets. Section (4) presents the main results for income decile groups in each country of interest, and Section (5) extends the analysis to various population subgroups. Section (6) concludes.

[1] See also Auclert et al. (2023), who study the effects of monetary and fiscal policy responses to energy shocks in energy-importing economies.

[2] Pallotti et al. (2023) adopt a general equilibrium framework in which they study the welfare effects of changes in inflation. We rely instead on a simpler framework and report the effect of inflation and the policy response on the valuation of household wealth, in the spirit of Cardoso et al. (2022). Pallotti et al. (2023) rely on econometric estimates to evaluate the impact of the inflationary shock on various components of individual incomes (including capital income such as rents and dividends). We instead heavily rely on the EUROMOD uprating factors (computed using external data on income growth for various income sources) in order to update non-financial nominal incomes, and use our estimates of the URE to evaluate the impact of the change in the monetary policy stance on financial asset returns. Finally, we make use of the estimates of Amores et al. (2023) to assess the impact of the fiscal response to the crisis, while Pallotti et al. (2023) rely on the national fiscal policy responses identified by the Bruegel think-tank. Despite those differences, the results we get are in line with Pallotti et al. (2023).

2 The Theoretical Framework

2.1 Main Assumptions

We follow Auclert (2019) and analyse the impact of an unexpected temporary increase in inflation at time t. We make the following assumptions:

A1: The inflation shock is unexpected and lasts only one period. In all other periods, inflation is as expected and (for simplicity) normalised to $\overline{\pi}$:

$$\pi_{\tilde{t}} = \begin{cases} \overline{\pi} & \text{at } \tilde{t} \neq t \\ \overline{\pi} + d\pi & \text{at } \tilde{t} = t \end{cases}$$

Furthermore, we assume that expectations about future inflation rates are not affected by the inflation surge in period t, i.e. $E_t \pi_{t+1} = \overline{\pi}$ for all t.[3]

A2: The monetary authority responds to the inflationary shock by increasing interest rates at time t by dR, before reverting interest rates to their previous, constant value thereafter. The change in interest rates moves all bond prices Q by $dQ/Q = -dR/R$.

A3: Nominal incomes are partially rigid: incomes in t are agreed upon in $t-1$, and are partially indexed to inflation.

2.2 The Household Balance Sheet

We model household wealth and its dynamics using the perfect foresight framework of Auclert (2019), to which we add heterogeneity in individual consumption baskets, (partial) indexation of nominal incomes, and taxation. We then use this framework to assess the impact of inflation on household wealth. Specifically, we look at how inflation affected households pre-existing stock of wealth, via the Fisher effect, as well as the accumulation of wealth in the period of shock, through the nominal income and the consumption channel. Similarly, we consider the impact of the policy response on household wealth through the interest rate exposure (i.e the amount of wealth subject to re-financing) and net gains form from the temporary fiscal measures implemented in response to the cost of living crisis.

[3] We assume that $\overline{\pi} = 2\%$ for our empirical specification.

Budget constraint Households consume a basket of K different goods. Consumption of good k by household j in period t is denoted as $c_{j,k,t}$, and the price of good k in that period is denoted as $P_{k,t}$. The household budget constraint can be written as:

$$\begin{aligned}\sum_k P_{k,t}c_{j,k,t} &= P_t y_{j,t} + B_{j,t-1}^{(t)} + P_t b_{j,t-1}^{(t)} + \sum_{s\geq 1} Q_t^{(t+s)}\left(B_{j,t-1}^{(t+s)} - B_{j,t}^{(t+s)}\right) \\ &\quad + \sum_{s\geq 1} q_t^{(t+s)} P_{t+s}\left(b_{j,t-1}^{(t+s)} - b_{j,t}^{(t+s)}\right) - P_t\boldsymbol{\tau}\left(y_{j,t}\,;\,\{c_{j,k,t}\}_k\right), \end{aligned} \tag{1}$$

where $B_{j,t}^{(t+s)}$ and $b_{j,t}^{(t+s)}$ are individual holdings of, respectively, zero-coupon nominal and real bonds maturing in $t+s$, which trade at prices $Q_t^{(t+s)}$ and $q_t^{(t+s)}$ at time t.

Nominal income $P_t y_{j,t}$ is the individual's nominal income, which can be obtained from various sources such as labour, unemployment benefits, regular transfers, or pension entitlements. Nominal incomes have a sticky component: we assume that individuals agree to a level of nominal income at $t-1$, which is then partially indexed to realised inflation. Letting $P_{t-1}y_{j,t-1}^{(t)}$ be the agreed upon nominal income for time t, we have:

$$P_t y_{j,t} = (1 + \lambda_{j,t}\pi_t) P_{t-1} y_{j,t-1}^{(t)}, \tag{2}$$

where $0 \leq \lambda_{j,t} \leq 1$ denotes the fraction of household j's income that is indexed to inflation. Indexation is individual-specific, as we will allow it to depend on individual features such as the work status, sector of activity and country of residence.[4]

Taxation The net taxes paid by individual households are summarised by the function $\boldsymbol{\tau}(\cdot)$, which is divided into two components:

$$\boldsymbol{\tau}\left(y_{j,t}\,;\,\{c_{j,k,t}\}_k\right) = \tau_y(y_{j,t}) + \tau_c(\{c_{j,k,t}\}_k). \tag{3}$$

Those components capture, respectively, income-related taxes and benefits $\tau_y(\cdot)$ on the income-side (i.e net income taxes) and consumption taxes and subsidies $\tau_c(\cdot)$ on the price-side (i.e effective consumption taxation).

[4]Note that our assumption of partial indexation is not meant to capture the systematic indexation of nominal incomes, a feature which is absent in most countries. We rather use this component to capture the fact that, while wages tend to be more rigid than prices, they do respond at least partially to inflation developments. Our choice for the value of λ's is therefore data driven, rather that aiming at capturing specific institutional features.

Wealth The end-of-period net wealth of household j at time t, denoted as $a_{j,t}$, is the sum of net nominal and real assets held by the household:

$$P_t a_{j,t} = \sum_{s\geq 1} Q_t^{(t+s)} B_{j,t}^{(t+s)} + \sum_{s\geq 1} q_t^{(t+s)} P_{t+s} b_{j,t}^{(t+s)}. \tag{4}$$

The aim of this paper is to evaluate the effects of the cost-of-living crisis on this variable for Eurozone households.

2.3 The Inflationary Shock

As stated previously, to analyse the impact of a surprise temporary inflation surge on wealth between period t and $t+1$, we assume that the inflation shock is one-off and does not affect future inflation expectations, hence there is no impact of the price surge beyond $t+1$. As in Cardoso et al. (2022), we can then calculate the first-order impact on nominal wealth of a transitory and unexpected inflation shock as follows:[5]

$$da_{j,t}^{(\pi)} = -\left[\underbrace{NNP_{j,t}}_{\text{Fisher effect}} \underbrace{-(\lambda_{j,t}-1)\left(1-\frac{\partial \tau}{\partial y}\right)y_{j,t-1}^{(t)}}_{\text{Nominal income}} + \underbrace{\left(\frac{d\pi_j}{d\pi}-1\right)c_{j,t}}_{\text{Relative consumption}}\right] d\pi. \tag{5}$$

The first term, which is denoted as the *Fisher Effect*, is a function of the households' net nominal asset position, defined as $NNP_{j,t} = \sum_{s\geq 0} Q_t^{(t+s)} B_{j,t-1}^{(t+s)}$ (using the convention $Q_t^{(t)} = 1$). This term represents the impact that households suffer due to a devaluation of the real value of their nominal assets. In the case where the household is a net nominal debtor, i.e. it holds more liabilities than assets, it would gain as the real value of its debt is devalued. Vice versa, if a household holds more nominal assets than liabilities, i.e. it is a net nominal creditor, it would experience a devaluation of its stock of net assets. The second term, which is denoted the *nominal income effect*, captures the loss that households suffer from the devaluation of the purchasing power of their nominal income, which is for most households regular labour income. Note that in the case where nominal wages fully adjust to inflation, i.e. $\lambda_j = 1$, this effect is zero, as in this case nominal wages are perfectly adjusted to inflation, and their purchasing power is not affected. Finally, the third term, dubbed as the *relative consumption channel*, represents the difference between the household-specific inflation rate and the headline inflation

[5] See Appendix (A) for details on the derivation of Equ. (5).

rate, taking into account each household's individual consumption pattern. For example, some households – typically at the low end of the income distribution – are more exposed to rising energy prices due to their relatively high consumption of energy-intensive goods.

2.4 The Fiscal Policy Impact

Eurozone governments have adopted a wide range of fiscal measures to cushion households from the cost-of-living crisis. Such measures are related to the income-side, e.g. social benefits and support programs for low-income receivers, and the price-side, such as price-caps. In our framework we account for these policy interventions through changes in the tax-benefit functions $\tau_y\left(y_{j,t}\right)$ and $\tau_c\left(\{c_{j,k,t}\}_k\right)$. Formally, we define the fiscal impact as follows:

$$da_{j,t}^{(\tau)} = -\left[\underbrace{d\tau_y\left(y_{j,t}\right)}_{\text{Income-side measures}} + \underbrace{d\tau_c\left(\{c_{j,k,t}\}_k\right)}_{\text{Price-side measures}}\right]. \tag{6}$$

2.5 The Monetary Policy Impact

To fight against rising inflation in the Euro area, the European Central Bank raised its policy rates to historical highs. Interest rate fluctuations have a direct effect on the interest income flows received or paid by households. Our analysis focuses exclusively on such direct (first-order) effects of monetary policy and disregards any indirect effect that monetary policy might have through e.g. its impact on economic activity.

As described in Auclert (2019), the impact of interest rate changes on households' balance sheet can be summarised through the so-called 'Unhedged Interest Rate Exposure' (URE). The URE is defined as the difference between maturing assets and liabilities at a given point in time. Maturing assets include households' net income, and maturing liabilities include households' current consumption. In net terms, it is the resource flow available to households to be saved or the amount required to be borrowed by households, over an interval of time that is exposed to current changes in interest rates. Obviously, it is important in this context to consider each asset's and liability's maturity, since longer maturities partially protect households against transitory interest rate changes, as is the case for instance in the case of mortgage contracts with fixed interest payments. Such assets and liabilities are considered to be 'hedged' against a change in the interest rate, as compared to 'unhedged' ones with short maturities.

Assuming a complete pass-through of the policy rate into retail rates for deposits and loans, the individual interest rate exposure translates one-to-one into a (direct) effect on individual wealth, following from a change in the policy rate. More formally, we show in Appendix A that the impact of changing interest rates can be summarised as follows:

$$da_{j,t}^{(R)} = URE_{j,t}\, dR \tag{7}$$

where $URE_{j,t} = \frac{B_{t-1}^{(t)}}{P_t} + b_{t-1}^{(t)} + y_{j,t} - \boldsymbol{\tau}\left(y_{j,t}\,;\,\{c_{j,k,t}\}_k\right) - \sum_k \frac{P_{k,t}}{P_t} c_{j,k,t}$ is the difference between the maturing assets and maturing liabilities of the household. Households with a positive URE, e.g. those who hold large amounts of sight account deposits or other short-term instruments, benefit from a rise in interest rates, while households with a negative URE (for instance, those holding large amounts of adjustable-rate mortgages and relatively smaller amounts of short-term assets) lose from an increase in interest rates through higher interest payments on their maturing debt position.

3 Empirical Strategy

We quantify the effects of the recent inflationary episode on households in six Eurozone countries: Germany, France, Italy, Spain, Portugal and Greece.[6] To do so, we combine data from different sources. Data on household (gross) income and consumption, wealth and its composition are obtained from the third wave of the Household Finance and Consumption Survey (HFCS) of 2017.[7] Information on individual consumption baskets is obtained from the 2015 Household Budget Survey (HBS). Furthermore, the EUROMOD micro-simulation model, and in particular its Indirect Tax Tool (ITT) extension (which makes use of the EU-SILC and HBS as underlying data sources), are used to (i) translate gross incomes from the HFCS into disposable income, (ii) to index nominal incomes, and (iii) to simulate the effects of the fiscal measures outlined in the previous section.

Table (1) describes the various data sources and information we retrieve from them in order to construct the final dataset used in our analysis. HFCS survey data constitutes the starting

[6]These countries together represent some 85% of the Eurozone GDP; we then use them as a proxy for the Eurozone as a whole.

[7]We deliberately refrain from using data from the most recent fourth wave of the HFCS survey, which was conducted between the first half of 2020 and the first half of 2022. Given the disruptive nature of the Covid pandemic and its impact on household balance sheets, e.g., through income losses and (in)voluntary savings, we did not consider this data to be the most suitable for our analysis.

point. From gross total household incomes provided in the data, we applied net-to-gross income ratios, obtained from EUROMOD (2023) at the country and income decile level, to obtain net income. The net nominal asset positions (NNP) and the 'Unhedged Interest Rate Exposure' (URE), needed to estimate the effects of inflation and monetary policy through the asset channel (see Equ. (5) and (7)) can be directly computed at the household level from the HFCS data. Details on how those variables are computed are provided in Appendix (B.1) and (B.2). In a second step, we use the HBS data, which provide information on consumption expenditures by COICOP category, to compute household-specific effective inflation rates.[8] HBS data on net incomes are used to group households into income deciles and compute decile-specific inflation rates by income decile and country, which are then merged with income decile-specific information in the HFCS data. Finally, to compute the magnitude of the fiscal policy response (described in Equ. (6)), we need to feed in the response of $\tau_y(\cdot)$ and $\tau_c(\cdot)$. To do that, we draw from the recent work of Amores et al. (2023), who use microsimulation techniques to estimate the cushioning effect of income-side and price-side measures by income decile for the same countries as the ones we analyse.[9]

In our work, we use income deciles in each country as the main unit of analysis. We do so because it allows us to use the information combined in all the datasets we utilize in a consistent way. Indeed, while all our data sources contain information on household income, this is not the case for wealth-related variables and other demographic characteristics. For example, data on household wealth are only available in the HFCS survey and cannot be merged with wealth-specific information on consumption patterns, nominal income, etc retrieved from other sources. However, as we analyse the effect of inflation on household by income groups, it is important to note that income is correlated with other characteristics that are important for explaining the results we obtain.

To describe the socio-demographic and economic characteristics of the income deciles in our dataset, we summarise them in Figure (1). Panel (1A) shows the relative shares of various age groups along the income dimension. Differences across income brackets are significant:

[8] Data on inflation rates at the country-level and the COICOP 4-digit level are obtained from the ECB's Harmonised Indices of Consumer Prices (HICP). At the country-level we use the following year-on-year inflation rates: 8.7% in Germany, 5.9% in France, 9.3% in Greece, 8.3% in Spain, 8.7% in Italy and 8.1% in Portugal.

[9] It is worth pointing out that the market inflation rates we used in this analysis are not adjusted to take into account the existence of the (price-side) fiscal policy measures, which could have dampened price surges. As shown in Amores et al. (2023), the difference between the observed market inflation rate and the hypothetical inflation rate excluding price-side fiscal measures is small, however. For example, in the case of the Eurozone as a whole, the difference accounts to 1.5 percentage points, which is comparably small relative to the overall level of inflation rate.

TABLE 1: Main Data Sources

Variable	Source
Individual exposures	
Net nominal position (NNP)	HFCS
Gross Income (Y)	HFCS
Consumption level (C)	HBS & HFCS
Gross to disposable income	EUROMOD
Interest rate exposure (URE)	HFCS
Inflation effect	
Nominal income indexation (λ_j)	EUROMOD
Aggregate inflation (π)	ECB (HICP)
Effective inflation rate (π_j)	HBS & COICOP4 level π (ECB).
Policy response	
Fiscal response (τ_y, τ_c)	EUROMOD ITT & Amores et al. (2023).
Interest rate response (R)	ECB

Notes: HFCS: Household Finance and Consumption Survey, 2017 (Wave 3). HBS: Household Budget Survey, 2015 wave. EUROMOD is the micro-simulation model for tax-benefit system for the EU27, which uses the EU Statistics on Income and Living Conditions (EU-SILC) as its main data input source. The EUROMOD ITT (Indirect Tax Tool) extension makes use of the Household Budget Survey (HBS) as additional data source.

young individuals, aged between 16 and 34 years, are most often found in the first income decile. Their share is gradually declining in higher income deciles. On the contrary, the share of individuals aged between 45 and 60 years, which are likely to have reached the final stages of their work career and, therefore, higher incomes, is gradually increasing from the second to the tenth income decile. Old age individuals, aged 75 and higher, are most often found in the bottom half of the income distribution, in particular in the second income decile. The share of pensioners at the bottom of the income distribution is crucial in shaping the distribution of net nominal asset positions - which is, on average, positive at the bottom of the income distribution and negative at the top. Indeed, pensioners tend to display positive nominal asset balances accumulated over their life-cycle. On the contrary, high income working age individuals tend to feature negative nominal positions, because of their large mortgage holdings. We discuss the implications of this pattern in Section 4.1.

Panel (1B) illustrates the relationship between income and wealth deciles. Not surprisingly, we find a strong positive relationship between income and wealth, with higher-wealth households typically featuring in higher-income deciles. Panel (1C) divides income deciles into non-home owners, home owners without mortgage debt and home owners with mortgage debt. First, note that the share of home owners is substantially increasing in higher income deciles, rising

from around 35% in the first to more than 90% in the highest income decile. Second, the share of home owners with mortgage debt is increasing from about 3% in the first decile to 41% in the last. Lastly, the share of home owners without mortgage debt is relatively constant at about 40% across most income deciles, except the first one. Focusing on households with mortgage debt, we can see from Panel (1D) that mortgages with adjustable interest rates, which evolve with market interest rates, are more prominent among lower income deciles, in particular the first and the third decile. On the other hand, mortgage debt with fixed rates are more common in the upper half of the income distribution.

Panel (1E) suggests that lower income households feature a higher consumption share of COICOP product groups that have experienced particularly pronounced price surges. Concretely, these were COICOP groups 1 ("Food and non-alcoholic beverages"), 4 ("Housing, Water, Electricity, Gas and other Fuels") and 7 ("Transport"), all of which have seen prices in 2022 surging faster than other categories. While households in the first income decile allocate approximately 65% of their expenditures to products in those three groups, the expenditure share falls gradually to around 52% in the top income decile. Lastly, Panel (1F) shows the proportion of so-called Hand-to-mouth (HtM) consumers across income deciles. A household is classified as HtM if its net balance of liquid wealth is smaller than a certain share of monthly income.[10] The lack of liquid wealth gives those households poor insurance against fluctuations in their earnings, so those individuals typically feature high marginal propensities to consume out of transitory shocks to their income. Within the group of HtM households, we distinguish between 'wealthy' and 'poor' individuals. Wealthy HtM have a positive net illiquid wealth balance, while poor HtM have zero or negative net illiquid wealth balances.Along the income distribution, the share of HtM individuals is gradually declining from around 40% to 25%. Among the HtM households, the share of wealthy HtM is slightly increasing, while it is declining for poor HtM individuals.

[10]See Section (B.3) for more details on the classification as HtM households.

FIGURE 1: Population Characteristics Along the Income Distribution

Notes: Figure (1) displays the composition of income deciles with respect to demographic and economic characteristics. All panels show the weighted average effects across the six selected countries. For "age" we consider the age of the household's reference person (HFCS variable DHAGEH1). Net wealth is defined as the difference between total household assets, excl. public and occupational pension wealth, minus total outstanding household's liabilities (HFCS variable DN3001). Home ownershp status is conditional on whether households report positive housing values or not (HFCS variables HB0900 and HB280x). The mortgage status can be directly inferred from the survey questionnaire (HFCS variable DL1100i). The amount of mortgages with adjustable interest rates is inferred from the survey questionnaire (sum of HFCS variables DL1110ai and DL1120a). The relative expenditures on COICOP product groups 1, 4 and 7 by income decile are based on the Household Budget Survey (HBS). Details on the classification of households as Hand-to-mouth can be found in Section (B.3).

4 The Cost-of-Living Crisis Effects Across Income Deciles

In this section, we provide results on the effects of inflation on households in the Eurozone. In our baseline results we study the magnitude of the effects from inflation through the channels identified previously as a share of disposable income, separately for each income decile group. In a second step, in Section (5), we extend our analysis by classifying households into various other subgroups, depending on characteristics such as age, net worth, and housing/mortgage status.

4.1 Inflation Effect Through Consumption, Income and Nominal Wealth

In this section we discuss the heterogeneous impact of the inflationary surge on households across the income distribution through the relative consumption, nominal income and Fisher channel described above and summarised in Equ. (5).

Table (2) summarises the main results across the Eurozone, as proxied by our six countries of interest (Germany, France, Italy, Spain, Greece and Portugal), which together represent about 85% of Eurozone GDP. The results point towards a pronounced regressive pattern, with households in lower income brackets relatively more negatively affected than those in higher income groups. The general pattern holds true for all three separate channels considered. With respect to the net stock of nominal assets, as described in Section 3, lower income households tend to hold a positive balance of nominal assets, which are devalued by a surge in inflation. On the contrary, households in higher income brackets are characterized by negative net nominal asset positions, which are also devalued in real terms, thereby leaving such households with a gain. The effect ranges between -0.59% of disposable income in the bottom income decile and $+1.47\%$ for the top decile. As concerns nominal income, we can see that households in all income deciles tend to lose in real terms as they see that their nominal income is only partially adjusted to inflation, thereby reducing its purchasing power. Table (2) reveals however a regressive pattern with households in the bottom income deciles losing more than those in the higher income deciles, resulting from substantially lower income growth in 2022. Finally, with respect to the inflation exposure resulting from decile-specific consumption patterns, we find that individuals in the bottom income deciles are more exposed to high inflation goods, such as fuel and electricity, than higher income households, as has also been documented in other studies. In monetary terms, this is equivalent to a loss of 1.38% of disposable income for households in the first income decile, as compared to the country average. In total, the

TABLE 2: Impact of Inflation on Eurozone Households in 2022 by Income Decile

Income Decile	Channel (% disposable income)			Total
	(1) Revaluation of Nominal Assets	(2) Revaluation of Nominal Income	(3) Relative Consumption	
1	−0.59	−5.53	−1.38	−7.50
2	−1.62	−5.27	−0.67	−7.55
3	−0.59	−4.98	−0.38	−5.95
4	−0.59	−4.70	−0.18	−5.46
5	0.11	−4.60	−0.04	−4.53
6	0.17	−4.50	0.15	−4.19
7	1.10	−4.40	0.24	−3.07
8	1.24	−4.30	0.33	−2.73
9	1.31	−4.26	0.44	−2.51
10	1.47	−3.62	0.54	−1.61

Notes: The table reports, for each income decile, the impact of the inflation surge through three different channels, based on Equ. (5), and the total effect, in percent of disposable income. Negative values indicate losses from inflation, while positive ones indicate gains. The figures are the weighted average of six countries, which are France, Germany, Greece, Italy, Portugal and Spain.

consumption channel is noticeably smaller than the wealth and income channels. Taking the three effects together, we find a total loss that accounts to 7.50% of disposable income in the bottom income decile, which is gradually shrinking to only 1.61% of disposable income for the top income decile.

Fig. (2) illustrates the total effect and its composition graphically, starting with the Eurozone as a whole in Panel (2A) before looking at the individual country cases in the subsequent panels of the figure. As noted previously, the relative consumption channel is generally small in absolute terms. Lower income households are negatively affected due to their higher reliance on high inflationary goods, such as energy and food (see, e.g., Amores et al. (2023) and Cardoso et al. (2022)). Nevertheless, from a quantitative point of view, the main drivers behind the impact of inflation on household wealth is the devaluation of their nominal incomes and, to a smaller extent, the revaluation of their net nominal asset positions (Fisher effect). Both the erosion of the real value of incomes and the asset devaluation effects imply a larger loss for lower income households. The effect is somewhat smaller for households in higher income deciles due to higher nominal income growth rates.

A regressive total effect from these three channels is present in all six countries, albeit to different extents. More regressive trends can be observed in Germany and Spain, while the trend is less pronounced in Italy, with households in higher income deciles losing as much as their

counterparts in lower income deciles. The distribution of net nominal asset positions is a key driver of the extent of the regressive nature of the inflationary impact. For example, positive net nominal asset positions among lower-income groups in Germany, and negative ones in France and in Spain among higher-income groups, strengthen the regressive nature of the impact. On the other hand, in Italy and in Greece the distribution of nominal balances appears to be more balanced among income groups, thereby flattening the distributional impact.[11] A second important determinant for the extent of the regressive nature is the decile-specific growth rate of nominal incomes, which partially offsets inflation-induced devaluations. For example, nominal income growth has been stronger in Portugal, while it has been particularly small in Italy (see Fig. (A.1) in the Appendix), thereby explaining the relatively small and large effects, respectively, in both countries with respect to the nominal income channel, despite inflation rates of similar magnitudes in both countries.

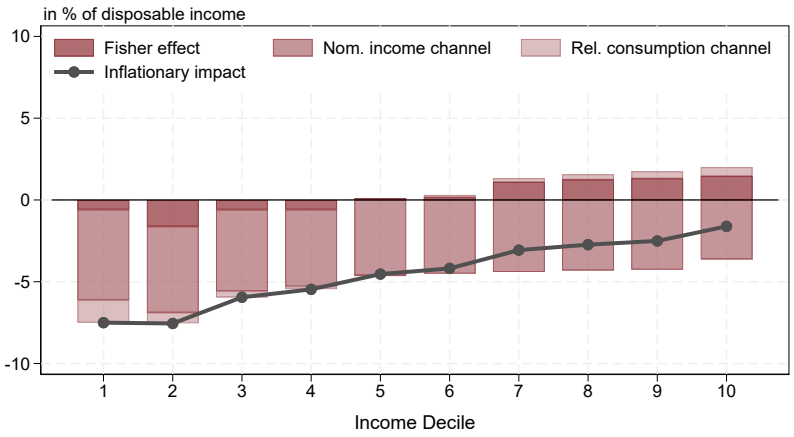
Regarding the inflation exposure through the Fisher channel, which is determined by the net nominal asset position, we can see from the figure that lower income households generally experience a loss from holding a positive net balance on average. As previously discussed, this is to be ascribed to the larger share of pensioners - with positive nominal balances accumulated during the life-cycle - at the bottom of the income distribution. Higher income individuals with mortgage-driven nominal liabilities tend to be more prominent at the top of the distribution. In this context, it is important to note that by grouping households into income deciles, other potentially important characteristics such as age and mortgage status are overlooked. Furthermore, the net nominal asset position is not to be confused with the net wealth position. For example, households with a large stock of real assets, such as real estate or pension claims, and a nominal liability from holding a mortgage will be considered high net wealth but with a large negative net nominal position.

For those reasons, considering the results along the income dimension masks other critical characteristics which might be important for the the magnitude of the effects. We will revisit the results in Section (5) for various subgroups of the population, e.g. by age group and mortgage status. Not surprisingly, we show in that section that these characteristics are indeed strongly related to the level and composition of nominal wealth, implying large heterogeneity across subgroups of households with respect to the impact of inflation on wealth.

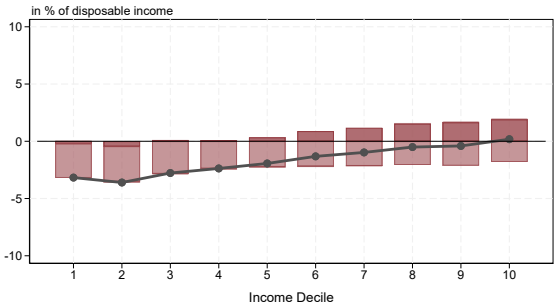
[11] The situation in the first income decile in Greece is a notable exception from this pattern, due to a substantial devaluation of nominal liabilities which are held by households.

FIGURE 2: Inflation Impact Across Income Deciles in Selected Eurozone Countries

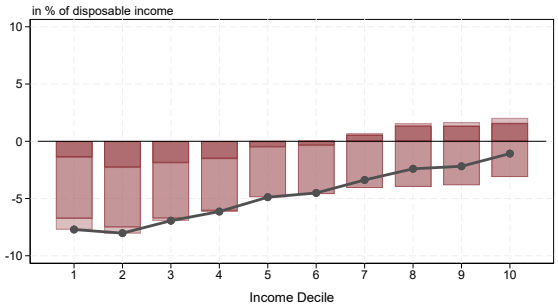
(A) Eurozone



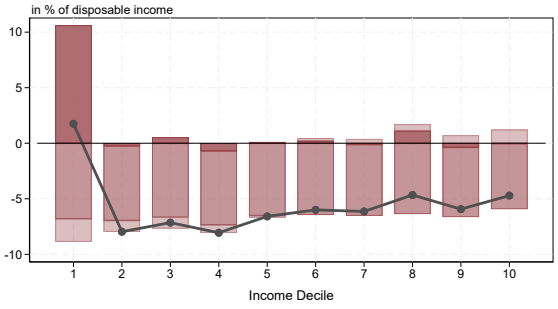
(B) France



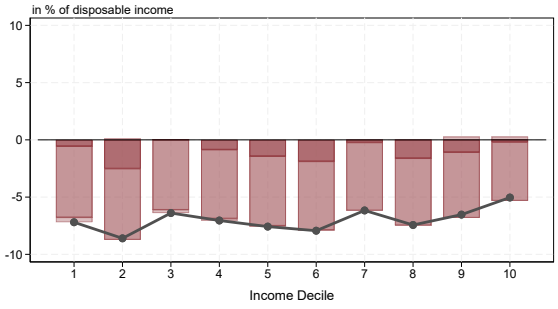
(C) Germany



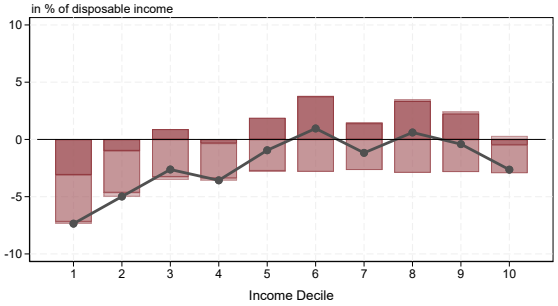
(D) Greece



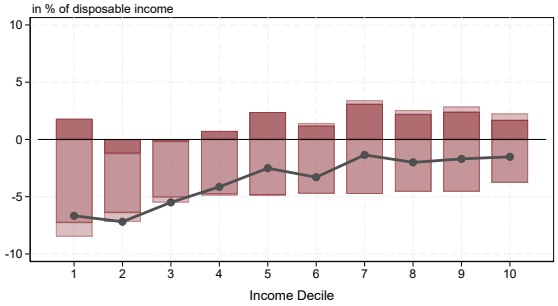
(E) Italy



(F) Portugal



(G) Spain



Notes: The figure shows for each income decile the monetary loss from inflation relative to disposable income through a devaluation of nominal assets (Fisher effect) and nominal income, as well as the relative consumption channel. Panel (2A) shows the weighted average across the six selected countries.

4.2 Fiscal and Monetary Policy Responses

Following the inflationary shock, Eurozone governments moved quickly to cushion the population against the economic and social fallout of rising prices, often with the explicit aim of supporting incomes at the lower-end of the distribution. Governments adopted measures to limit the increase in prices, particularly for energy consumption, e.g. by introducing price caps, subsidies or discounts, and by adopting price measures, such as reducing taxes on goods and services. Governments also adopted measures to shield households' disposable income more directly through income measures, for example in the form of transfers or tax credits. For the Eurozone as a whole these measures were estimated to cost some 2% of GDP. In parallel, the European Central Bank has increased interest rates to unprecedented levels, lifting them from zero to 2.5% by the end of 2022.[12] Given the quantitative importance of the monetary and fiscal policy response to inflation and their impact on household wealth, any assessment of the inflationary shock that disregards them is bound to provide an incomplete picture of the actual impact of the cost-of-living crisis on households.

In this section we investigate the impact of the fiscal and monetary policy response to inflation. First, in order to assess the impact of fiscal policy measures, we draw from Amores et al. (2023), who analyse more than 50 different price and income-side measures, which were adopted in the six Eurozone countries selected for our study. Second, in order to measure the impact of the monetary policy response we employ the framework of Auclert (2019) and construct a measure of each households' URE to quantify the impact of the increase in the interest rate on households. Consistently with the first part of the analysis, we present results for the Eurozone block as a whole, before focusing on the cross-country differences.

4.2.1 Fiscal Policy

The impact of the fiscal measures that were implemented in 2022 along the income distribution for the Eurozone is presented in Fig. (3A). It shows that, on average, governments cushioned almost 6% of the income loss for the lowest income decile in the countries we consider through various income and price-side measures. For higher income brackets the support gradually decreases. This difference across deciles is mostly due to income-side measures, which were more targeted in nature, while price-side measures tend to benefit households across the whole

[12]The ECB kept progressively increasing its main interest rate through 2023, until reaching 4.5% in September 2023.

TABLE 3: Fiscal Support in the Eurozone in 2022 by Income Decile

Income decile	Type of fiscal support		Total
	Income-side measures	Price-side measures	
1	3.31	2.50	5.82
2	2.23	1.98	4.21
3	1.76	1.70	3.46
4	1.44	1.58	3.02
5	1.22	1.47	2.69
6	1.06	1.42	2.48
7	0.91	1.29	2.20
8	0.80	1.23	2.02
9	0.64	1.08	1.72
10	0.38	0.79	1.17

Notes: Table (3) shows for each income decile the average fiscal support received in % of disposable income. The figures are the weighted average of six countries, which are France, Germany, Greece, Italy, Portugal and Spain.

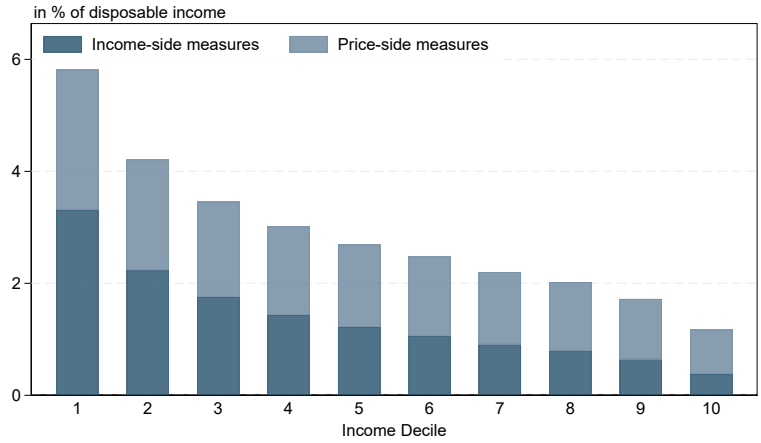
income distribution.

The generosity and the composition of support measures, as shown in Panels (3B) to (3G) in Fig. (3), exhibit strong cross-country variation. Support measures were noticeably more generous in Italy, Greece and Portugal, where households in the lowest income brackets received support measures that accounted to about 10% of disposable income. This is considerably more than what was granted in other countries, such as Germany and France. In terms of the exact type of fiscal support provided, Greece and Spain mostly adopted price-side measures, while Portugal almost exclusively relied on income-side measures.[13]

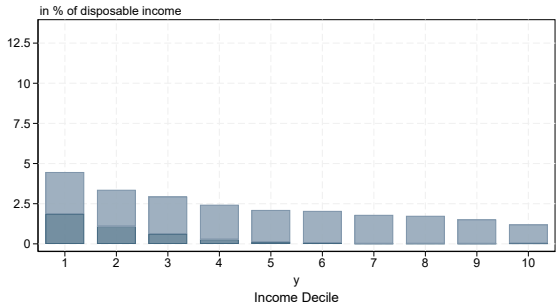
[13] As discussed in Amores et al. (2023), the cases of Portugal and Greece are interesting by themselves, as the two countries achieved a similar cushioning effect for households in the lowest income deciles. However, as the authors explain, while Greece spent around 2.5% of GDP on the adopted fiscal measures, Portugal achieved a similar effect with less than half the fiscal burden.

FIGURE 3: Fiscal Support for Households in 2022 in the Eurozone

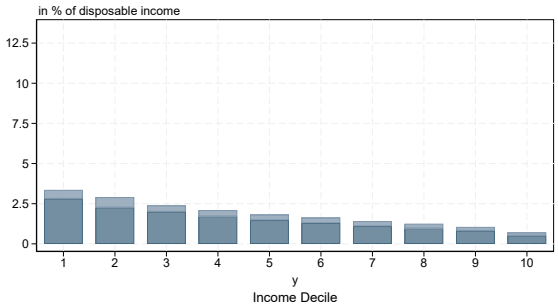
(A) Eurozone



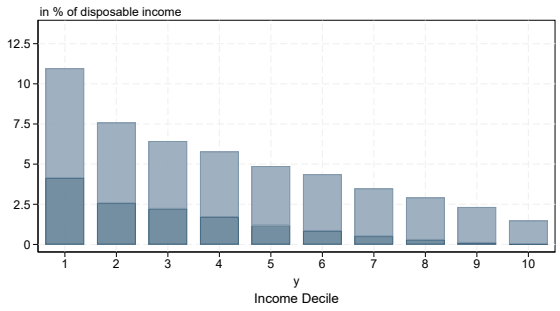
(B) France



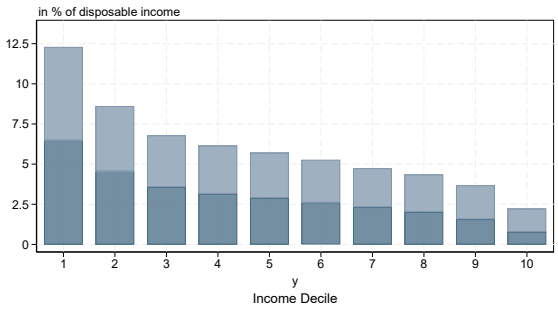
(C) Germany



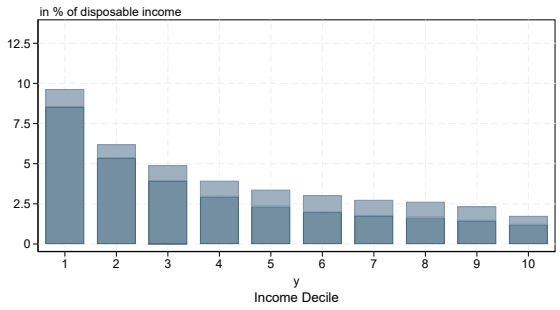
(D) Greece



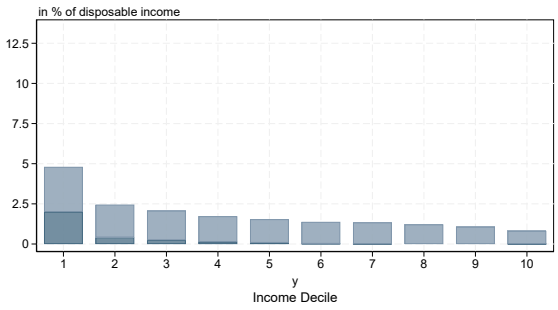
(E) Italy



(F) Portugal



(G) Spain



Notes: The figure shows for each income decile the financial support received in the form of income-side and price-side fiscal measures relative to disposable income. Income-side and price-side measures are based on Amores et al. (2023). Panel (3A) displays the weighted average of fiscal measures across the six selected countries.

4.2.2 Monetary Policy

As discussed in Auclert (2019), the impact of monetary policy on household wealth depends on the extent to which they are exposed to changes in the real rate of interest through the balance between maturing assets, which yield interest payments, and liabilities, which require to make interest payments. The net balance between the two is captured by the "Unhedged Interest Rate Exposure" (URE). Therefore, in order to asses the impact of the interest rate change, we compute the value of the URE for each household in the HFCS sample.[14]

Table (4) below displays the average URE across income deciles for the average of the six Euro-zone countries. On average, households in the first income decile feature a negative exposure to rising interest rates, while all other income groups are positively exposed. In other words, on average, households in the lowest income decile suffer from an increase in the interest rate, while other income groups would generally gain, ceteris paribus.[15]

Based on the derived values of the URE for each income decile, it is straightforward to compute the impact of monetary policy based on Equ. (7), i.e the surprise change in the interest rate multiplied with the group-specific URE. In general, the effect is relatively small in magnitude, ranging between -0.53% in the case of the bottom income decile, to 1.32% for the highest income decile as a share of disposable income.[16] One reason why the effect is comparably small in magnitude is due to the fact that each income decile comprises households of different types, e.g. those with and without mortgage, thereby partially offsetting positive and negative values of the URE. As shown in Section 5, a more targeted analysis yields substantially higher exposure to interest rate changes for some population subgroups, such as individuals with flexible rate mortgages.

At the country-level, Fig. (A.2) suggests that in all countries, except in Portugal, the URE tends to gradually increase along the income distribution with households in low income brackets typically the most negatively affected by interest rate increases and households in high income brackets usually gaining instead. There is, however, a substantial degree of varia-

[14] See Section (B.2) of the Annex for more details on the URE definition and the variables used from the HFCS data to construct the URE.

[15] Nevertheless, as mentioned before already, it is important to note that income decile-specific figures hide a large extent of heterogeneity within each income decile, which are due to other important margins of heterogeneity across households, e.g. their mortgage status, the mortgage type, age and wealth. We explore the importance of these factors in the next section in more detail.

[16] Obviously, the magnitude of the effect is proportional to the actual change in the interest rate. While the increase of the interest rate accounted to 2.5% by the end of 2022, it has risen by 4.5% until end-2023. This would have almost doubled the magnitude of the effect, leaving it at 0.96% of disposable income in case of the first decile in Table (4).

TABLE 4: Interest Rate Impact by Income Decile for Eurozone Households in 2022

Income decile	Unhedged Interest Rate Exposure (URE)	Financial gain/loss from interest rate hike
1	−21.31	−0.53
2	8.38	0.21
3	1.56	0.04
4	16.76	0.42
5	14.73	0.37
6	21.17	0.53
7	22.85	0.57
8	26.92	0.67
9	36.82	0.92
10	52.56	1.32

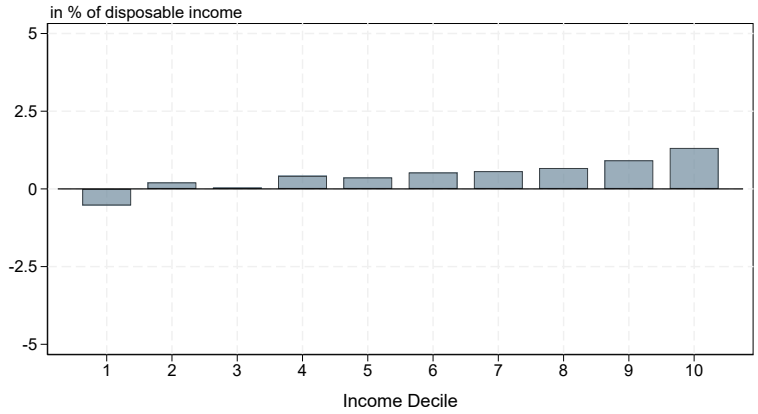
Notes: Table (4) reports for each income decile the exposure to interest rate changes, as measured by the unhedged interest rate exposure (URE) in % of disposable income, and the actual financial impact resulting from the interest rate hike. The actual monetary impact from the interest rate hike in 2022 is obtained by multiplying the decile-specific URE by 2.5% (see Equ. (7)). A negative number signals a negative exposure to rising interest rates, while positive ones indicate gains. The figures are the weighted average of six countries, which are France, Germany, Greece, Italy, Portugal and Spain.

tion across countries, with the most negative effects for the first income bracket in Spain and Greece.[17]

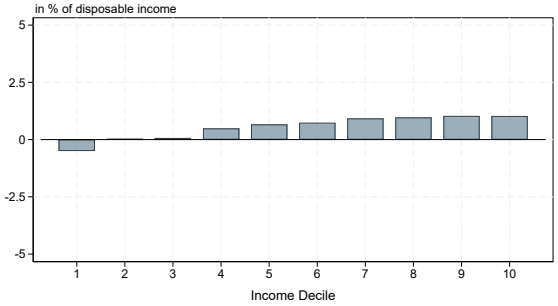
[17]Fig. (A.3) provides a decomposition of the URE by country and income decile. A high exposure to rising interest rates in the first decile, notably in Greece, Spain, and to a smaller extent in Italy, are driven by large current period negative net savings, i.e. the difference between net income and current period consumption. Furthermore, cross-country differences in the URE can be traced back to the presence of adjustable rate mortgages and those with fixed rates and a short maturity (see in particular Portugal and Spain on this).

FIGURE 4: Interest Rate Impact on Households Across the Eurozone in 2022

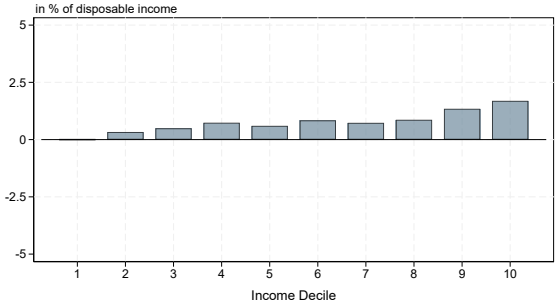
(A) Eurozone



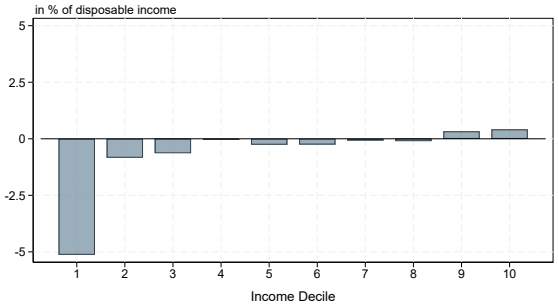
(B) France



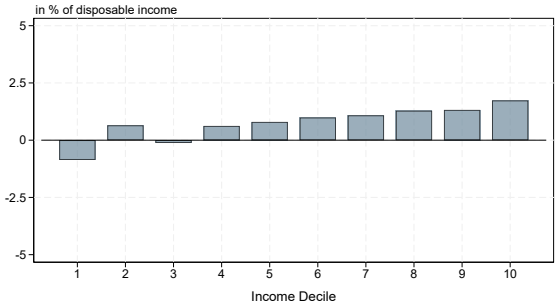
(C) Germany



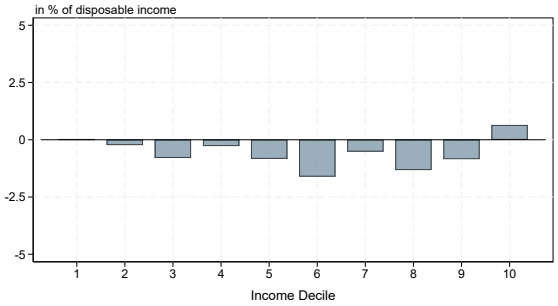
(D) Greece



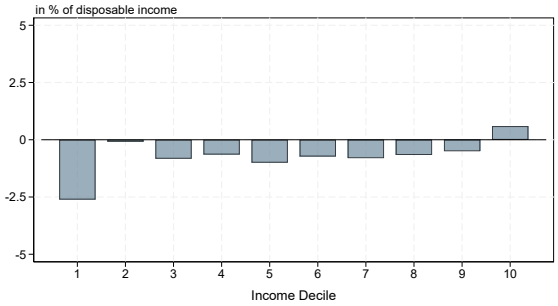
(E) Italy



(F) Portugal



(G) Spain



Notes: The figure shows for each income decile the monetary loss from an increase in the interest rate by 2.5%. Panel (4A) shows the weighted average effects across the six selected countries.

4.3 Relative gains and losses from the cost-of-living crisis

This section brings together the effects from inflation and the impact from fiscal and monetary policy responses in order to assess the overall impact of the cost-of-living crisis on households. The results are displayed in Fig. (5) for the Eurozone as a whole and the individual countries separately.

Starting with the Eurozone as a whole (Panel (5A)), our results indicate that the regressive nature of the effect from inflation prevails, but appears to be significantly dampened due to the presence of supporting fiscal policy measures. As fiscal support measures mostly benefited low-income groups, they were not only successful in alleviating the regressive impact of inflation, but also more than offset the adverse consequences of the interest rate rise, which has been mostly negative for households in the first income bracket. Households in the highest income brackets, on the contrary, benefited both from the untargeted components of fiscal policy measures, e.g. price-side instruments, as well as from the monetary policy response through higher interest rate gains, albeit to a smaller overall extent. The overall loss during the inflationary period in 2022 amounts to about 2% of disposable income for low-income households, while it leaves households in the highest income brackets with an overall gain when considering also the impact from fiscal and monetary responses.

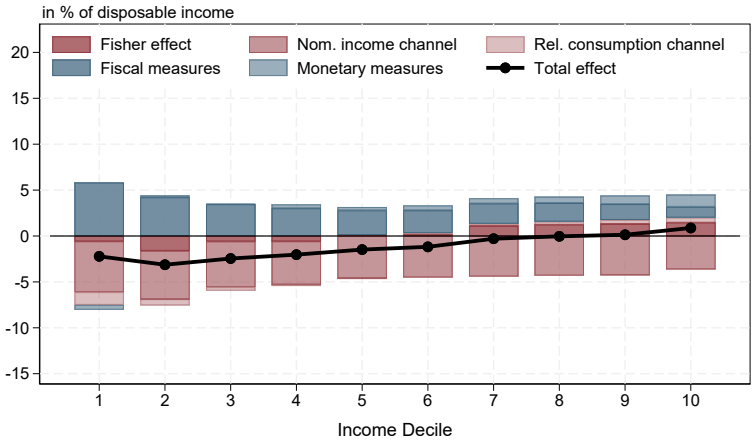
At the country-level, our results indicate that generous fiscal policy initiatives in Greece, Portugal and Italy have mostly levelled out the heterogeneous effect from inflation. Households in Italy were compensated for the inflationary effect, households in Portugal even overcompensated by the end of 2022. Households in the first income decile of Greece, despite their high exposure to rising interest rates on maturing liabilities, were more than compensated through very generous fiscal policy support programs.

Regressive patterns are still visible in the case of Germany, Spain and, to a lesser extent, France, but with the magnitude of the impact from inflation being visibly reduced across all income deciles. Households in the bottom income bracket experience losses of about 5% of disposable income in the cases of Germany and Spain, while households in the top income bracket are equally well or even better off, as in the case of Germany. Households in France, while in general less exposed to the inflationary effect thanks to smaller overall price rises, were better off thanks to the fiscal measures. Interestingly, the monetary policy effect from higher interest rates has taken a relatively larger toll on low income households in Spain, which feature a high sensitivity to rising interest rates. On top of being less generous in general, fiscal measures

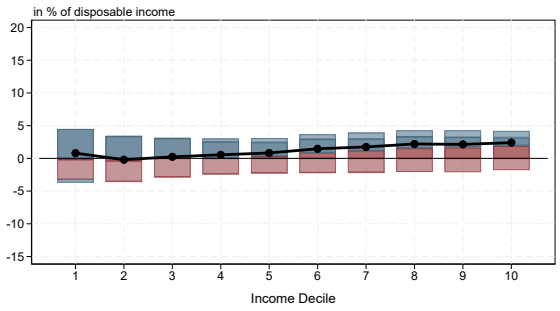
in Spain also appear to be largely untargeted in nature with households in the second to the tenth decile receiving similar relative amounts of support. In Germany, on the other hand, the persistence of the regressive effect is mostly due to the less generous fiscal policy measures. For example, in the case of the first income decile, the magnitude of the relief is only half the size of the one paid out in Spain and a quarter of those in Greece, Italy and Portugal, which were successful in mitigating the regressive impact of inflation on wealth.

FIGURE 5: The Impact of the Cost-of-Living Crisis on Households in the Eurozone

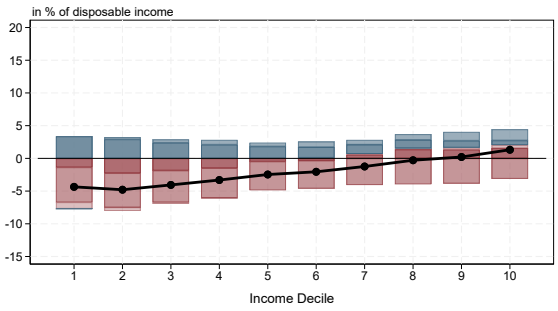
(A) Eurozone



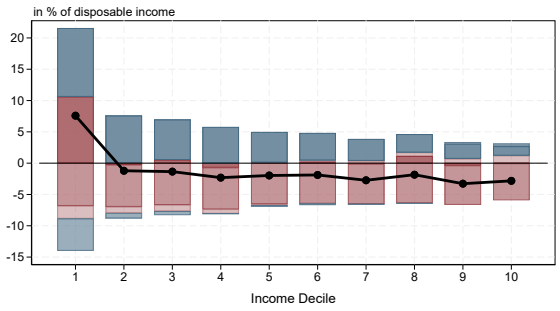
(B) France



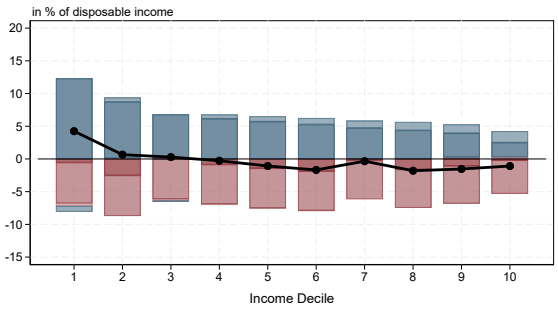
(C) Germany



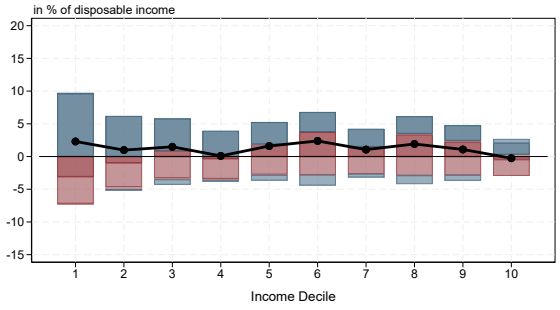
(D) Greece



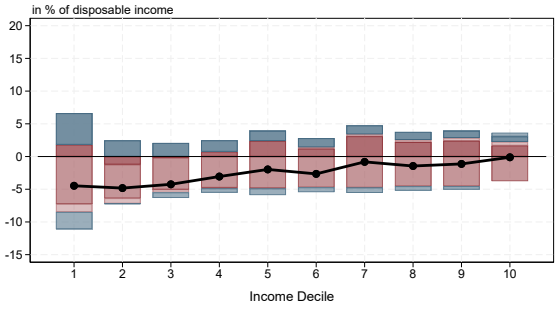
(E) Italy



(F) Portugal



(G) Spain



Notes: The figure shows for each income decile the monetary loss from inflation relative to disposable income through a revaluation of nominal assets (Fisher effect), nominal income and consumption, together with the effect resulting from fiscal and monetary responses. Panel (5A) shows the weighted average effects across the six selected countries.

5 Revaluation of Wealth Across Population Subgroups

In the previous section, we studied the impact of the cost-of-living crisis and the policy response through various channels, focusing on the effects on households along income deciles. While income is a useful proxy for consumption behaviour and the composition of nominal income, it is arguably a less suitable predictor of wealth and its composition. This section therefore focuses on splits of the population along other margins, such as net worth, the mortgage status and the type of mortgages, which all appear to be a more suitable predictor for the individual exposure to, e.g., the Fisher effect and monetary policy adjustments.

Fig. (6) shows the impact of the inflationary surge and the policy responses for various subgroups of the population. For comparability, Panel (6A) shows again the effect along the income distribution that we have discussed before. Panel (6B) depicts the impact of the cost-of-living crisis along deciles of net wealth (which adds real assets such as housing to the net nominal wealth). Not surprisingly, we can see from the figure that individuals in the lowest wealth bracket tend to benefit the most from the effects of inflation, which is mostly due to the revaluation of their negative net nominal wealth through the Fisher channel. As households in this group are on average net debtors, the real value of their liabilities decreases following the surprise increase in inflation. While this is partly offset by a higher exposure to rising interest servicing costs, the total effect is positive, making such households better off. For households in other wealth deciles, the effect is fluctuating around zero. Households which are located in the third to the sixth decile benefit from a devaluation of their nominal liabilities. On the other hand, households with positive net nominal assets in the highest wealth deciles experience a negative Fisher effect as their nominal assets are valued downwards. However, some of the losses can be recouped from gains resulting from rising interest rates.

Panels (6C) and (6D) investigate the effect across the housing and mortgage status of households. Panel (6C) shows the effect separately for non-home owners, home-owners without mortgage and those with mortgage, respectively. Both non-home owners and home owners without mortgage debt suffer from the Fisher effect as households in both groups tend to have positive net nominal asset positions. On the contrary, home owners with mortgage debt are typically large net debtors, which makes them benefit substantially from a devaluation of their debt contract through the Fisher channel. On average, the monetary gain for households in that group accounts to about 7% of disposable income. Within the group of home owners with mortgages (Panel (6D)), the gain is even higher for those that have only fixed rate mortgages

as they are not exposed to rising interest rates. For households with at least some fraction of their mortgage subject to rising interest rates, the effect is somewhat smaller because of higher debt service payments, but still noticeably positive on average.

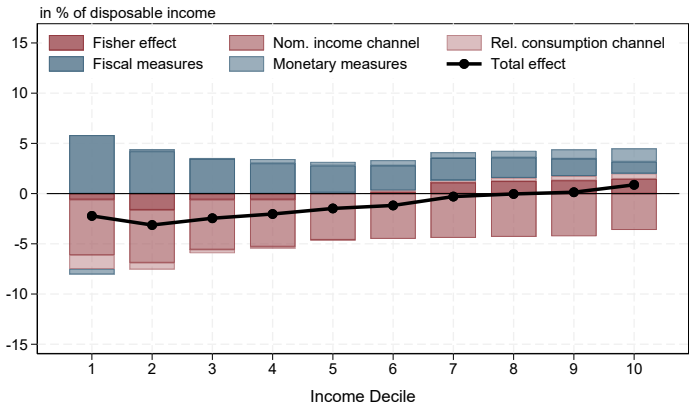
In Panel (6E) we investigate the magnitude of the effect across age groups. From the figure we can immediately see that the effect exhibits a strong life-cycle dimension with a particularly strong negative relationship between age and the revaluation of wealth through the Fisher channel. On average, older households have accumulated a higher stock of positive nominal wealth through savings and have paid back their mortgage debt. As a result, these population groups have on average a larger net nominal asset position than their counterparts in lower age groups. An inflationary surge brings about large monetary losses for those households, as has been emphasized by, e.g., Doepke and Schneider (2006) and Pallotti et al. (2023). The large negative Fisher effect for households above the age of 60 years is to some small extent reduced through the positive interest rate exposure.

Finally, in Panel (6F) we split the population into households considered as "Hand-to Mouth" (i.e. which hold no or little amounts of net liquid wealth) The lack of liquid wealth exposes such households to fluctuations in their earnings, meaning that they typically have a high marginal propensities to consume out of transitory earnings shocks. Within the group of HtM households, we further distinguish between those with positive illiquid wealth, the 'wealthy HtM' households (typically owning housing wealth financed with mortgage debt) and the 'poor HtM' with no illiquid wealth.[18] The results closely mirror those for the mortgage status in Panel (6C): non-HtM households have been negatively affected by inflation through a devaluation of their nominal assets. Poor HtM consumers are protected from the Fisher effect as they hold, by definition, no net nominal assets. The total effect, however, is negative and of similar magnitude in both cases. Wealthy HtM consumers, on other other hand, benefit from a substantial devaluation of their nominal assets, leaving those households with an overall gain of around 8% of disposable income in total.

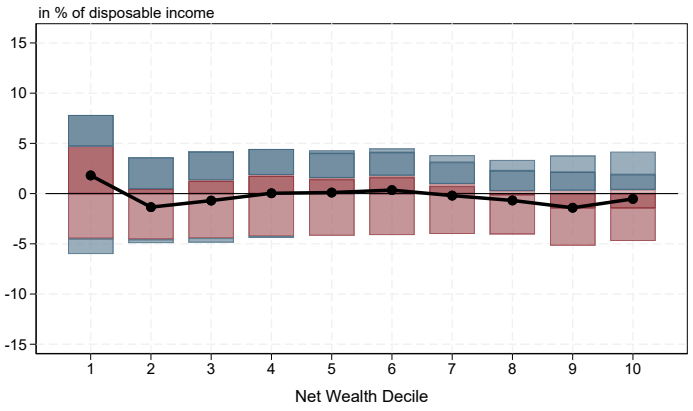
[18]This classification follows the influential work of Kaplan and Violante (2014).

FIGURE 6: Effects of the Cost-of-Living Crisis Across Population Subgroups

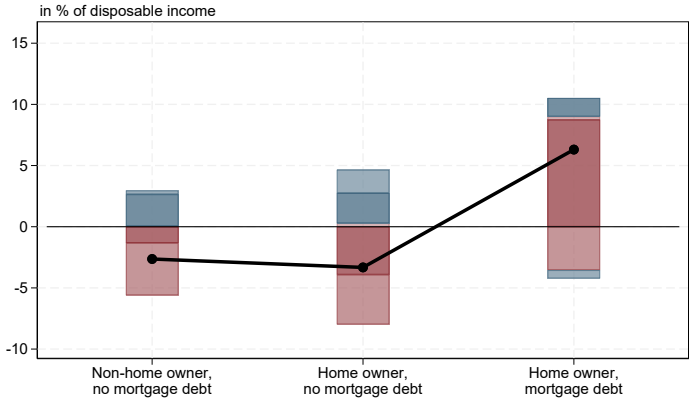
(A) Gross income



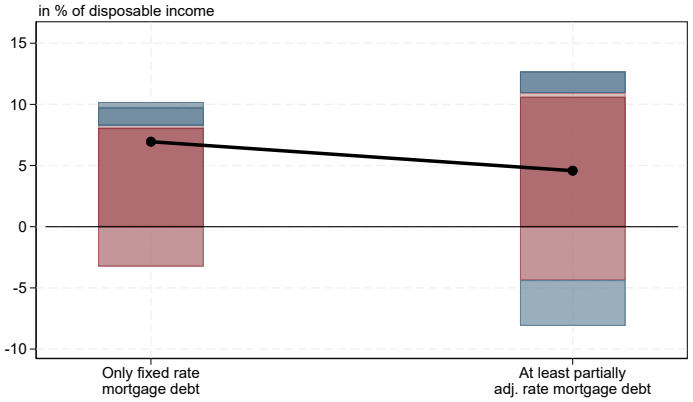
(B) Net wealth



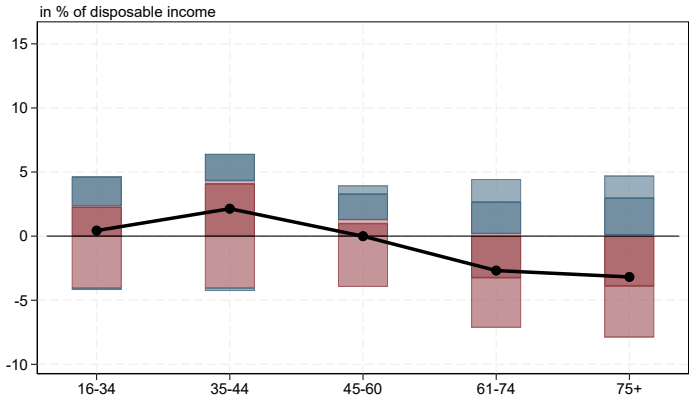
(C) Housing status



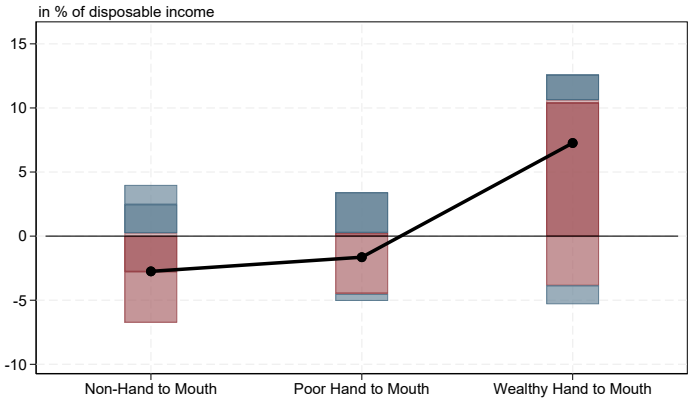
(D) Mortgage type



(E) Age group



(F) Hand to mouth status



Notes: The panels shows for different subgroups of the population the monetary loss from inflation as a share of disposable income through a revaluation of nominal assets (Fisher effect), nominal income and consumption, together with the effect resulting from fiscal and monetary responses. All panels shows the weighted average effects across the six selected countries. Net wealth is defined as the difference between total household assets, excl. public and occupational pension wealth, minus total outstanding household's liabilities (HFCS variable DN3001, wave 3).

6 Concluding Remarks

In this paper we studied the impact of the recent cost-of-living crisis on European households using detailed data on individual consumption, income and wealth.

Our framework captures three main channels that are underpinning inflation heterogeneity: the Fisher channel, the nominal income channel, and the relative consumption channel. We add to these the cushioning effect from fiscal policy interventions across the Eurozone and the consequences of interest rates increase by the European Central Bank.

Our results show that, across the Eurozone, the inflationary shock had a pronounced regressive pattern, with households in the lowest income deciles the most negatively affected. This is so because nominal income growth has been smaller for households in lower income brackets, because those households received a bigger fraction of income from components that did not grow with inflation, and because low-income households tend to hold their wealth in the form of nominal assets. In addition, households in higher income brackets hold more mortgage debt, whose value has decreased in real terms. We find that the impact of inflation through the Fisher and nominal income channels are an order of magnitude higher than the relative consumption channel.

We find that the extraordinary fiscal policy measures taken to mitigate the effects of the crisis on households were in general successful in dampening the negative and regressive impact of inflation through the other channels. The effects were particularly successful in countries relying more on income measures, which are more explicitly targeted towards households at the bottom of the income distribution. Regarding the impact of higher interest rates, we find a positive relationship between household income and benefits from higher interest rates, leading to gains (losses) for households at the top (bottom) of the income distribution.

Our modelling assumptions ignore the general equilibrium effects of the shock, including the behavioural response of individuals. However, we believe that our approach helps make the analysis more transparent, and that it provides useful insights on the the effects of inflation on European households. We leave the analysis of the second-round effects and longer-run implications of the crisis on households for future research.

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Appendix

A Theoretical Framework

In this section we provide more details on the derivation of the equations shown in Section (2) of the main text.

To obtain Equ. (5) and (7), let us first rewrite the household budget constraint (1) as:

$$\begin{aligned} a_{j,t} &= y_{j,t} + b_{j,t-1}^{(t)} + \frac{1}{1+\pi_t}\Big[B_{j,t-1}^{(t)} + \sum_{s\geq 1} Q_t^{(t+s)} B_{j,t-1}^{(t+s)}\Big] \\ &\quad + \sum_{s\geq 1}(1+\overline{\pi})^s q_t^{(t+s)} b_{j,t-1}^{(t+s)} - \boldsymbol{\tau}\big(y_{j,t}\,;\,\{c_{j,k,t}\}_k\big) - c_{j,t}\sum_k \omega_{j,k,t}\frac{1+\pi_{k,t}}{1+\pi_t} \end{aligned} \tag{A.1}$$

where we have normalized P_{t-1} to one, $\omega_{j,k,t} \equiv \frac{P_{k,t-1}c_{j,k,t}}{P_{t-1}c_{j,t}}$ is the household's share of spending on good j, $c_{j,t}$ denotes household j's overall consumption, and noting that $y_{j,t} = \frac{1+\lambda_{j,t}\pi_t}{1+\pi_t} y_{j,t-1}^{(t)}$. $a_{j,t}$ is the end-of-period wealth of the individual, which has been defined in Equ. (4). The aim of the paper is to evaluate the effect of the cost-of-living crisis on this object, through the impact of the crisis on (surprise) inflation, and changes in monetary and fiscal variables.[19] We want to compute:

$$da_{j,t} = da_{j,t}^{(\pi)} + da_{j,t}^{(\tau)} + da_{j,t}^{(R)} \tag{A.2}$$

We now derive the inflation and interest rate components on the RHS of (A.2).

Inflation impact Using $\frac{1}{1+\pi} \approx 1-\pi$, $\frac{1+\pi_k}{1+\pi} \approx 1+\pi_k-\pi$, and $\frac{1+\lambda\pi}{1+\pi} \approx 1+(\lambda-1)\pi$, we get from (A.3) that:

$$da_{j,t}^{(\pi)} = -\sum_{s\geq 0} Q_t^{(t+s)} B_{j,t-1}^{(t+s)} d\pi - c_{j.t}\Big(\sum_k \omega_{j,k,t} d\pi_k - d\pi\Big) + (\lambda_{j,t}-1)\Big(1-\frac{\partial \boldsymbol{\tau}}{\partial y}\Big)d\pi$$

Using the NNP definition, together with $d\pi_j = \sum_k \omega_{j,k,t} d\pi_k$, we get Equ. (5) of the main text.

[19] Note that, because we stop our analysis at time t, we do not need to specify how $a_{j,t}$ is distributed among its components.

Interest rate impact To obtain $da_{j,t}^{(R)}$, first notice that, given our assumptions, all bond prices move equally by the amount $\frac{dQ^{(t+s)}}{Q^{(t+s)}} = \frac{dq^{(t+s)}}{q^{(t+s)}} = -\frac{dR}{R}$ for all $s \geq 1$.

To compute the effect of a change in interest rates, we consider a change in the value of goods today in tomorrow's terms ($Q_t^{(t)}$, which so far was normalised to one), rather than the change in tomorrow goods in today's term.[20] To do so, we consider the effect of a dR increase in $Q_t^{(t)}$ (so far normalised to ones) rather than a dR decrease in $Q_t^{(t+s)}$ for $s \geq 1$, which we normalise to one. In this case, the household budget constraint (A.3) can be written as:

$$\begin{aligned} a_{j,t} &= Q_t^{(t)} \left[y_{j,t} + b_{j,t-1}^{(t)} + \frac{1}{1+\pi_t} B_{j,t-1}^{(t)} - \tau\left(y_{j,t}\,;\,\{c_{j,k,t}\}_k\right) - c_{j,t} \sum_k \omega_{j,k,t} \frac{1+\pi_{k,t}}{1+\pi_t} \right] \\ &\quad + \frac{1}{1+\pi_t} \sum_{s\geq 1} Q_t^{(t+s)} B_{j,t-1}^{(t+s)} + \sum_{s\geq 1} (1+\overline{\pi})^s q_t^{(t+s)} b_{j,t-1}^{(t+s)} \\ &= Q_t^{(t)} URE_{j,t} + \frac{1}{1+\pi_t} \sum_{s\geq 1} Q_t^{(t+s)} B_{j,t-1}^{(t+s)} + \sum_{s\geq 1} (1+\overline{\pi})^s q_t^{(t+s)} b_{j,t-1}^{(t+s)} \end{aligned}$$

where $a_{j,t}$ is now expressed in terms of today's goods $Q_t^{(t)}$. From this equation we get:

$$da_{j,t}^{(R)} = URE_{j,t} dQ^{(t)} = URE_{j,t} dR$$

which is the equation stated in the main text.

B Data and Empirical Construction of Variables

B.1 Computing the Net Nominal Asset Position (NNP)

We follow the approach in Doepke and Schneider (2006) and Pallotti et al. (2023) and define the "Net Nominal Asset Position" (NNP) as the difference between the sum of nominal assets, comprising deposits, bonds and money owned to the household, and the sum of liabilities. Liabilities include both mortgage debt and non-mortgage debt (credit lines, credit cards and other non-collateralized loans). Table (A.1) provides details on the specific variables which were used to construct the NAP based on HFCS data.

[20] Auclert (2019) uses a similar argument to compute the effects of monetary policy on household consumption.

TABLE A.1: Construction of the Net Nominal Asset Position (NNP) from HFCS Data

HFCS Variable	Description
Nominal assets	
HD1110	Value of sight account
HD1210	Value of saving accounts
DA2103	Bonds
HD1701	Money owed to households
Nominal liabilities	
DL1110	Outstanding balance of households' main residence mortgages
DL1120	Outstanding balance of mortgages on other properties
DL1210	Outstanding balance of credit line/overdraft
DL1220	Outstanding balance of credit card debt
DL1231	Outstanding balance of private loans
DL1232	Outstanding balance of other non-private non-collateralised loans

Notes: The variable names refer to the third wave of the Household Finance and Consumption Survey (HFCS).

B.2 Computing the Unhedged Interest Rate Exposure (URE)

The following table provides details on the specific variables which were used to construct the URE. This approach follows closely the elaborations in Tzamourani (2021).

TABLE A.2: Construction of Components of the Unhedged Interest Rate Exposure (URE)

HFCS Variable	Description	Adjustment
Net Income		
DI2000	Total household gross income	Net income obtained from net-to-gross income ratios from EUROMOD (2023)
Consumption		
	Consumption-to-net-income ratios obtained from HBS by country and income decile, allied to net income above.	
HB2300	(Monthly) amount paid as rent	$\times 12$ to obtain annual value
Liabilities		
DL1110a	Outstanding balance of adjustable interest rate HMR mortgages	
DL1120a	Outstanding balance of adjustable interest rate mortgage on other properties	
DL1200	Outstanding balance of other, non-mortgage debt	
HB170x, $x = \{1,2,3\}$	Fixed rate mortgage 1, 2 or 3 on household's main residence with maturity of 1 year or less (HB171x ≤ 1)	
HB370xy, $x, y = \{1,2,3\}$	Other fixed rate mortgage 1, 2 or 3 on household's other properties 1, 2 or 3 with maturity of 1 year or less (HB371xy ≤ 1)	
Assets		
HD1110	Value of sight accounts	
HD1210	Value of saving accounts	$\times 0.8$
HD1320b	Value of mutual funds invested in bonds	$\times 0.9$
HD1320c	Value of mutual funds invested in money market	$\times 0.9$
HD1420	Value of bonds	Multiplied with respective share by country, see Tzamourani (2021, Table A1)
HD1620	value of additional assets in managed accounts	$\times 0.9$

Notes: All variable names refer to the third wave of the Household Finance and Consumption Survey (HFCS).

B.3 Identifying Hand-to-Mouth Households

For the classification of households into HtM status we follow Almgren et al. (2022) and Kaplan et al. (2014). A household is classified as HtM if its net balance of liquid wealth is smaller than a certain share of monthly income. Following the authors' notation, let m_i denote net liquid assets, y_i denote income, and $\underline{m}_i$ be a credit limit for household i, which is set to be the household's monthly income. Then, a household is categorized as HtM if

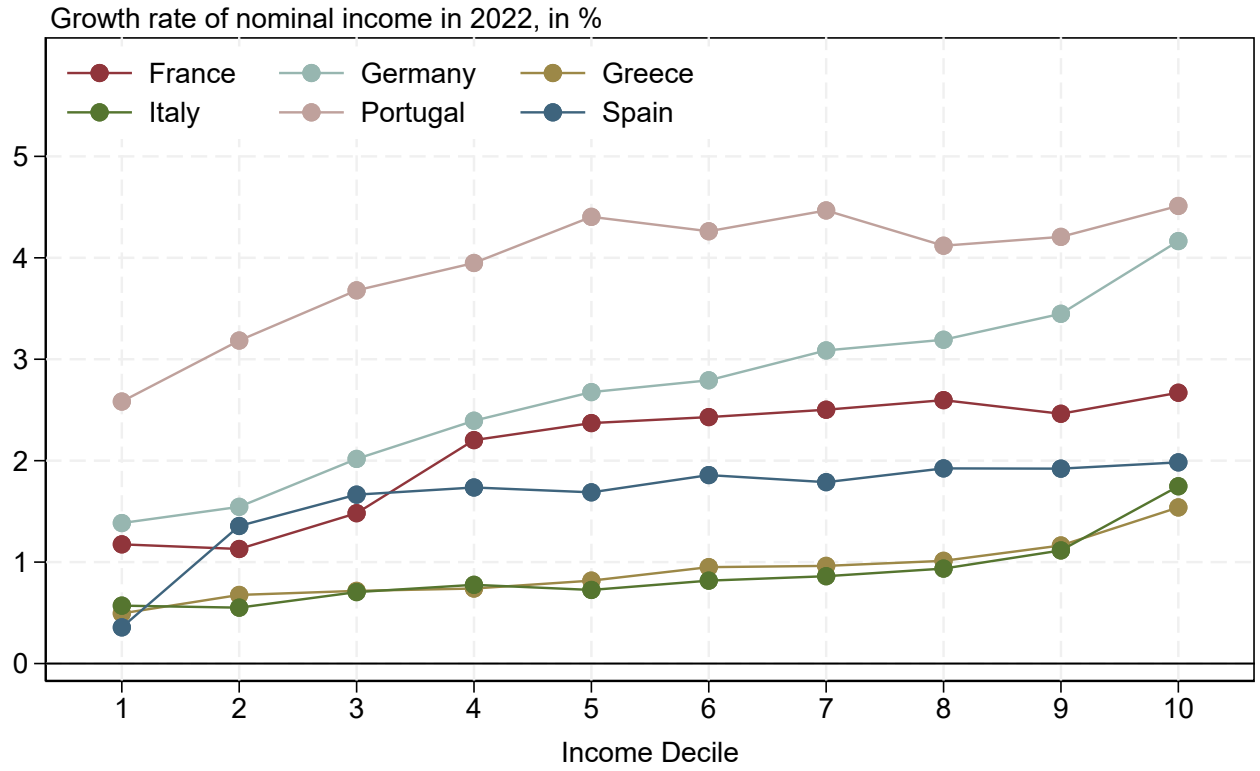
$$0 \leq m_i \leq \frac{y_i}{2},$$

or if

$$0 \leq m_i, \quad \text{and} \quad m_i \leq \frac{y_i}{2} - \underline{m}_i.$$

Within the group of HtM households, we distinguish between 'wealthy' and 'poor' individuals. Wealthy HtM have a positive net illiquid wealth balance, while poor HtM have zero or negative net illiquid wealth balances.

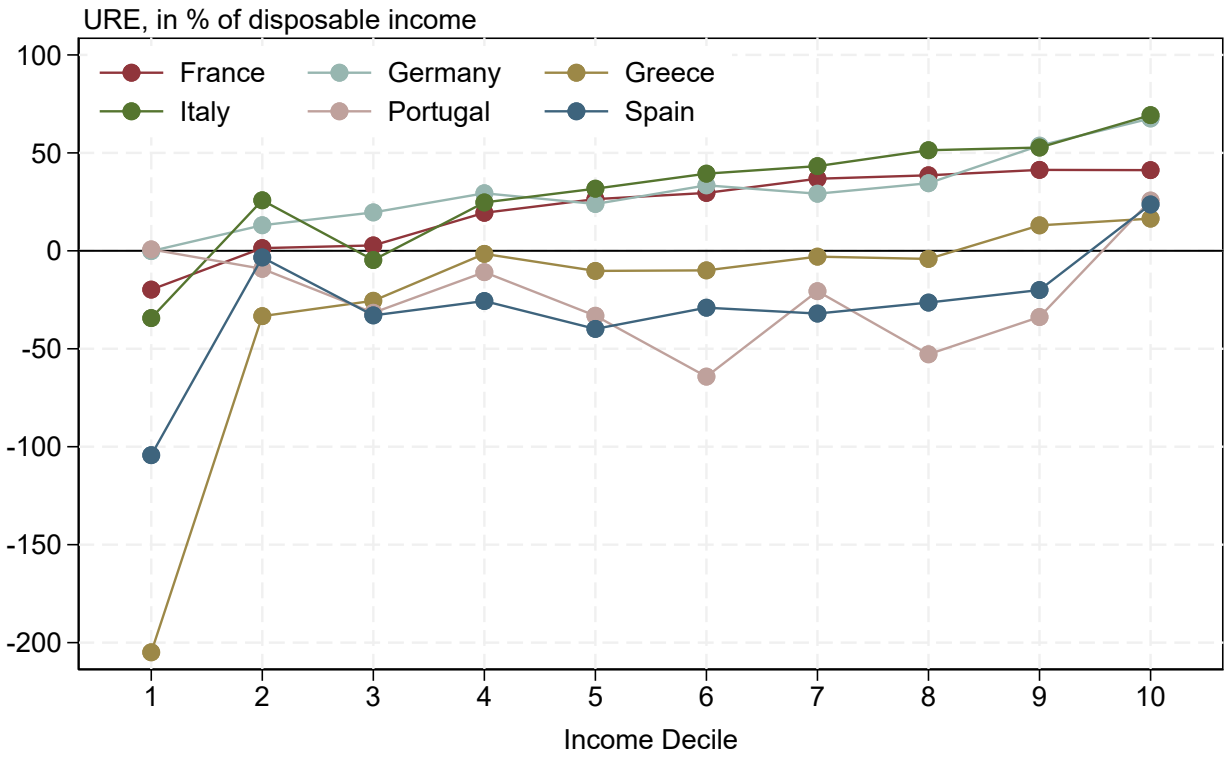
FIGURE A.1: Growth in Nominal Incomes by Income Decile



Notes: Fig. (A.1) shows for each income decile the growth in disposable income. The results are based on the EUROMOD simulations.

C Additional Figures

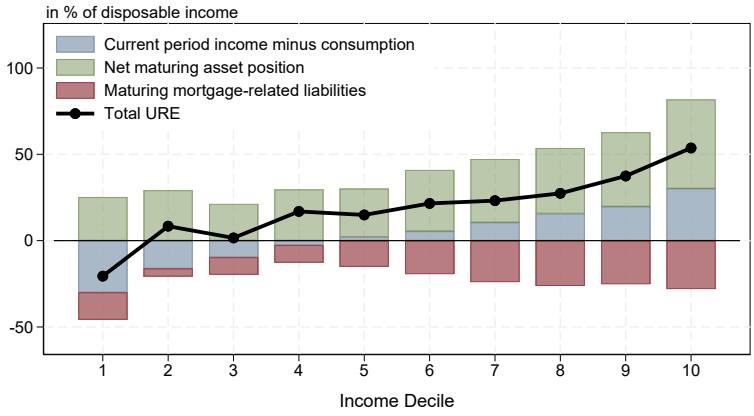
FIGURE A.2: Unhedged Interest Rate Exposure (URE) by Country



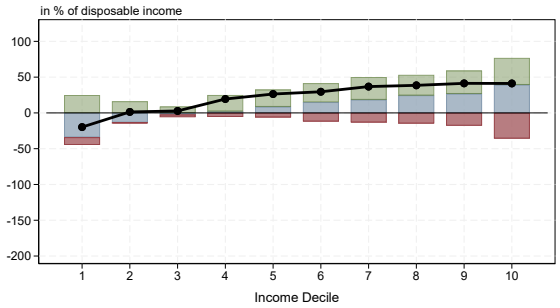
Notes: Fig. (A.2) shows for each country and income decile the URE as a percentage share of disposable income by country and income decile. See Table (A.2) for details about the construction of the URE based on HFCS data.

FIGURE A.3: Decomposition of the Unhedged Interest Rate Exposure (URE)

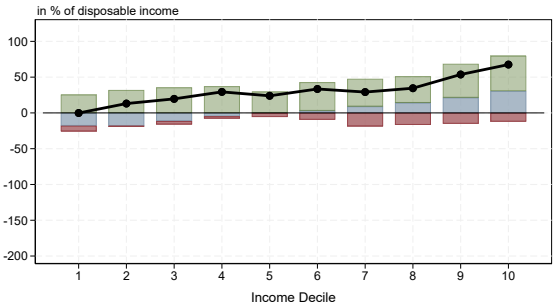
(A) Eurozone



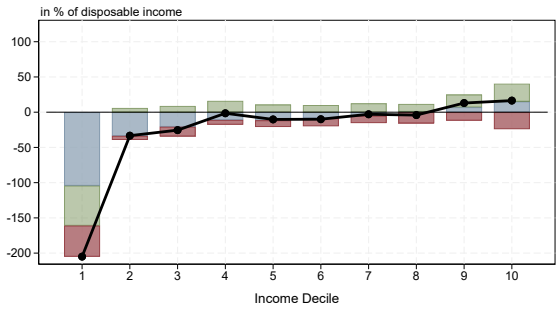
(B) France



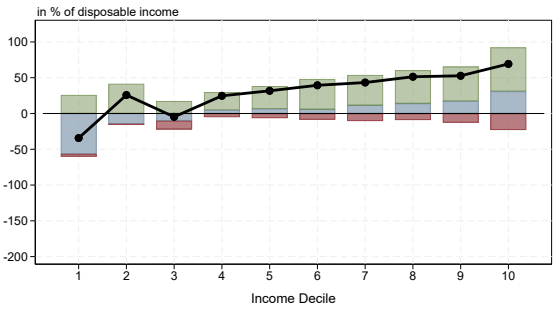
(C) Germany



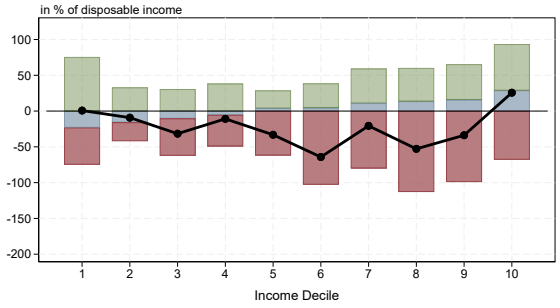
(D) Greece



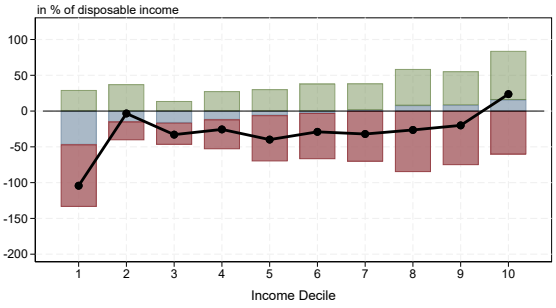
(E) Italy



(F) Portugal



(G) Spain



Notes: Fig. (A.3) shows for each income decile the decomposition of the URE. Panel (A.3A) shows the weighted average across the six selected countries. The "Net maturing asset position" is defined as the net difference between the sum of all assets and non-mortgage related liabilities. "Maturing mortgage-related liabilities" defines the subset of mortgage-related liabilities. See Table (A.2) for the exact HFCS variables and their definitions.

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