European Commission

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

JRC Working Papers on Taxation and Structural Reforms No 01/2024

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2024

EU Science Hub
https://joint-research-centre.ec.europa.eu

JRC136870

Seville: European Commission, 2024

How to cite this report: Chafwehé, B., Ricci, M. and Stöhlker, D., *The Impact of the Cost-of-Living Crisis on European Households*, JRC Working Papers on Taxation and Structural Reforms No 01/2024, European Commission, Seville, Spain, 2024, JRC136870.

This paper was updated in May 2024.

Abstract

We study the impact of the recent cost-of-living crisis on European households using 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 on average pension-age households lost nearly three times as much as their working-age counterpart, due to the devaluation of their nominal wealth. Along the income distribution, differences in nominal asset holdings and in the evolution of nominal incomes imply that the inflationary shock was regressive for working-age households and mostly flat for pension-age households. Overall, high-income working-age households with mortgage debt gained the most from the inflationary surge, while older individuals with large nominal asset positions were those for which the largest losses were recorded. Fiscal policy measures were able to partially offset the impact of the crisis on the most vulnerable households. The interest rate response to the crisis partially offset the losses recorded by households with large nominal asset positions.

Acknowledgements

We wish to thank Maximilian Freier from the European Central Bank for a thorough review of this work. The authors are indebted to Salvador Barrios for his advice and guidance. Furthermore, the authors gratefully acknowledge helpful comments from Gonzalo Paz-Pardo, Matteo Salto, Boromeus Wanengkirtyo, and seminar participants at the Fiscal Policy Modelling Workshop in Seville. All errors are our own.

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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. Those policy responses constituted an integral part of the cost-of-living crisis period, as they explicitly tackled the inflationary shock and were key determinants of its impact on households' wealth.

Main analysis

In this paper, we study the impact of the cost-of-living crisis on Eurozone households, considering both the effects of the inflationary shock and those of the fiscal and monetary policy responses. Inflationary shocks have an immediate effect on households through three main channels: 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 (due to 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, the demographic status and other population groups.

Our analysis crucially 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 influenced 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 the recent cost-of-living crisis on European households. 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 providing a comprehensive cross-country analysis, incorporating the the impact of interest rate increases on households' wealth, and by highlighting the importance of characteristics like home ownership in driving the heterogeneous effects of the crisis on European households.

Key conclusions

We find that pension-age households lost nearly three times as much as their working-age counterpart due to the devaluation of the nominal wealth they accumulated during their life cycle. Differences in nominal balances and in the evolution of nominal incomes from different sources further imply that the inflationary shock was regressive among working-age households but mostly flat among the pension-age. In most cases, the impact of inflation through the Fisher and nominal income channels was an order of magnitude larger than the relative consumption channel, which has been the focus of much of the related literature.

Looking at the impact of the fiscal and monetary response, interest rate increases partially offset the losses made by households with large nominal asset positions, mostly pension-age households. In contrast, the extraordinary fiscal measures adopted in response to the crisis were able to partly offset the negative impact of inflation on the lowest-income households. Nonetheless, in several countries, large losses remain among the poorest households and those of pension-age.

Finally, we extend our results to consider the role of wealth composition in shaping the impact of the cost-of-living crisis on population sub-groups. We find that households with fixed-rate mortgages and wealthy hand-to-mouth households are the biggest winners of the cost-of-living crisis, whereas pension-age households are the main losers.

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

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May 15, 2024

Abstract

We study the impact of the recent cost-of-living crisis on European households using 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 on average pension-age households lost nearly three times as much as their working-age counterpart, due to the devaluation of their nominal wealth. Along the income distribution, differences in nominal asset holdings and in the evolution of nominal incomes imply that the inflationary shock was regressive for working-age households and mostly flat for pension-age households. Overall, high-income working-age households with mortgage debt gained the most from the inflationary surge, while older individuals with large nominal asset positions were those for which the largest losses were recorded. Fiscal policy measures were able to partially offset the impact of the crisis on the most vulnerable households. The interest rate response to the crisis partially offset the losses recorded by households with large nominal asset positions.

Keywords: Inflation Heterogeneity, Monetary and Fiscal Policy, Euro Area.
JEL classification: G51, D31, E31.

*The views expressed in this paper are those of the authors and should not be attributed to the European Commission, the Bank of England or its committees. The authors gratefully acknowledge helpful comments from Salvador Barrios, Maximilian Freier, Gonzalo Paz-Pardo, Matteo Salto, Boromeus Wanengkirtyo, and seminar participants at the Fiscal Policy Modelling Workshop in Seville.

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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 shocks to energy supplies and the ensuing price increases. Inflation has eroded the real value of nominal incomes and wealth, which has challenged the ability of households to pay for consumption, thereby generating one of the most severe cost-of-living crisis since decades. Crucially, the crisis has affected households in a heterogeneous way. In particular, differences in consumption patterns, sources of income, and the level and composition of wealth brought about substantial differences in the way individual households were impacted by inflation.

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 in years 2022 and 2023 (Bańkowski et al., 2023). On the monetary policy side, the European Central Bank raised interest rates to unprecedented levels, increasing the financing cost of loans and mortgages but also the rate of returns for households re-investing their savings. Those policy responses constituted an integral part of the cost-of-living crisis period, as they explicitly tackled the inflationary shock and were key determinants of its impact on households' wealth. Accounting for them should therefore be part of any assessment of this crisis.

In this paper, we study the impact of the cost-of-living crisis on Eurozone households, considering both the effects of the inflationary shock and those of the fiscal and monetary policy responses. 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 accounts for 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 the Household Budget Survey (HBS), EUROMOD (the micro-simulation model of the European Union) and its underlying EU-SILC data.

We consider in addition 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 composition of households' portfolios, and in particular the maturity of their assets and liabilities. We construct the URE at the household level using HFCS data to quantify the impact of the interest rate response on households across population subgroups. On the fiscal policy side, we draw from the recent work of Amores et al. (2023a) to quantify the cushioning effects of fiscal measures on the "income-side". To quantify measures on the "price-side", instead, we exploit differences between standard inflation figures and those calculated at constant taxes.[1]

We find that pension-age households lost nearly three times as much as their working-age counterpart due to the devaluation of the nominal wealth they accumulated during their life cycle. Differences in nominal balances and in the evolution of nominal incomes from different sources further imply that the inflationary shock was regressive among working-age households (affecting low-income households the most) but mostly flat among the pension-age. In most cases, the impact of inflation through the Fisher and nominal income channels was an order of magnitude larger than the relative consumption channel, which has been the focus of much of the related literature cited below. Looking at the impact of the fiscal and monetary response, interest rate increases partially offset the losses made by households with large nominal asset positions, mostly pension-age households. By contrast, the extraordinary fiscal measures adopted in response to the crisis were able to partly offset the negative impact of inflation on the poorest households. Nonetheless, in several countries, large losses remain among the poorest households and those of pension age.

Finally, we extend our results to consider the role of wealth composition in shaping the impact of the cost-of-living crisis on population sub-groups. In particular, we look at the home-ownership, mortgage and hand-to-mouth status of households. We find that accounting for the home-ownership and mortgage status helps explain most of the differences in the effects of inflation on household wealth across age groups. We show that there is substantial heterogene-

[1] Throughout the paper, we follow the terminology used by Amores et al. (2023a) and distinguish between fiscal policy interventions aimed at directly mitigating the effective prices paid by households - the *price-side* measures- and interventions aimed at supporting household incomes, the *income-side* measures.

ity in the effects of inflation among working-age households, depending on whether they are homeowners or not. The difference is explained by the fact that young homeowners usually have a mortgage attached to their house, and the real value of this large nominal liability is re-valued downwards following the inflationary shock. Overall, we find that households with fixed-rate mortgages and wealthy hand-to-mouth households are the biggest winners of the surge in inflation and increase in interest rates, whereas pension-age households are the main losers.

Related literature Our paper is related to a large 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. (2023a), Curci et al. (2022) and Langot et al. (2023), who document the impact of fiscal adjustments, the impact resulting from pronounced fiscal and monetary policy responses have not been considered in the aforementioned papers.[2]

The two papers most closely related to ours are Cardoso et al. (2022) and Pallotti et al. (2023), who study the effects of the crisis on European households through most of the channels we also consider. Cardoso et al. (2022) make use of 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 a 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. We rely on a simpler framework that does not account for general equilibrium effects but, in addition to Pallotti et al. (2023), we account for the impact of the interest rate response and

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

shed light on the importance of characteristics such as home ownership and mortgage status in driving the heterogeneous effects of the crisis.[3] 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 and age groups in each country of interest, and Section (5) extends the analysis to various population subgroups. Section (6) concludes.

2 The Theoretical Framework

Our framework relies on a simple, yet comprehensive, model of the household balance sheet that determines wealth accumulation over time. Under a few explicit assumptions, we use this framework to quantify the effect of inflation, fiscal policy and monetary policy on household wealth. In this section, we set out our model of the household balance sheet, derive these effects and discuss the main assumptions underpinning their derivation.

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 $\overline{\pi}$:

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

[3] Pallotti et al. (2023) adopt a general equilibrium framework in which the authors 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 rely heavily on the EUROMOD uprating factors (computed using external data on income growth for various income sources) 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. (2023a) 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).

Furthermore, we assume that expectations about future inflation rates are not affected by the inflation surge in period t, i.e. $\mathbb{E}_t[\pi_{t+1}] = \overline{\pi}$ for all t.[4]

A2: The monetary authority responds contemporaneously 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 only 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 the 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 from temporary fiscal measures implemented in response to the cost-of-living crisis.

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:

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

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. P_t is the aggregate

[4] In our empirical specification, we use the results from the *Survey of Professional Forecasters* (SPF) to determine the expected inflation between mid-2021 and end-2023. Concretely, from the mean point estimates of forecast inflation in the third quarter of 2021, we infer that the expected cumulative price increase between mid-2021 and end-2023 was 2.494%. See Appendix (D.1) for details.

price level, i.e. the price of the consumption basket C_t, which is obtained using the average spending weights of households on individual goods $k = 1, ..., K$.

Nominal income $P_t y_{j,t}$ is the household's nominal income, which can be obtained from various sources such as labour, unemployment benefits, regular transfers, or pension entitlements, and it is expressed as net of regular taxes. In normal times (i.e. absent the extraordinary fiscal measures described below), $y_{j,t}$ therefore corresponds to household j's *disposable income*. 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 $P_{t-1} y^{(t)}_{j,t-1}$ be the nominal income for time t agreed upon in $t-1$, we have:

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

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.[5]

Fiscal policy The term $T_{j,t}$ summarises the net taxes paid by households in addition to the regular components of taxes and transfers entering disposable income $y_{j,t}$. We focus here on consumption taxes τ^c, and the discretionary fiscal transfers that were implemented as a response to the cost-of-living crisis, which we denote $\tilde{T}_{j,t}$. We therefore get:

$$P_t T_{j,t} = \sum_k \tau^c_{k,t} P_{k,t} c_{j,k,t} - P_t \tilde{T}_{j,t} \tag{3}$$

where $\tau^c_{k,t}$ denotes the consumption tax rate on good k. When computing the effects of the fiscal response to the cost-of-living of crisis below, we consider both consumption-side measures, that affect effective consumption spending through changes in $\tau^c_{k,t}$,[6] and income-side measures, that are meant to capture fiscal benefits received by households. As those measures were in many cases means-tested, we allow them to be household-specific in our framework, and label them 'income-side' measures following the terminology of Amores et al. (2023a).

[5] 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 than aiming at capturing specific institutional features.

[6] To simplify the algebra, we assume in our theoretical framework that all fiscal measures take the form of changes in consumption taxes $\tau^c_{k,t}$.

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 surge in inflation 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 $t+1$.

Inflation measure Conventional inflation measures, such as the evolution of the HICP index used by the ECB as its main inflation target, reflect movements in the price level faced by consumers and therefore include the effects of indirect taxes (such as VAT, excise duties, etc.) on the price of goods and services. In the modeling framework that we outlined in the previous section, inflation is therefore defined as:

$$1 + \pi_t = \frac{1 + \tau_t^c}{1 + \tau_{t-1}^c} \frac{P_t}{P_{t-1}} \tag{5}$$

where τ_t^c is the effective consumption tax rate on the aggregate consumption basket C_t. As it can be seen from Equ. (5), fiscal measures affecting τ_t^c will be reflected in the aggregate inflation measure. However, we want to tease out the effects of the cost-of-living crisis arising from the exogenous inflationary shock, from those arising from the fiscal response. When computing the direct effects of inflation, we therefore make use of the Harmonised Index of Consumer Prices at constant tax rates (HICP-CT) measure published by Eurostat. We denote inflation computed from this measure as $\tilde{\pi}_t = \frac{P_t}{P_{t-1}} - 1$. Up to the first order, we therefore have the following relationship between overall inflation and inflation at constant tax rates:

$$\pi_t \approx \tilde{\pi}_t + d\tau_t^c. \tag{6}$$

Direct effects of inflation In the spirit of Cardoso et al. (2022), we calculate the first-order impact on the nominal wealth of a transitory and unexpected inflation shock, which in our framework can be expressed as follows (see Appendix (A) for detailed derivations):

$$da_{j,t}^{(\tilde{\pi})} = -\left[\underbrace{NNP_{j,t}}_{\text{Fisher effect}} + \underbrace{(1-\lambda_{j,t})y_{j,t-1}^{(t)}}_{\text{Nominal income}} + \underbrace{\left(\frac{d\tilde{\pi}_j}{d\tilde{\pi}}-1\right)c_{j,t}}_{\text{Relative consumption}}\right] d\tilde{\pi}. \tag{7}$$

The first term, labeled as the *Fisher Effect*, is a function of the household's 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 from inflation as the real value of its debt is devalued. In constrast, 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 as the *nominal income effect*, captures the loss that households suffer from the devaluation of the purchasing power of their nominal income. Note that in the case where nominal incomes fully adjust to inflation, i.e. $\lambda_j = 1$, this effect is zero, as in this case 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 rate at the country level, taking into account each household's specific consumption pattern. For example, some households – typically at the lower end of the income distribution – are more exposed to rising energy prices due to their relatively high consumption of energy-intensive goods. Given that energy prices increased more than the prices of other goods following the inflationary shock, those households would therefore be net losers from the relative consumption channel.

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 households, and the price-side, e.g. VAT reductions. In our framework, we account for these policy interventions through changes in consumption

taxes and fiscal transfers. Formally, we show in the Appendix that the fiscal impact can be expressed as:

$$da_{j,t}^{(\tau)} = \underbrace{d\tilde{T}_{j,t}}_{\text{Income-side measures}} - \underbrace{\left[c_{j,t}\left(\frac{d\tau_j^c}{d\tau^c} - 1\right) + NNP_{j,t} + (1-\lambda_{j,t})y_{j,t-1}^{(t)}\right] d\tau_t^c}_{\text{Price-side measures: spending \& wealth/income effects}} \tag{8}$$

The first element, $d\tilde{T}_{j,t}$, captures income-side measures adopted by governments to support household income directly. The exact design of those measures and their size varied across countries, but in most cases they were targeted towards low-income households.

The second term of Equ. (8) relates to the effects of price-side measures, with which governments tried to dampen price pressures through changes in indirect taxes, subsidies, discounts, etc. In our framework, those measures – modeled through a change in consumption tax rates $d\tau^c$ – have a direct effect on consumption prices. Therefore, they affect the effective inflation rates faced by households, mitigating the impact of inflation through the relative consumption, Fisher and nominal income channels described above.

2.5 The Monetary Policy Impact

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) interest rate effects and disregards the effect that monetary policy has on economic activity and inflation.

As described in Auclert (2019), the impact of interest rate changes on households' balance sheets 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 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 and bond prices, the in-

dividual interest rate exposure translates one-to-one into a (direct) effect on individual wealth, following 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:

$$da_{j,t}^{(R)} = URE_{j,t}\, dR \tag{9}$$

where $URE_{j,t} = \frac{B_{t-1}^{(t)}}{P_t} + b_{t-1}^{(t)} + y_{j,t} - T_{j,t} - \sum_k \frac{P_{k,t}}{P_t} c_{j,k,t}$ 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. By contrast, households with a negative URE, e.g. those holding large amounts of adjustable-rate mortgages, lose from an increase in interest rates through higher interest payments on their maturing debt position.

3 Empirical Strategy

We analyse the impact of the cost-of-living crisis on households in six Eurozone countries: Germany, France, Italy, Spain, Portugal, and Greece.[7] For this purpose, we combine data from different sources to quantify the effects of inflation, fiscal policy and monetary policy derived in the previous section. 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), containing data for the year 2017.[8] Information on the composition of households' consumption basket are obtained from the 2015 Household Budget Survey (HBS). Finally, the EUROMOD micro-simulation model, together with its Indirect Tax Tool (ITT) extension,[9] are used to: (i) translate gross incomes from the HFCS into disposable incomes, (ii) construct a measure of nominal income growth during our period of analysis, and (iii) simulate the effects of the fiscal measures.

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

[8] 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-19 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 reliable for the exercise we conduct in this paper.

[9] EUROMOD and ITT, in turn, make use of the EU-SILC and HBS as underlying data sources.

Table (1) provides a summary of the various data sources we use to compute the effects of the cost-of-living crisis across population groups. In what follows, we describe our empirical strategy in more detail.

The inflationary shock We consider the period 2021M6-2023M12 as the main period of analysis (i.e. period t in the language of the framework presented above), as Eurozone inflation started to surge in the second half of 2021, and – while not yet fully back to the 2% target – had already gone down significantly by the end of 2023. To construct the 'surprise inflation' measure, we make use of the 2021Q3 wave of the Survey of Professional Forecasters (which reflects inflation expectations of the financial sector as of mid-2021) to subtract the expected cumulative inflation from the realised inflation in our period of analysis.[10]

To compute the direct effects of inflation, we further use the HICP at constant tax rates (HICP-CT), which is a variant of the HICP that excludes the impact of changes in consumption taxes, such as value-added tax (VAT) and excise duties, on consumer prices. We use this measure to separate the direct effects of inflation from those arising from the fiscal response appearing in Equ. (8), which are reported separately.[11]

Population groups Our main results (presented below in Section (4)) are provided for population subgroups that vary along the income and age dimensions. First, we group households into deciles of gross income, separately for each country. To obtain a measure of household disposable income from the HFCS data (which only contains information on market incomes), we make use of EUROMOD to calculate the ratio between gross and disposable income by decile of market income (EUROMOD, 2023).

Once households have been assigned to an income decile group, we assign them to an *age group* based on the reported age of the household head. We consider two main age groups: working-age households, with age below 65, and retirement-age households, with age above 65. We then end up with 20 groups in total for each country. In Table (2), we report the joint distribution of households into those twenty groups in row (A), pooling all countries together.

[10]The implied cumulative inflation forecast for our period of analysis was of 2.494% in the 2021Q3 SPF. In Appendix (D.1) we provide a figure comparing the inflation path implied by this forecast to realised inflation. The gap between the two is equal to 12.7 percentage points.

[11]One limitation of using the constant-tax inflation measure is that it does not include price-side measures which are not tax-related, such as price-caps and reimbursement for higher energy prices. This means that the fiscal effects that we report in the paper are effectively a lower bound on the actual effects of the fiscal response to inflation. Headline and constant-tax cumulative inflation rates during our period of interest are summarised in Table (1).

We observe from the table that, on average, there is a higher share of households with young individuals in high-income groups, reflecting the fact that working-age individuals, who obtain a large fraction of their income as labour income, earn more than retirees. The equivalent figures for individual countries are available in the Appendix C.1 of this paper.

In Section (5), we extend our results by studying the effects of the crisis on various population subgroups according to the composition and the level of their wealth. Rows (B) to (E) of Table (2) show the fraction of households according to wealth characteristics such as the home-ownership and mortgage status, by income and age group. We observe that households with young individuals are on average less likely to be home-owners (especially at the lower end of the income distribution), more likely to have a mortgage, and more likely to be considered as 'hand-to-mouth' (i.e. having insufficient holdings of liquid assets to smooth out consumption in the event of averse income shocks).[12]

Consumption basket composition To compute the effects of inflation arising from the relative consumption channel, we need to account for heterogeneity in consumption baskets to compute effective inflation rates for our age/income groups of interest. To do so, we use the Household Budget Survey (HBS), which provides information on individual consumption expenditures by COICOP consumption good category.[13] HBS data on net incomes are used to group households into income deciles. The HBS also contains data on age, so we are able to compute age and decile-specific inflation rates by country, that we can then plug into Equ. (7) when assessing the effects of inflation.

Nominal income growth To obtain the effects of inflation through the nominal income channel, we need to compute the value of λ_j for each of our groups of interest. As reflected in Equ. (2), λ_j denotes the fraction of household income that grows with inflation. To compute it from the data, we assume that all the growth in nominal market incomes during our period of interest was due to inflation. We then compute growth in disposable incomes from EUROMOD, using the following strategy. We first use EUROMOD 'uprating factors' to adjust nominal incomes in the latest EU-SILC data (dating to 2021) to approximate their values in 2022 and in 2023.[14] Then, to obtain disposable income growth abstracting from the policy changes

[12]The Appendix provides more details on how individuals are assigned to the various subgroups we consider.

[13]Data on inflation rates at the country level and the COICOP 4-level at constant tax rates are obtained from the ECB's Harmonised Index of Consumer Prices (HICP).

[14]EUROMOD 'uprating factors' are mostly based on Eurostat data on nominal income growth by sector of activity and income source. The full list of uprating factors used for each country and the under-

during our period of analysis, we compute it as:

$$1 + \Delta Y = \frac{EM^{2023}(y^{2023})}{EM^{2023}(y^{2022})} \times \frac{EM^{2022}(y^{2022})}{EM^{2022}(y^{2021m6})} \tag{10}$$

where $EM^t(\cdot)$ summarises the EUROMOD tax-benefit calculator using policy rules of year t to translate market incomes y into disposable incomes.[15] For each year t, market incomes y are updated, using uprating factors between 2021M6 and year t. The obtained values of uprated incomes are denoted y^t in the above formula. Note that, by calculating in each year the ratio between disposable incomes from uprated and not uprated market incomes, we are effectively eliminating the effect of policy changes. Finally, we compute the value of λ for each country/population group as $\lambda_j = \frac{\Delta Y_j}{\pi}$, using ΔY_j computed from (10), and where π is the country's aggregate cumulative inflation rate at constant tax rates for the period 2021M6 to 2023M12.

Net nominal asset positions and Interest rate exposures The net nominal asset positions (NNP) and the 'Unhedged Interest Rate Exposure' (URE) of individuals, which are necessary to estimate the effects of inflation and monetary policy through the Fisher and interest rate channels (see Equ. (7) and (9)), are computed at the household level from the HFCS data, before aggregating them by population subgroups. Details on how those variables are computed are provided in Appendix (B.1) and (B.2).

Fiscal support As mentioned in Section (2), to assess the effects of the fiscal response to the crisis, we distinguish between the 'price-side' (interventions aiming at reducing the prices paid by consumers), and 'income-side' (fiscal transfers aiming at supporting household incomes). To compute the effects of price-side measures, we make use of the regular HICP inflation series together with the HICP-CT measure (which removes the effect of indirect tax changes, and which we use to compute the direct effects of inflation, as described above) to obtain an implicit measure of the effect of tax changes on inflation, from Equ. (6). We then use the values of τ^c (using aggregate inflation) and τ^c_j (using group-specific inflation rates) obtained from this procedure to compute the fiscal effects outlined in Equ. (8).

lying data sources are documented in EUROMOD country reports, available online at: https://euromod-web.jrc.ec.europa.eu/resources/country-reports.

[15] Note that the policy rules used to update nominal incomes *do not include* the effects of the policy response to the cost-of-living crisis, which are reported in the fiscal policy effects $d\tilde{T}$.

To assess the effects of income-side fiscal measures, i.e. the various social benefits and income support measures taken by governments to help households cope with rising living costs – denoted as $d\tilde{T}_{j,t}$ in Equ. (8) – we draw from the recent work of Amores et al. (2023a), who use microsimulation techniques to estimate the cushioning effect of those measures by income decile for the same subset of countries as the one we consider in this paper. As those values are not available for different age groups, we assign the same effects to working-age and retirement-age individuals that are part of the same income decile. Moreover, given that Amores et al. (2023a) provided these calculations only for 2022, we project them to 2023 based on their relative budgetary cost at the macro level.[16] under the assumption that the degree of targeting (wrt 2022 measures) did not change.

[16]The budgetary impact of fiscal measures adopted by governments in 2022 and in 2023 in support of households are drawn from the European Commission's calculations, summarised in Bethuyne et al. (2022).

TABLE 1: Main Data Sources and Inflation Numbers

Variable	**Source/Value**
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)
Expected inflation ($E_{t-1}\pi_t$)	SPF (2.50%)
Effective inflation rate (π_j)	HBS & COICOP4 π (ECB).
Policy response	
Fiscal response ($d\tilde{T}_y$)	EUROMOD & Amores et al. (2023a).
Interest rate response (R)	ECB

Country	**HICP inflation**	**HICP-CT inflation**
France	12.94%	13.48%
Germany	16.04%	16.29%
Greece	14.49%	14.55%
Italy	15.68%	16.19%
Portugal	13.01	14.20%
Spain	12.66%	14.21%
Euro Area	15.18%	15.59%

Notes: HFCS: Household Finance and Consumption Survey, 2017 (Wave 3). SPF: Survey of Professional Forecasters, conducted by the ECB (2021Q3). 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.

TABLE 2: Population Distribution Across Income Deciles

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	7.16%	4.90%	5.77%	6.26%	6.65%	6.79%	7.41%	7.84%	8.10%	8.23%
		RA	2.86%	5.11%	4.27%	3.74%	3.36%	3.17%	2.59%	2.19%	1.87%	1.76%
B	Home-owner	WA	1.96%	1.50%	2.41%	2.84%	3.47%	4.04%	5.03%	6.02%	6.73%	7.40%
		RA	1.50%	2.77%	2.74%	2.75%	2.52%	2.61%	2.23%	2.00%	1.69%	1.66%
	Non owner	WA	5.19%	3.39%	3.36%	3.42 %	3.18%	2.76%	2.39%	1.83%	1.37%	0.84%
		RA	1.34%	2.33%	1.53%	0.99%	0.83%	0.56%	0.36%	0.20%	0.18%	0.09%
C	Mortgage	WA	0.47%	0.41%	0.89%	1.04%	1.53%	1.89%	2.55%	3.05%	3.81%	4.18%
		RA	0.06%	0.10%	0.12%	0.17%	0.18%	0.17%	0.17%	0.21%	0.26%	0.29%
	No mortgage	WA	1.49%	1.09%	1.51%	1.80%	1.94%	2.15%	2.48%	2.97%	2.92%	3.22%
		RA	1.44%	2.68%	2.62%	2.58%	2.35%	2.44%	2.06%	1.79%	1.43%	1.37%
	Non owner	WA	5.19%	3.39%	3.36%	3.42 %	3.18%	2.76%	2.39%	1.83%	1.37%	0.84%
		RA	1.34%	2.33%	1.53%	0.99%	0.83%	0.56%	0.36%	0.20%	0.18%	0.09%
D	AR mortgage	WA	0.22%	0.18%	0.43%	0.44%	0.64%	0.70%	0.78%	1.04%	1.16%	1.17%
		RA	0.02%	0.02%	0.02%	0.04%	0.04%	0.02%	0.04%	0.04%	0.04%	0.03%
	FR mortgage	WA	0.25%	0.23%	0.46%	0.60%	0.89%	1.18%	1.77%	2.01%	2.65%	3.01%
		RA	0.05%	0.08%	0.09%	0.13%	0.14%	0.16%	0.13%	0.17%	0.22%	0.26%
E	Poor HTM	WA	2.08%	1.37%	1.09%	0.96%	0.61%	0.50%	0.47%	0.25%	0.13%	0.06%
		RA	0.42%	0.79%	0.44%	0.21%	0.15%	0.11%	0.05%	0.03%	0.04%	0.00%
	Wealthy HTM	WA	1.12%	0.89%	1.32%	1.46%	1.98%	1.96%	2.30%	2.46%	2.49%	2.40%
		RA	0.47%	0.57%	0.51%	0.39%	0.37%	0.32%	0.22%	0.20%	0.19%	0.15%
	Non HTM	WA	3.95%	2.63%	3.35%	3.84%	4.06%	4.33%	4.64%	5.14%	5.49%	5.78%
		RA	1.96%	3.75%	3.32%	3.14%	2.83%	2.74%	2.32%	1.96%	1.63%	1.60%
F	Effective π	WA	17.35%	16.57%	16.27%	16.19%	15.94%	15.76%	15.71%	15.48%	15.27%	14.91%
		RA	14.84%	15.19%	14.88%	15.04%	14.48%	14.59%	14.34%	14.27%	14.37%	13.82%

Notes: WA: working-age (<65 years old) individuals, RA: retirement-age (65+ years old) individuals. The numbers apply to the six-country average.

4 The impact of the Cost-of-Living Crisis

In this section, we analyse the impact of the cost-of-living crisis on households in the Eurozone. In our baseline results, we study the magnitude of these effects on real wealth through the channels previously identified, separately for each income decile and age group. In a second step, in Section (5), we extend our analysis by considering various other subgroups, depending on characteristics such as liquid assets, housing and mortgage status.

4.1 Effects of Inflation Through Consumption, Income and Nominal Wealth

We begin our analysis considering the impact of the inflationary surge on households across the income distribution through the relative consumption, nominal income and Fisher channels described above and summarised in Equ. (7).

Table (3) summarises the main results for the Eurozone, as proxied by our six countries of interest (i.e. Germany, France, Italy, Spain, Greece and Portugal), which together represent about 85% of Eurozone GDP. Most importantly, the results point towards a striking difference in the extent of the exposure between working-age and retirement-age households. On average, pension-age households lost nearly three times as much as their working-age counterparts. This is mainly driven by the Fisher effect, which implies a devaluation of nominal wealth of about 8% in the case of pension-age households, who tend to hold larger stocks of positive net nominal assets. This is in sharp contrast to the revaluation of nominal wealth of about 4% for the group of working-age households, as a result of the fact that households in this group hold on average negative net nominal asset balances. Altogether, working-age households suffered an average loss from inflation amounting to ca. 6% of their disposable income, whereas the effect for those in pension-age amounted to 16%. These differences are consistent with the findings of the recent literature reviewed in the introduction section.

Another important finding is the gap between high and low-income households. Our results suggest a regressive impact among working-age households, with the lowest deciles suffering between four to five times the impact borne by the highest deciles. In contrast, the impact appears rather flat among pension-age households, with households in this group experiencing losses of similar magnitudes across the income distribution. This result is related to differences in income and asset devaluations between age groups. On the nominal income side, pensions have grown relatively homogeneously across the income distribution following

the inflationary shock, whereas income growth was higher among high-income working-age households.[17] Concerning the balance of nominal assets and liabilities, working-age households in high-income deciles are more likely to have positive mortgage balances and to benefit from the large debt devaluation from inflation. On the other hand, pensioners across all income deciles generally do not have mortgages and hold positive nominal asset balances, hence are loosing out by a similar magnitude (relative to their income) across the income distribution. Taken together, these factors are responsible for the significant difference in the regressivity of inflation effects between age groups.

Finally, with respect to the inflation exposure resulting from decile-specific consumption patterns (the relative consumption channel), we find that households in the bottom income deciles, both in working and retirement-age groups, are more exposed than higher income households to price increases on goods such as fuel and electricity, that have featured above-average price rises, as documented in other studies (see, e.g., Amores et al., 2023b). In monetary terms, this is equivalent to a loss of approximately 1.9% and 1.7%, respectively, of disposable income for households in the first income decile, as compared to the country average. The consumption channel is noticeably smaller in magnitude than the Fisher and income channels.

Figure (1) shows the effects of inflation by income and age group for the Eurozone as a whole and for each country separately. As it can be seen from the figure, the differences in the effects of inflation across age and income groups discussed above are present in all countries: pension-age households tend to experience significantly larger losses than their working-age counterparts. Moreover, among working-age households, the impact of inflation appears regressive, with low-income households suffering the greatest losses. Across countries, differences in the distribution of net nominal asset positions are the key driver of the differences in the magnitude and the regressive nature of the impact of inflation. For instance, comparing the case of German and Greek pensioners, it can be seen that the devaluation of large asset balances led to a significant loss of beyond 20% of disposable income for the German middle-income pension-age households, whereas Greek pension-age households suffered losses which are only about half of that size, due to their smaller nominal asset positions. At the other extreme, negative net nominal asset positions among higher-income working-age households in France and Spain imply that these households even benefited from the inflationary shock.

[17] This fact can be appreciated in Figure A.2 in the Appendix of this paper, where we plot the value of λ (from Equ. (2)) by age and income groups in each country.

TABLE 3: 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	
Working-age				
1	1.31	−11.16	−1.94	−11.80
2	0.23	−11.22	−0.74	−11.73
3	2.72	−10.91	−0.36	−8.55
4	2.44	−10.43	−0.25	−8.24
5	3.40	−10.21	0.00	−6.81
6	4.57	−9.88	0.18	−5.14
7	6.46	−9.63	0.21	−2.96
8	5.47	−9.28	0.38	−3.43
9	5.33	−9.18	0.53	−3.32
10	5.04	−8.27	0.71	−2.53
Pension-age				
1	−6.82	−9.81	−1.73	−18.37
2	−6.93	−8.84	−1.08	−16.85
3	−6.57	−8.27	−0.62	−15.46
4	−7.43	−8.41	−0.40	−16.23
5	−6.00	−8.39	−0.17	−14.57
6	−8.96	−8.38	0.06	−17.28
7	−10.15	−8.49	0.31	−18.34
8	−8.44	−8.34	0.53	−16.25
9	−9.43	−8.29	0.86	−16.86
10	−7.26	−7.23	0.99	−13.49

Notes: The table reports, for each income decile, the impact of the inflation surge through three different channels, based on Equ. (7), 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.

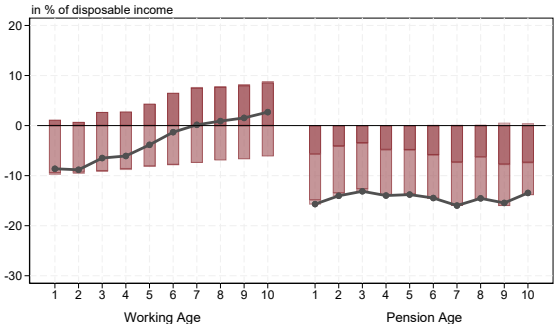
The amount of savings and the mortgage status are key in determining the size and the sign of the net nominal asset positions of working-age households. Hence, considering the results along the income and age dimension only is likely to hide other critical characteristics that are important for the the magnitude of the effects. We will revisit these results in Section (5), in which we investigate the effects for various population subgroups, e.g. mortgagees.

Finally, note that while the relative consumption channel is generally the smallest in most countries, the case of Italy stands out, as low-income households suffered to a big extent from this channel. This result can be explained by the large differences in effective inflation rates experienced at the bottom of the income distribution (ca. 21%) compared to the top (ca. 15%). This difference is about twice as large as for the Eurozone average.

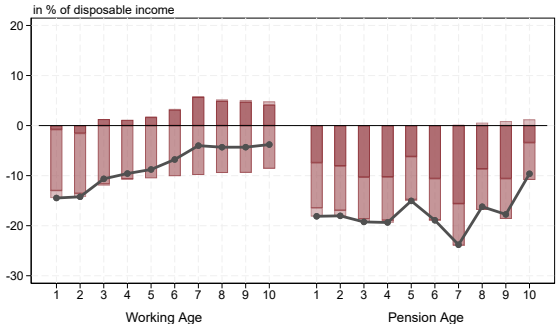
FIGURE 1: Inflation Impact Across Income Deciles in Selected Eurozone Countries

(A) Eurozone

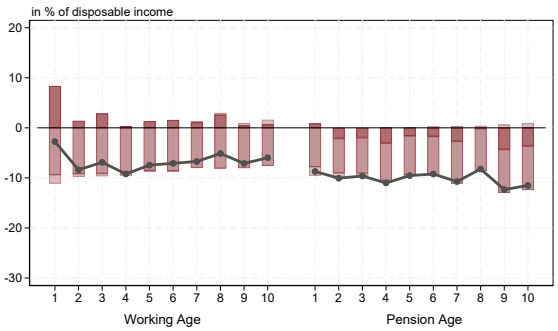
(B) France



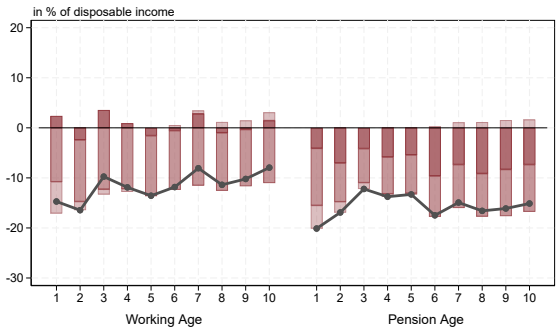
(C) Germany



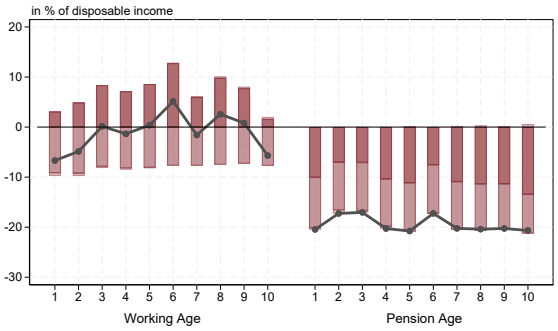
(D) Greece



(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 (1A) shows the weighted average across the six selected countries.

4.2 Fiscal and Monetary Policy Responses

In response to the inflationary shock, Eurozone governments adopted measures to limit the increase in prices, particularly for energy consumption, by introducing price caps, subsidies or discounts, and by reducing taxes on goods and services. They also adopted measures to shield households' disposable income more directly through income-support 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 each year, in 2022 and 2023. In parallel, the European Central Bank increased interest rates to unprecedented levels, lifting them from zero to 4.5% by the end of 2023. Given the quantitative importance of the monetary and fiscal policy response to inflation and their impact on household wealth, the effects of those policies need to be accounted for in the assessment of the 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. Consistently with the first part of the analysis, we present results for the Eurozone as a whole before focusing on cross-country differences.

4.2.1 Fiscal Policy

The impact of the fiscal measures along the income distribution in the Eurozone is shown in Table (4). On average, governments cushioned around 5% of the income loss for the lowest income decile through the various income and price-side measures. For higher income deciles the support gradually decreases. Differences across income groups are mostly related to differences in the support through income-side measures, which were more targeted to lower-income households and larger in magnitude than price-side fiscal measures.

The generosity and composition of support measures, as shown in Panels (2B) to (2G) of Figure (2), exhibit strong cross-country variation. Support measures were noticeably more generous in Italy and Portugal, where households in the lowest income brackets received support measures that accounted for about 10% of disposable income. That 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, Spain relied more than other countries on price-side support measures, while income-side measures were typically the largest part of the fiscal support.

TABLE 4: Fiscal Support in the Eurozone by Income Decile

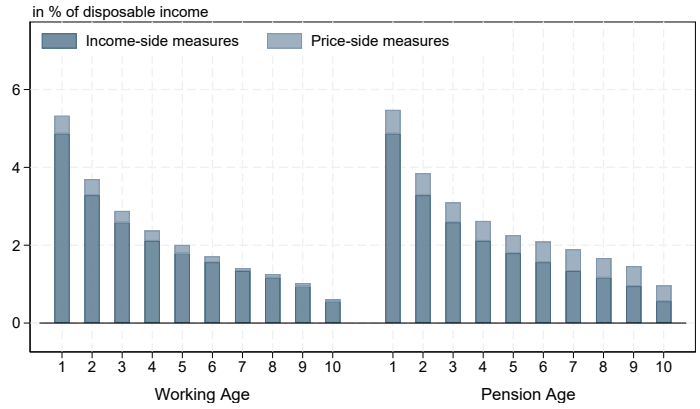
Income decile	Type of fiscal support		Total
	Income-side measures*	Price-side measures	
Working-age			
1	4.87	0.46	5.33
2	3.28	0.41	3.69
3	2.59	0.29	2.88
4	2.11	0.26	2.37
5	1.79	0.21	2.01
6	1.56	0.15	1.71
7	1.34	0.07	1.41
8	1.17	0.09	1.26
9	0.95	0.08	1.02
10	0.56	0.05	0.61
Pension-age			
1	4.87	0.61	5.48
2	3.28	0.56	3.85
3	2.59	0.51	3.10
4	2.11	0.51	2.62
5	1.79	0.46	2.25
6	1.56	0.53	2.09
7	1.34	0.56	1.89
8	1.17	0.50	1.67
9	0.95	0.41	1.46
10	0.56	0.05	0.96

*Income-side measures in Amores et al. (2023a) are reported at the income decile-level. The numbers are therefore the same for the two age groups in the table.

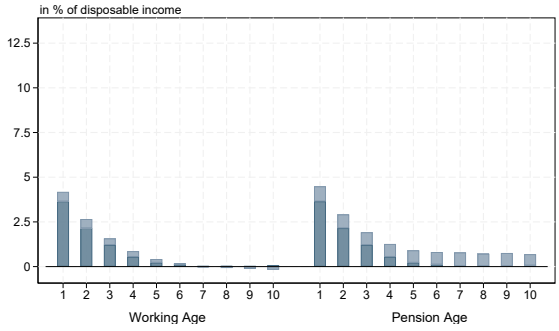
Notes: The table shows for each income decile the average fiscal support received in % of disposable income. The figures are the weighted average of six selected countries.

FIGURE 2: Fiscal Support for Households in 2022 in the Eurozone

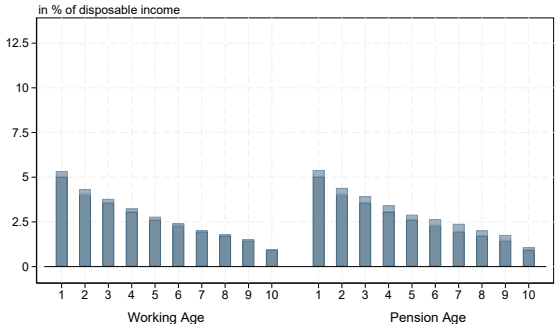
(A) Eurozone



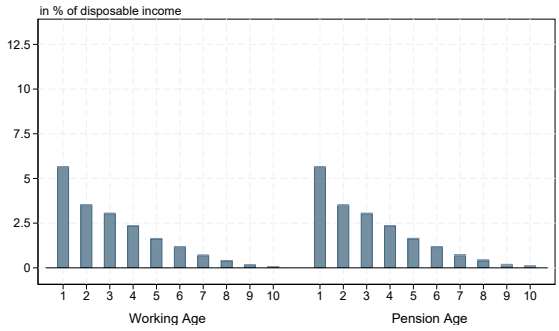
(B) France



(C) Germany



(D) Greece



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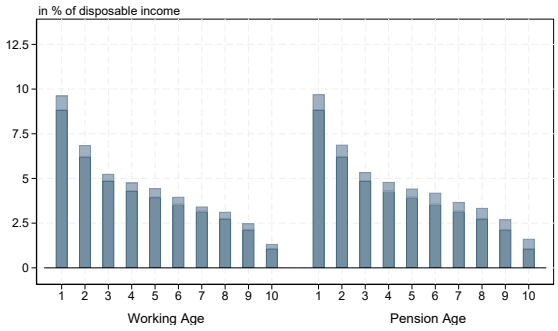
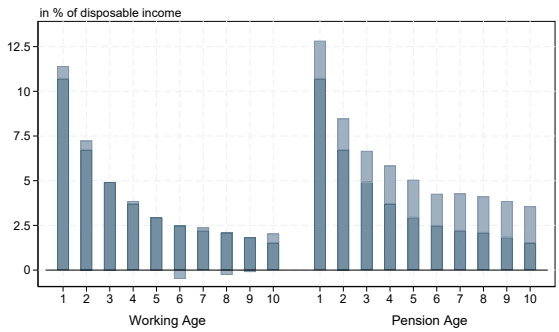
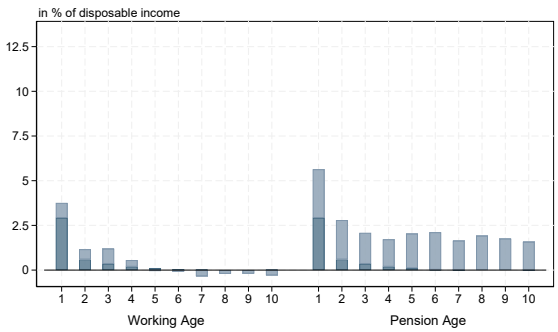


(F) Portugal



(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. (2023a). Panel (2A) 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 interest rate. This exposure is given by the difference between maturing assets (which yield interest payments), and liabilities (which require interest payments), the so-called "Unhedged Interest Rate Exposure" (URE), which has been described in Section (2). Therefore, to assess the impact of the interest rate change, we compute the value of the URE for each household in the HFCS sample.[18]

Table (5) displays the average URE across income deciles and age groups for the Eurozone block. On average, working-age households in the first half of the income distribution feature a negative exposure to rising interest rates, while all others are positively exposed. Hence, the former group of households would generally suffer from an increase in the interest rate, while the others would generally gain.[19] Among high-income households, the URE tends to be larger for households in pension age. To rationalize this, we break down the URE into each of its elements i.e. the net current savings as well as the amount of net maturing assets and net maturing liabilities.[20] Pension-age households are unlikely to hold mortgages and therefore tend to display positive asset balances, making them benefit from higher interest rates. As for lower-income working-age households, a large negative exposure to interest rates is driven by the need to finance dis-savings of the period at higher rates as well as, in some cases, to refinance mortgages.

Based on the derived values of the URE for each income decile and age group, it is straightforward to compute the impact of monetary policy based on Equ. (9), i.e the surprise change in the interest rate multiplied by the group-specific URE. For working-age households, the effect is comparably small in magnitude, ranging between -1.8% of disposable income for bottom income deciles, to 1.8% for the highest decile. To put this in perspective, losses from higher interest rates for lower-income working-age households are of the same order of magnitude as the ones from the relative consumption channel. In contrast, the gains for households in pension-age are significant and they become larger for households at the top of the income distribution. Pension-age households in the highest deciles gain about 5% of disposable income, thanks to

[18] See Section (B.2) in the Appendix for more details on the variables used from the HFCS data to construct it at the household level.

[19] Nevertheless, it is important to note that figures by age and income groups hide a large extent of heterogeneity within groups. These are due to other important households characteristics, particularly their mortgage status and the mortgage type. We explore the importance of these factors in the next section.

[20] Figure (A.6) in the Appendix provides this break-down for each household group.

their large asset balances which are positively exposed to higher interest rates. Altogether, at the Eurozone level, we observe a regressive impact of the interest rate response.[21]

At the country level, Figure (3) suggests that in most countries the URE tends to gradually increase along the income distribution and it is positive for pension-age households. Hence the impact of interest rate increases is regressive in all countries, with low-income working-age households typically suffering from interest rate increases, whereas high-income pension-age households are the main winners. There is, however, a substantial degree of variation across countries in the magnitude of the impact. The largest negative effects are suffered by households in the first income decile in Spain (working-age only) and Greece (both age groups) experiencing a loss of 5% to 7% of disposable income, while the impact is close to zero for low-income working-age households in Germany. On the other hand, the highest income pension-age households in Spain are the ones benefiting the most from increases in rates thanks to a large stock of wealth (relative to their income) exposed to the higher interest rate. Looking at the decomposition of the URE by country (see Figure (A.6) in the Appendix) and income decile, consumption in excess of income (i.e. negative net savings) is often responsible for the bigger share of the URE in the first decile and particularly so in Greece, Spain and Italy. Moreover, cross-country differences in the URE – and by this account with respect to the impact of rising interest rates – can be traced back to the prevalence of adjustable-rate mortgage types in some countries as opposed to fixed-rate ones (see in particular Portugal and Spain).

[21] We should however be cautious in the interpretation of this result, as our analysis abstracts from the effect of interest rate hikes on inflation. It is therefore likely that households suffering the most from the direct effects of interest rates have benefited to a large extent from the fact that the monetary policy response prevented inflation from increasing further. Studying the impact of those second-round effects goes beyond the scope of this paper; we leave this for further research.

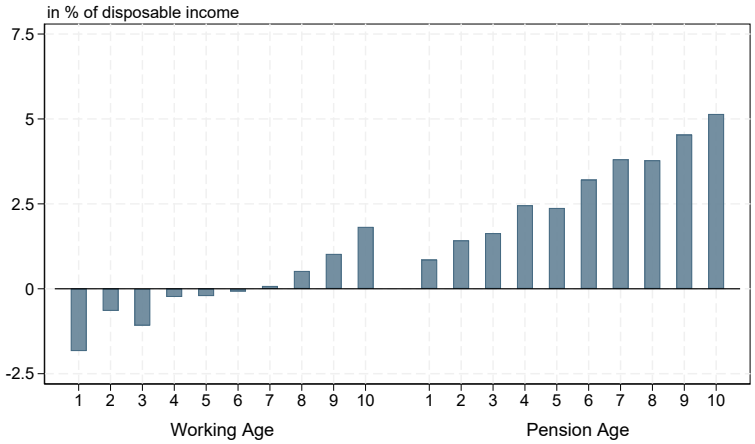
TABLE 5: Interest Rate Impact by Income Decile for Eurozone Households in 2022

Income decile	Unhedged Interest Rate Exposure (URE) (in % of disp. income)	Financial gain/loss from interest rate hike (in % of disp. income)
Working-age		
1	−40.76	−1.83
2	−14.42	−0.65
3	−24.05	−1.08
4	−5.35	−0.24
5	−4.78	−0.22
6	−1.61	−0.07
7	1.87	0.08
8	11.70	0.53
9	22.85	1.03
10	40.54	1.82
Pension-age		
1	18.57	0.84
2	30.07	1.35
3	35.47	1.60
4	53.04	2.39
5	52.66	2.37
6	70.87	3.19
7	84.19	3.79
8	84.03	3.78
9	101.47	4.57
10	124.17	5.59

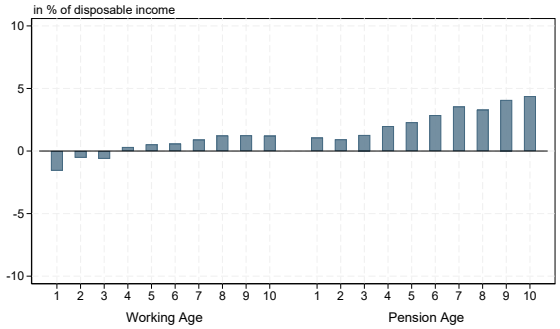
Notes: The table reports for each income decile the exposure to interest rate changes, as measured by the unhedged interest rate exposure (URE) in % of disposable income, and the actual financial impact resulting from the interest rate hike in % of disposable income. The actual monetary impact from the interest rate hike between mid-2021 and end-2023 is obtained by multiplying the decile-specific URE by 4.5% (see Equ. (9)). 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.

FIGURE 3: Interest Rate Impact on Households Across the Eurozone

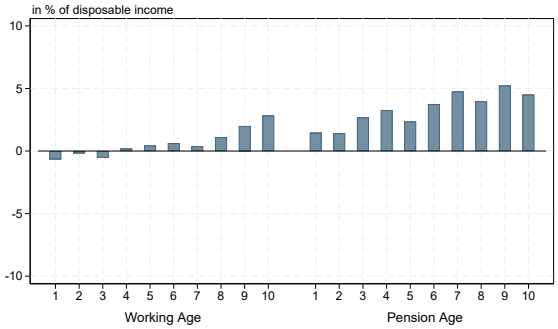
(A) Eurozone



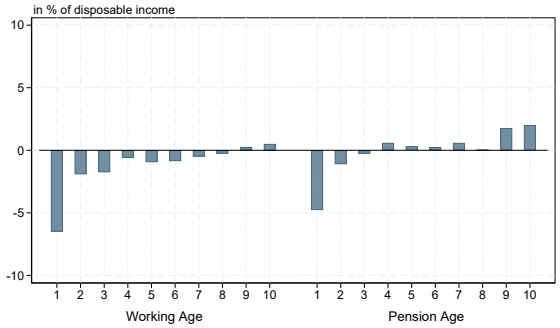
(B) France



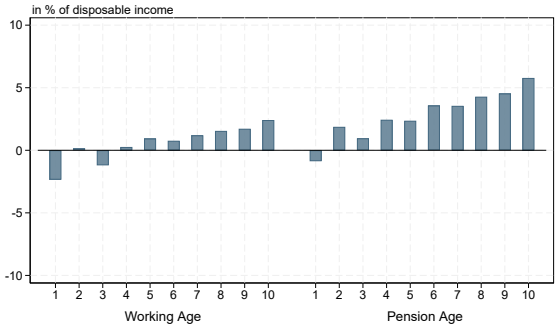
(C) Germany



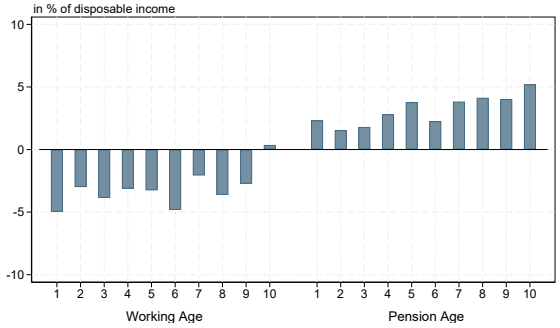
(D) Greece



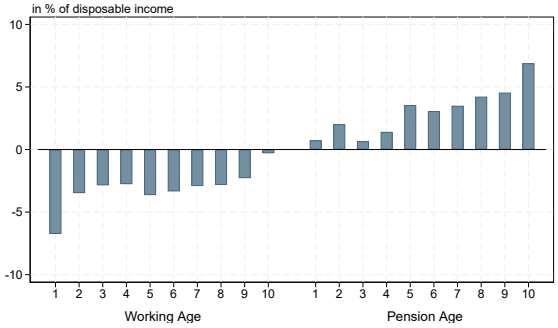
(E) Italy



(F) Portugal



(G) Spain



Notes: The figure shows for each income decile the monetary loss from an increase in the interest rate by 4.5%. Panel (3A) shows the weighted average effects across the six selected countries.

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

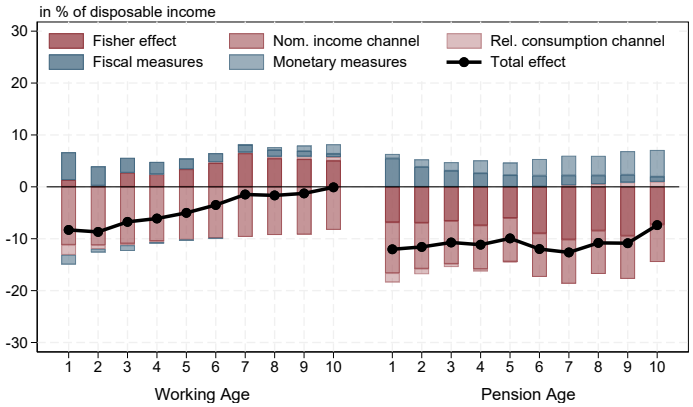
This section brings together the analysis of the direct effects of inflation and the impact from fiscal and monetary policy responses, to assess the overall impact of the cost-of-living crisis on Euro Area households. The combined results are displayed in Figure (4) both for the Eurozone as a whole and for the individual countries.

Starting with the Eurozone as a whole (Panel (4A)), our results indicate that the regressive direct effects of inflation prevail among the working-age population. While this was partially dampened by supporting fiscal policy measures, the rise in interest rates has reinforced the regressive effects of the crisis for this population group. Overall, the loss for working-age households ranges from 10% of disposable income for low-income households to virtually zero for high-income households. In contrast, among pension-age households, the impact was visibly less regressive in nature, and although the increase in rates had a mostly beneficial effect, the large devaluation of nominal balances induced by inflation implied that, across the income distribution, pension-age households were the most affected, with a loss of beyond 10%.

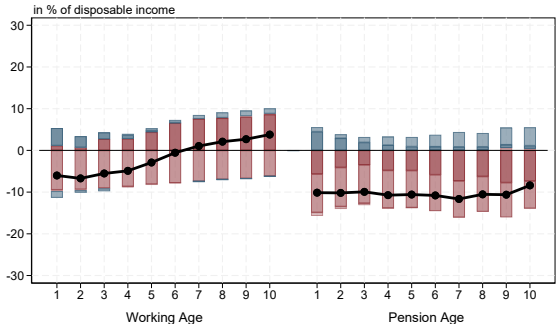
At the country level, our results indicate that fiscal policy measures in Portugal have entirely offset the effect of inflation on working-age households. By the end of 2023, Portuguese households in this age group were in most cases fully compensated. In contrast, regressive patterns are still visible in most countries among working-age households with low-income households experiencing losses of about 8% to 10% of disposable income in Germany, Italy and Spain, whereas high-income households are equally well or even better off, as in the case of France. As for pension-age households, they tend to display similar losses across income groups and countries of about and beyond 10%.

FIGURE 4: The Impact of the Cost-of-Living Crisis on Households in the Eurozone

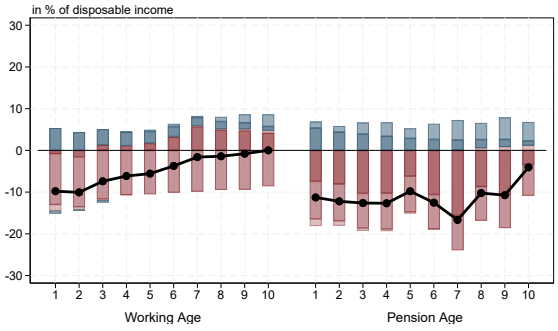
(A) Eurozone



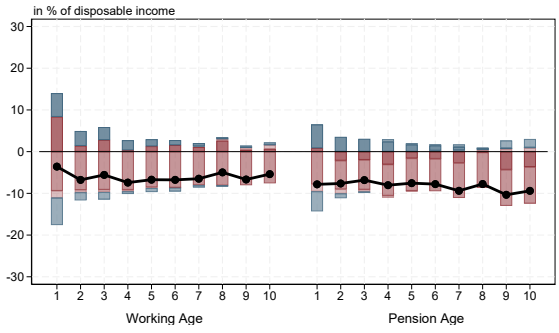
(B) France



(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 (4A) shows the weighted average effects across the six selected countries.

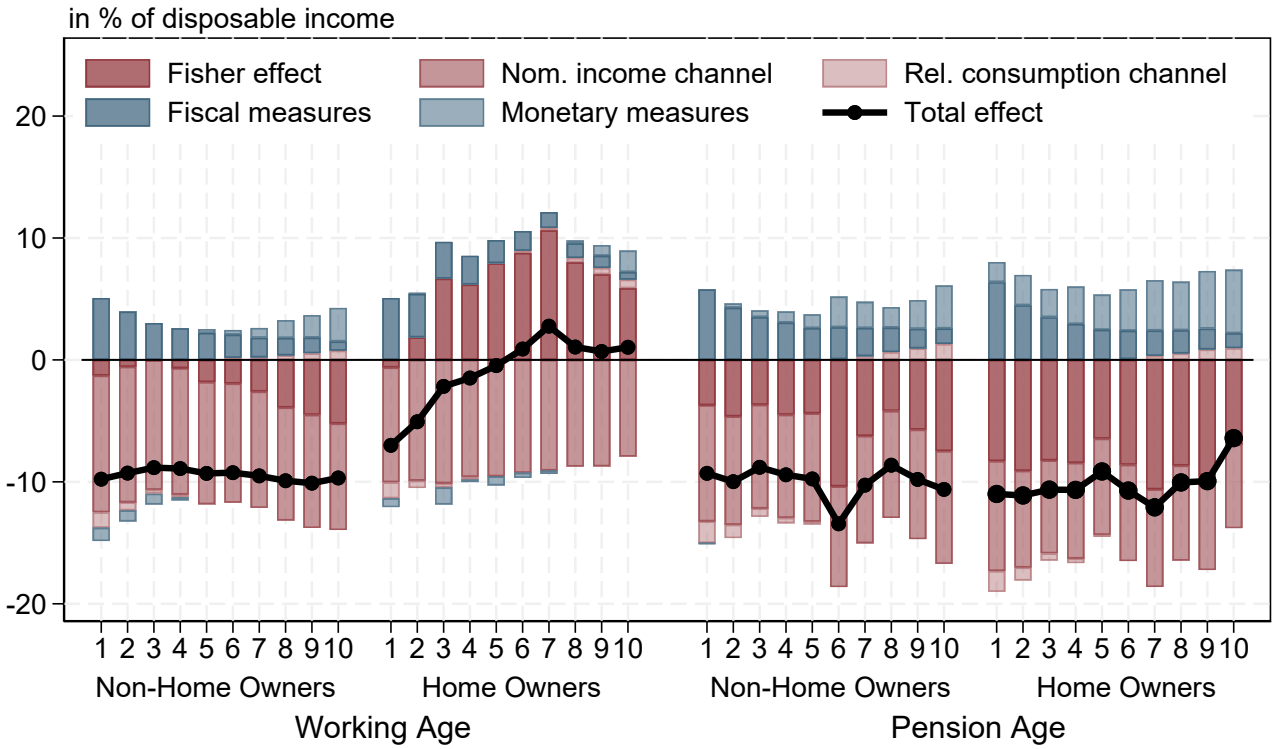
5 The Role of Wealth and its Composition

In the previous section, we analysed the effects of the cost-of-living crisis on various age and income subgroups of Euro Area households. We now extend the analysis by looking at how additional characteristics influence the exposure of households to inflation and the policy response, focusing on characteristics related to wealth and its composition. In particular, we look at the effects of home ownership, the mortgage status and the 'hand-to-mouth' status of households, as proxied by their levels of liquid wealth holdings.

Housing In Section (4), we reported large differences in the effects of inflation through the Fisher channel across age groups. We found that, on average, working-age households benefit from inflation through this channel because of negative net nominal positions, while pension-age households lose from the devaluation of their nominal assets. In Figure (5), we depict the effects of the crisis as a function of the home-ownership status for each age-income decile group. We can see from the figure that, when accounting for home ownership, the gains from the Fisher effect within the working-age population (left panels) are driven by the effect of the shock on homeowners, who benefit the most from inflation. Those effects are non-monotonic over income deciles: the home-owners benefiting the most from the revaluation of nominal liabilities are those in middle-income deciles, the effect being as high as 10% of disposable income in the 7^{th} income decile. Home-owners in low-income deciles appear to gain very little, and even lose in the case of the first decile. Non-homeowners have on average positive net nominal asset positions in all income deciles. As a result, working-age households in this group lose from inflation through the Fisher effect, as is the case for the retirement-age group.

Looking at the pension-age population (right panels), the effects of inflation are very homogeneous across home-ownership groups. This makes the home-ownership status a poor predictor of the effects of the crisis on pension-age individuals.

FIGURE 5: Effects of Cost-of-Living Crisis Across Population Subgroups and Housing Status



Notes: The figure shows 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. The figure shows the weighted average effects across the six selected countries.

Mortgages The stark difference in the role played by home ownership across age groups can be explained by accounting for the mortgage status of individuals more explicitly. As it can be seen from looking at Table (2), only about 8% of the retirement-age population has positive mortgage balances. For the working-age population, this share is equal to 60%. Moreover, conditional on having a mortgage, the average value of the remaining mortgage balance is equal to 198% of disposable income for working-age households, and to 156% for their retirement-age counterpart.

Figure (6) displays the effects of the crisis on households conditional on their mortgage status.[22] From the figure, we clearly see that mortgage holdings are a strong predictor of the exposure to inflation through the Fisher channel. For mortgage holders, the gains from inflation co-move negatively with income, with low-income households experiencing the largest gains as a fraction of their disposable income. The effects are strong in magnitude, with mortgagees in the first decile seeing their net wealth revalued upwards by approximately 35%.

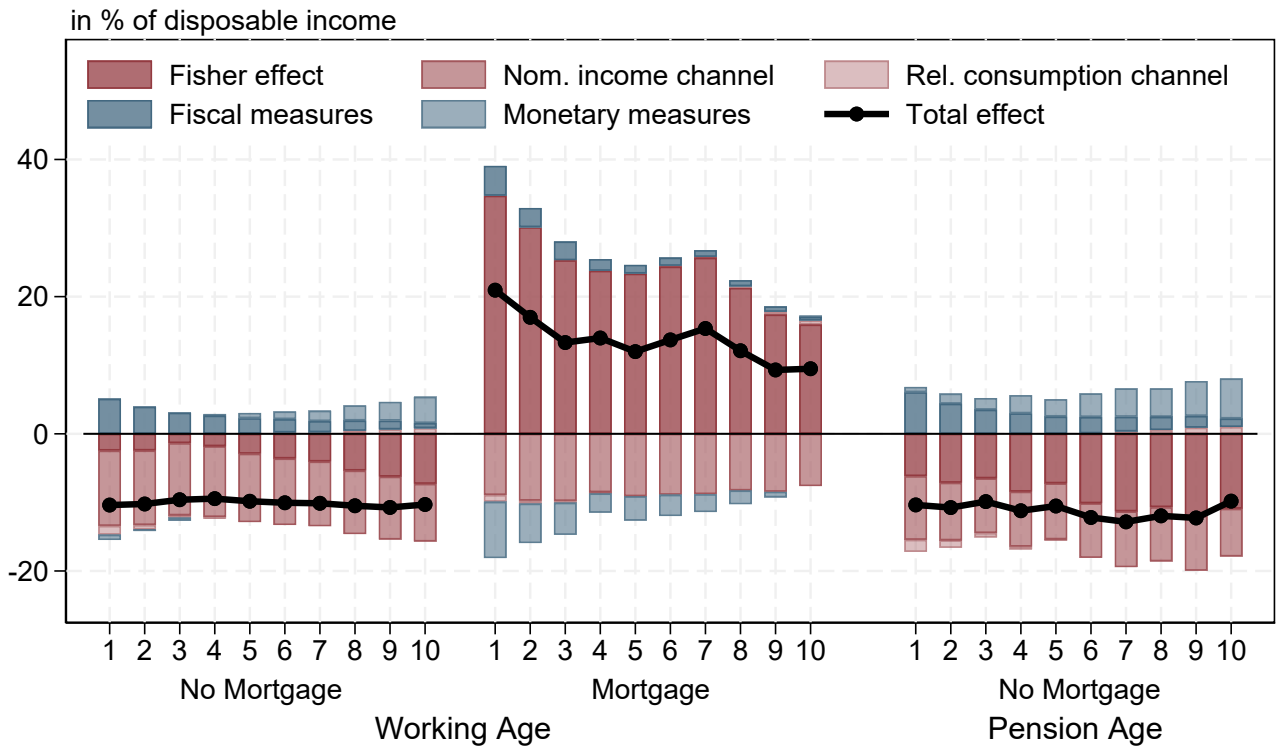
[22]The very low reported share of retirement-age households with a mortgage implies very noisy numbers when computing the effects on this group of individuals. Therefore, the figure only displays results for retirement-age households without mortgages.

Conditional on having positive mortgage balances, we show in the Appendix the effects of having a fixed-rate vs. adjustable-rate mortgage contract. We find that gains from the Fisher effect are similar across households with fixed and adjustable-rate contracts. However, the gains for households with adjustable-rate mortgages are partially offset by the losses they face from higher interest rates, given their large negative URE, reflecting the fact that interest payments on mortgages with adjustable rate increase following a monetary tightening. Given the strong cross-country differences in the type of the average mortgage contract (as can be seen from the country-specific population distribution tables in Section (C.1) of the Appendix),[23] losses associated with having an adjustable-rate mortgage are highly concentrated in countries such as Spain and Portugal.

We present country-specific results on the effects across housing and mortgage groups in the Appendix (Figures (A.3) and (A.4)). Overall, we find that the results at the country level feature striking similarities: the group of working-age home-owners, and in particular those with outstanding mortgages, have seen their wealth being devalued least or even gained, as is the case of mortgage holders. On the other hand, households without mortgages, both in working and pension age, have experienced wealth losses of very similar magnitudes. In terms of differences across the six countries, we notice somewhat smaller negative wealth effects on mortgage holders in France and Germany from the interest rate response, given the dominance of fixed-rate mortgage regimes (cf. Section (C.1) for the country-specific shares of mortgage types by income decile).

[23] Those differences have also been documented in the literature, see e.g. Pica (2021).

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



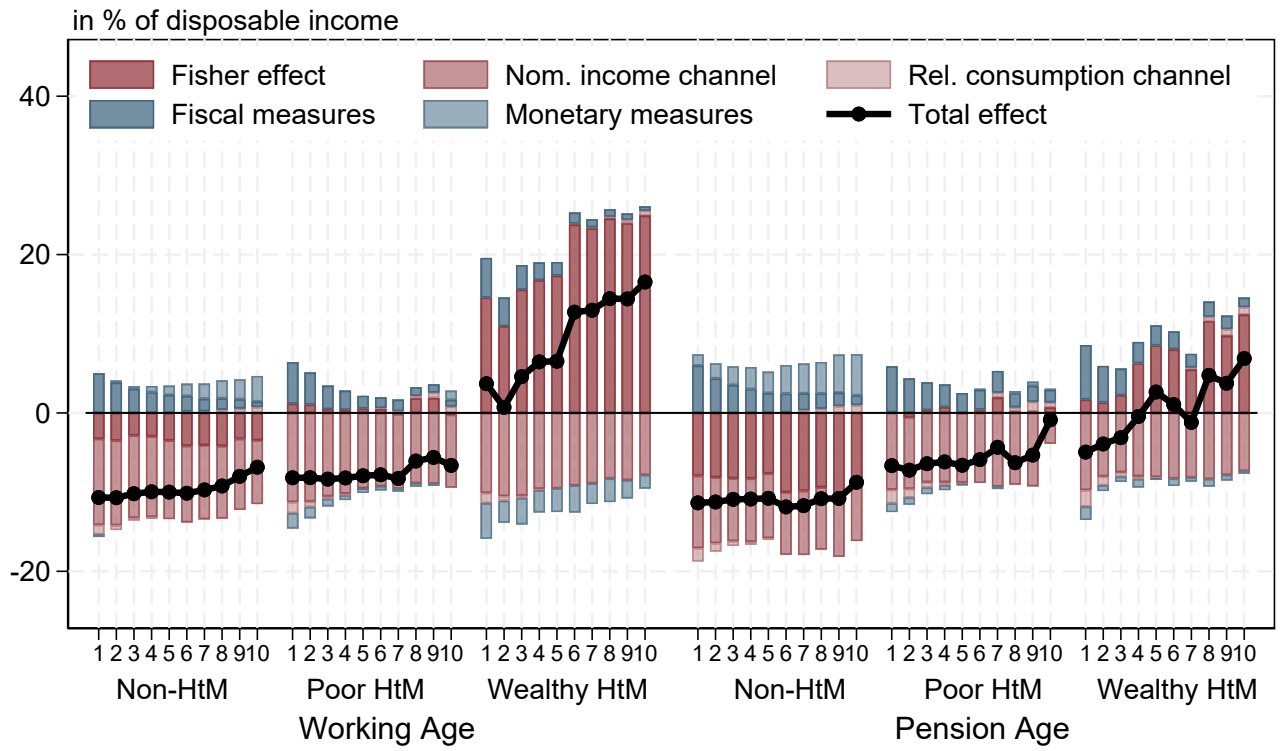
Notes: The figure shows the monetary loss from inflation as a share of disposable income through a revaluation of nominal assets (Fisher effect), nominal income and consumption, together with the effect resulting from fiscal and monetary responses. The figure shows the weighted average effects across the six selected countries.

Hand-to-mouth status In Figure (7) we split the population into households considered as being 'Hand-to-Mouth' (i.e. holding no or little amounts of liquid assets) or not. The lack of liquid wealth exposes households to fluctuations in their earnings, implying that they typically have a high marginal propensity to consume out of transitory earnings shocks. Knowing whether hand-to-mouth households are more affected by the crisis is therefore of interest for the design of the policy response to the inflationary shock.

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.[24] The results closely mirror those obtained looking at the housing and mortgage status: 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,

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

FIGURE 7: Effects of the Cost-of-Living Crisis Across Population Subgroups and Hand-to-Mouth Status

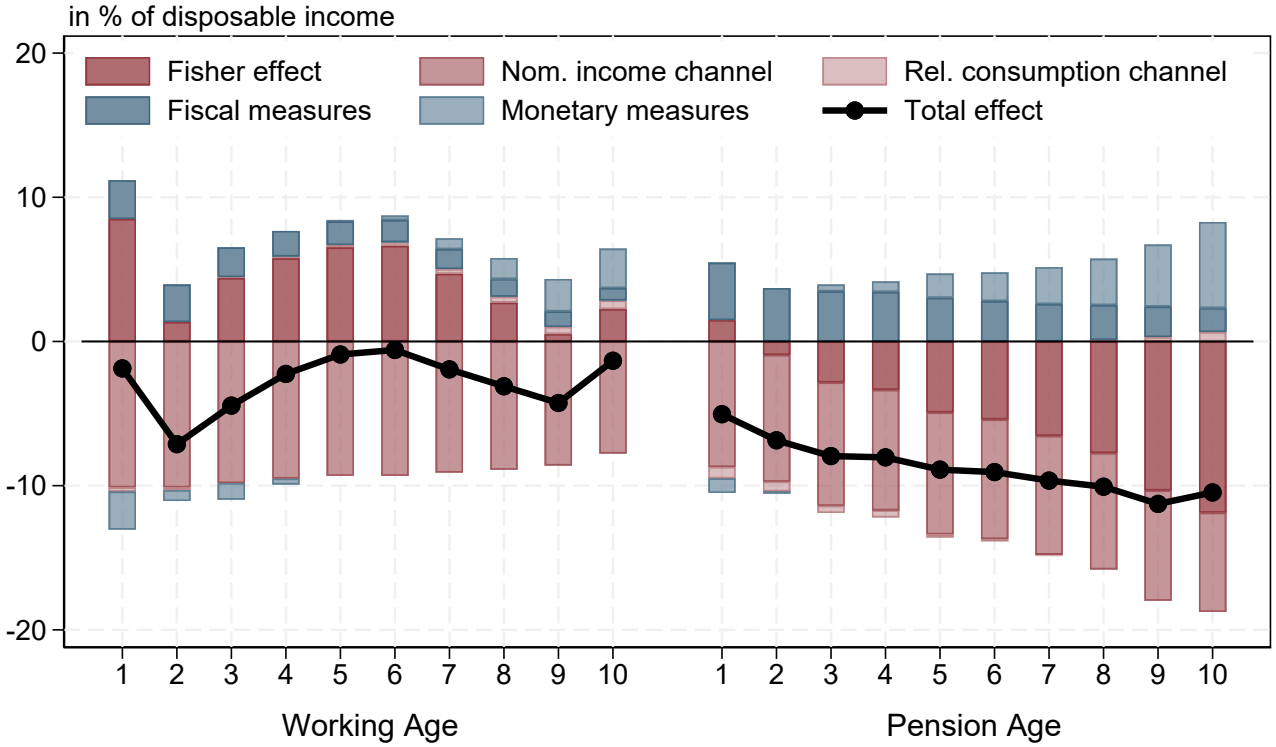


Notes: The figure shows the monetary loss from inflation as a share of disposable income through a revaluation of nominal assets (Fisher effect), nominal income and consumption, together with the effect resulting from fiscal and monetary responses. The figure shows the weighted average effects across the six selected countries.

on the other hand, benefit from a substantial devaluation of their nominal liabilities, leaving those households with an overall gain of around 8% of disposable income on average.

Net worth Figure 8 depicts the impact of the cost-of-living crisis along deciles of the net wealth distribution (rather than disposable income as in the baseline results). Most of the variations in the effects of inflation across wealth groups can be explained through differences in exposures through the revaluation of net nominal positions (the Fisher effect). Comparing the effects for the two age groups, results are similar to those presented in Figure (4): pension-age households face on average substantial losses through the Fisher effect, while working-age households tend to benefit from it. However, it can be seen from the figure that some pension-age individuals in low-wealth deciles gain from the Fisher effect, due to their negative nominal asset positions. For pension-age households, losses from inflation increase with the level of wealth, as wealthier individuals in this age group suffer more from the devaluation of their nominal asset holdings, which are increasing with wealth. For working-age households, the effects are non-monotonic across net wealth deciles, with middle-wealth households suffering

FIGURE 8: Effects of Cost-of-Living Crisis Across Net Wealth Deciles



Notes: The figure shows 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 by net wealth decile (HFCS variable DN3001), which is defined as total household assets (excluding public and occupational pension wealth) minus total outstanding household's liabilities. The figure shows the weighted average effects across the six selected countries.

the least from inflation. This result can be explained by the high proportion of households with mortgage holdings in middle-wealth groups, implying large gains from the Fisher effect.

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 underpin the heterogeneous impact of inflation on households: the Fisher channel, the nominal income channel, and the relative consumption channel. Furthermore, it accounts for the cushioning effect from fiscal policy interventions across the Eurozone and the consequences of interest rate increases by the European Central Bank.

Our results show that, across the Eurozone, the inflationary shock affected pension-age households the most, largely because of the devaluation of nominal wealth accumulated during the life-cycle. Differences in nominal balances and income growth further implied that the inflationary shock was regressive among working-age households. In most cases, the impact of

inflation through the Fisher and nominal income channels is an order of magnitude larger than the relative consumption channel. While fiscal policy came to the rescue through income support and price containment measures, pronounced losses remained among low-income and pension-age households.

Holding nominal assets and/or a mortgage are key determinants of the impact of the cost-of-living crisis for a household. A household with a mortgage will likely have benefited from the cost-of-living crisis thanks to the devaluation of a large, negative nominal asset position. Indeed, the size of the (outstanding) mortgage is typically several times the one of income and consumption, meaning that this effect largely dominates all others. Gains will be even larger for households with a fixed rate as they were protected from increasing interest rates. On the other hand, once we restrict the focus to the population without a mortgage, the losses of working-age and pension-age households become remarkably similar.

Our modelling ignores the general equilibrium effects of the shock, including the behavioural response of individuals. However, we believe that our approach helps to make the analysis more transparent as it relies on a clear identification of the direct effects of inflation on households, without the need to design a more complex model of the economy and specify the primitives of such a framework. 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. (7) and (9), let us first rewrite the household budget constraint (1) as:

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

where we have normalized P_{t-1} to one, $\omega_{j,k,t} \equiv \frac{(1+\tau^c_{k,t-1})P_{k,t-1}c_{j,k,t}}{P_{t-1}c_{j,t}}$ 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 household, 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.[25] We want to compute:

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

We now derive the inflation and interest rate components on the right-hand side 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 $\frac{1+\lambda\pi}{1+\pi} \approx 1+(\lambda-1)\pi$, $\pi \approx \tilde{\pi} + \Delta\tau^c$ and $\pi_j \approx \tilde{\pi}_j + \Delta\tau_j^c$ we get we get the following expression from differentiating (A.1) wrt $\tilde{\pi}$ and $\tilde{\pi}_k$:

$$da_{j,t}^{(\tilde{\pi})} = -\sum_{s\geq 0} Q_t^{(t+s)} B_{j,t-1}^{(t+s)} d\tilde{\pi} - c_{j.t}\Big(\sum_k \omega_{j,k,t} d\tilde{\pi}_k - d\tilde{\pi}\Big) + (\lambda_{j,t}-1) y_{j,t-1}^{(t)} d\tilde{\pi}$$

Using the NNP definition, together with $d\tilde{\pi}_j = \sum_k \omega_{j,k,t} d\tilde{\pi}_k$, we get Equ. (7) of the main text.

[25] 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.

Fiscal impact We consider the effects of changes in discretionary measures ("income-side measures") $\tilde{T}_{j,t}$, together with changes in consumption taxes ("price-side measures") on individual goods, $\tau^c_{k,t}$. Using $1+\pi_{k,t} = \frac{1+\tau^c_{k,t}}{1+\tau^c_{k,t-1}}\frac{P_{k,t}}{P_{k,t-1}} \approx \tau^c_{k,t} - \tau^c_{k,t-1} + \tilde{\pi}_{k,t}$, $1+\pi_t = \frac{1+\tau^c_t}{1+\tau^c_{t-1}}\frac{P_t}{P_{t-1}} \approx \tau^c_t - \tau^c_{t-1} + \tilde{\pi}_t$, we get the following expression from differentiating (A.1) wrt $\tau^c_{k,t}$, τ^c_t and $\tilde{T}_{j,t}$:

$$da^{(\tau)}_{j,t} = d\tilde{T}_{j,t} + c_{j.t}\Big(\sum_k \omega_{j,k,t} d\tau^c_k - d\tau^c\Big) + \Big(\sum_{s\geq 0} Q^{(t+s)}_t B^{(t+s)}_{j,t-1} + (1-\lambda_{j,t})y^{(t)}_{j,t-1}\Big)d\tau^c.$$

Re-arranging and using the NNP definition, we get equation (8) in the main text.

Interest rate impact To obtain $da^{(R)}_{j,t}$, 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.[26] 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 $Q^{(t+s)}_t$ for $s \geq 1$, which we normalise to one. In this case, the household budget constraint (A.1) can be written as:

$$\begin{aligned} a_{j,t} &= Q^{(t)}_t \left[y_{j,t} + b^{(t)}_{j,t-1} + \frac{1}{1+\pi_t} B^{(t)}_{j,t-1} + \tilde{T}_{j,t} - c_{j,t} \sum_k \omega_{j,k,t} \frac{1+\pi_{k,t}}{1+\pi_t} \right] \\ &\quad + \frac{1}{1+\pi_t} \sum_{s\geq 1} Q^{(t+s)}_t B^{(t+s)}_{j,t-1} + \sum_{s\geq 1} (1+\overline{\pi})^s q^{(t+s)}_t b^{(t+s)}_{j,t-1} \\ &= Q^{(t)}_t URE_{j,t} + \frac{1}{1+\pi_t} \sum_{s\geq 1} Q^{(t+s)}_t B^{(t+s)}_{j,t-1} + \sum_{s\geq 1} (1+\overline{\pi})^s q^{(t+s)}_t b^{(t+s)}_{j,t-1} \end{aligned}$$

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

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

which is the equation stated in the main text.

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

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 that were used to construct the NAP based on HFCS data.

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 that 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, applied 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'. Wealthy HtM have a positive net illiquid wealth balance, while poor HtM have zero or negative net illiquid wealth balances.

C Additional Tables

C.1 Population Distribution Across Income Deciles in Individual Countries

France

TABLE A.3: Population Distribution Across Income Deciles in France

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	7.82%	5.91%	6.12%	6.62%	6.28%	6.68%	7.14%	7.54%	7.87%	8.03%
		RA	2.19%	4.09%	3.94%	3.31%	3.75%	3.29%	2.86%	2.45%	2.14%	1.96%
B	Home-owner	WA	2.04%	1.50%	1.91%	2.51%	3.09%	3.75%	5.06%	5.88%	6.94%	7.43%
		RA	1.26%	1.82%	2.28%	2.39%	3.01%	2.84%	2.58%	2.31%	1.89%	1.91%
	Non owner	WA	5.78%	4.41%	4.21%	4.11%	3.19%	2.93%	2.09%	1.66%	0.92%	0.60%
		RA	0.94%	2.27%	1.66%	0.91%	0.74%	0.45%	0.28%	0.14%	0.25%	0.05%
C	Mortgage	WA	0.50%	0.51%	0.93%	1.27%	1.79%	2.24%	3.20%	3.78%	4.43%	5.05%
		RA	0.04%	0.07%	0.08%	0.09%	0.15%	0.11%	0.25%	0.20%	0.22%	0.26%
	No mortgage	WA	1.54%	0.99%	0.98%	1.24%	1.30%	1.51%	1.85%	2.10%	2.52%	2.38%
		RA	1.21%	1.75%	2.20%	2.30%	2.86%	2.73%	2.34%	2.11%	1.68%	1.65%
	Non owner	WA	5.78%	4.41%	4.21%	4.11%	3.19%	2.93%	2.09%	1.66%	0.92%	0.60%
		RA	0.94%	2.27%	1.66%	0.91%	0.74%	0.45%	0.28%	0.14%	0.25%	0.05%
D	AR mortgage	WA	0.04%	0.01%	0.07%	0.09%	0.10%	0.07%	0.19%	0.23%	0.22%	0.28%
		RA	0.00%	0.00%	0.00%	0.03%	0.02%	0.00%	0.00%	0.01%	0.01%	0.00%
	FR mortgage	WA	0.46%	0.50%	0.85%	1.18%	1.69%	2.17%	3.02%	3.55%	4.20%	4.77%
		RA	0.04%	0.07%	0.08%	0.06%	0.14%	0.11%	0.25%	0.19%	0.20%	0.26%
E	Poor HTM	WA	1.73%	1.68%	1.36%	1.17%	0.85%	0.80%	0.47%	0.33%	0.15%	0.04%
		RA	0.27%	0.57%	0.49%	0.25%	0.16%	0.14%	0.03%	0.03%	0.04%	0.00%
	Wealthy HTM	WA	1.14%	0.82%	1.07%	1.41%	1.88%	2.11%	2.58%	2.84%	2.88%	2.83%
		RA	0.22%	0.37%	0.49%	0.36%	0.33%	0.25%	0.30%	0.15%	0.16%	0.14%
	Non HTM	WA	4.94%	3.40%	3.69%	4.04%	3.55%	3.77%	4.10%	4.38%	4.84%	5.16%
		RA	1.70%	3.15%	2.96%	2.70%	3.26%	2.91%	2.52%	2.27%	1.94%	1.82%
F	Effective π	WA	15.07%	15.01%	14.97%	15.06%	14.93%	14.89%	14.81%	14.65%	14.49%	14.41%
		RA	16.64%	16.48%	16.45%	16.14%	16.04%	15.88%	15.91%	15.77%	15.16%	15.24%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

Germany

TABLE A.4: Population Distribution Across Income Deciles in Germany

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	7.22%	5.21%	5.58%	6.33%	6.63%	7.14%	7.87%	8.49%	8.67%	8.66%
		RA	2.79%	4.80%	4.43%	3.70%	3.37%	2.81%	2.13%	1.56%	1.28%	1.32%
B	Home-owner	WA	0.56%	0.74%	1.64%	2.00%	2.57%	3.05%	4.18%	5.65%	6.34%	7.29%
		RA	0.78%	1.35%	2.30%	2.29%	1.86%	2.06%	1.56%	1.24%	1.09%	1.22%
	Non owner	WA	6.66%	4.46%	3.94%	4.32%	4.06%	4.09%	3.69%	2.84%	2.33%	1.37%
		RA	2.01%	3.44%	2.14%	1.41%	1.51%	0.74%	0.57%	0.32%	0.19%	0.11%
C	Mortgage	WA	0.16%	0.15%	0.57%	0.56%	1.11%	1.80%	2.42%	3.05%	4.20%	4.57%
		RA	0.09%	0.10%	0.15%	0.28%	0.27%	0.27%	0.15%	0.27%	0.32%	0.37%
	No mortgage	WA	0.40%	0.59%	1.07%	1.44%	1.45%	1.25%	1.76%	2.60%	2.14%	2.72%
		RA	0.69%	1.26%	2.14%	2.02%	1.59%	1.79%	1.40%	0.97%	0.77%	0.84%
	Non owner	WA	6.66%	4.46%	3.94%	4.32%	4.06%	4.09%	3.69%	2.84%	2.33%	1.37%
		RA	2.01%	3.44%	2.14%	1.41%	1.51%	0.74%	0.57%	0.32%	0.19%	0.11%
D	AR mortgage	WA	0.06%	0.02%	0.25%	0.04%	0.29%	0.34%	0.25%	0.56%	0.50%	0.57%
		RA	0.02%	0.00%	0.02%	0.03%	0.01%	0.00%	0.03%	0.02%	0.01%	0.04%
	FR mortgage	WA	0.10%	0.13%	0.32%	0.52%	0.82%	1.46%	2.17%	2.49%	3.70%	4.00%
		RA	0.07%	0.09%	0.14%	0.25%	0.26%	0.27%	0.13%	0.26%	0.30%	0.33%
E	Poor HTM	WA	1.95%	1.56%	1.03%	0.99%	0.42%	0.49%	0.51%	0.30%	0.07%	0.07%
		RA	0.54%	1.31%	0.55%	0.21%	0.22%	0.08%	0.03%	0.05%	0.00%	0.00%
	Wealthy HTM	WA	0.36%	0.74%	1.27%	1.29%	2.13%	1.90%	1.96%	2.49%	2.37%	2.37%
		RA	0.17%	0.11%	0.38%	0.28%	0.30%	0.25%	0.09%	0.14%	0.08%	0.15%
	Non HTM	WA	4.91%	2.91%	3.29%	4.04%	4.07%	4.75%	5.39%	5.70%	6.24%	6.23%
		RA	2.08%	3.38%	3.50%	3.21%	2.85%	2.48%	2.00%	1.38%	1.20%	1.17%
F	Effective π	WA	18.72%	18.05%	17.69%	17.53%	17.39%	17.30%	17.29%	17.21%	17.01%	16.54%
		RA	18.98%	18.48%	18.08%	17.99%	17.81%	17.58%	17.39%	16.82%	16.39%	15.75%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

Greece

TABLE A.5: Population Distribution Across Income Deciles in Greece

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	6.64%	4.75%	5.88%	5.54%	6.55%	5.94%	6.61%	7.32%	7.84%	8.30%
		RA	3.37%	5.25%	4.13%	4.47%	4.06%	3.52%	3.33%	2.66%	2.15%	1.69%
B	Home-owner	WA	3.59%	2.84%	3.21%	3.33%	4.11%	4.77%	4.89%	6.22%	6.27%	7.84%
		RA	2.61%	4.33%	3.57%	4.15%	3.69%	3.36%	3.31%	2.62%	2.11%	1.58%
	Non owner	WA	2.84%	1.92%	2.68%	2.23%	2.46%	1.19%	1.74%	1.12%	1.59%	0.48%
		RA	0.74%	0.93%	0.57%	0.33%	0.38%	0.16%	0.03%	0.05%	0.04%	0.12%
C	Mortgage	WA	0.85%	0.34%	0.71%	0.71%	0.68%	0.67%	0.86%	1.58%	1.05%	1.84%
		RA	0.09%	0.08%	0.07%	0.15%	0.23%	0.16%	0.04%	0.18%	0.11%	0.31%
	No mortgage	WA	2.74%	2.50%	2.50%	2.62%	3.43%	4.10%	4.02%	4.64%	5.22%	6.00%
		RA	2.52%	4.25%	3.50%	4.00%	3.46%	3.20%	3.27%	2.44%	2.00%	1.26%
	Non owner	WA	2.84%	1.92%	2.68%	2.23%	2.46%	1.19%	1.74%	1.12%	1.59%	0.48%
		RA	0.74%	0.93%	0.57%	0.33%	0.38%	0.16%	0.03%	0.05%	0.04%	0.12%
D	AR mortgage	WA	0.39%	0.16%	0.44%	0.39%	0.34%	0.36%	0.49%	0.74%	0.58%	1.01%
		RA	0.07%	0.03%	0.03%	0.05%	0.04%	0.09%	0.04%	0.07%	0.00%	0.06%
	FR mortgage	WA	0.47%	0.17%	0.27%	0.32%	0.34%	0.32%	0.37%	0.84%	0.47%	0.84%
		RA	0.02%	0.05%	0.04%	0.11%	0.19%	0.07%	0.00%	0.10%	0.11%	0.25%
E	Poor HTM	WA	1.59%	1.20%	1.87%	1.45%	1.26%	0.55%	1.16%	0.57%	0.68%	0.17%
		RA	0.38%	0.52%	0.20%	0.25%	0.17%	0.09%	0.00%	0.01%	0.04%	0.00%
	Wealthy HTM	WA	2.42%	1.68%	1.71%	1.35%	1.86%	1.77%	2.31%	2.89%	2.63%	2.91%
		RA	1.84%	2.32%	1.48%	1.84%	1.53%	1.33%	0.83%	0.89%	0.81%	0.39%
	Non HTM	WA	1.13%	2.42%	2.45%	2.40%	2.37%	2.11%	2.51%	1.76%	1.31%	1.31%
		RA	3.72%	1.88%	3.57%	3.03%	3.51%	3.56%	3.79%	4.33%	4.41%	5.44%
F	Effective π	WA	16.49%	16.12%	16.14%	16.05%	15.87%	15.70%	15.45%	15.30%	15.12%	14.51%
		RA	17.52%	17.42%	17.09%	17.06%	16.77%	16.39%	16.29%	16.22%	15.93%	15.56%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

Italy

TABLE A.6: Population Distribution Across Income Deciles in Italy

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	6.33%	4.11%	5.36%	6.06%	6.50%	6.40%	6.80%	7.23%	7.62%	7.76%
		RA	3.68%	5.93%	4.60%	3.94%	3.50%	3.61%	3.20%	2.80%	2.35%	2.23%
B	Home-owner	WA	2.65%	1.44%	2.72%	3.10%	3.60%	4.29%	4.99%	5.79%	6.58%	7.26%
		RA	2.30%	4.08%	3.25%	3.07%	2.98%	2.87%	2.82%	2.61%	2.18%	2.06%
	Non owner	WA	3.67%	2.67%	2.63%	2.96%	2.90%	2.11%	1.81%	1.44%	1.04%	0.50%
		RA	1.38%	1.85%	1.35%	0.87%	0.52%	0.74%	0.38%	0.19%	0.17%	0.17%
C	Mortgage	WA	0.28%	0.10%	0.68%	0.42%	0.40%	0.51%	1.02%	1.10%	1.56%	2.30%
		RA	0.01%	0.04%	0.03%	0.03%	0.06%	0.06%	0.07%	0.11%	0.05%	0.09%
	No mortgage	WA	2.37%	1.34%	2.04%	2.68%	3.20%	3.78%	3.97%	4.69%	5.03%	4.96%
		RA	2.29%	4.05%	3.21%	3.04%	2.92%	2.81%	2.76%	2.50%	2.13%	1.97%
	Non owner	WA	3.67%	2.67%	2.63%	2.96%	2.90%	2.11%	1.81%	1.44%	1.04%	0.50%
		RA	1.38%	1.85%	1.35%	0.87%	0.52%	0.74%	0.38%	0.19%	0.17%	0.17%
D	AR mortgage	WA	0.06%	0.09%	0.36%	0.17%	0.26%	0.29%	0.51%	0.58%	0.79%	1.29%
		RA	0.01%	0.00%	0.01%	0.00%	0.02%	0.00%	0.03%	0.04%	0.01%	0.01%
	FR mortgage	WA	0.22%	0.01%	0.32%	0.25%	0.14%	0.22%	0.51%	0.52%	0.77%	1.01%
		RA	0.00%	0.04%	0.03%	0.03%	0.04%	0.05%	0.04%	0.06%	0.05%	0.08%
E	Poor HTM	WA	2.74%	1.42%	0.91%	0.76%	0.44%	0.24%	0.42%	0.12%	0.15%	0.06%
		RA	0.45%	0.58%	0.43%	0.19%	0.12%	0.19%	0.13%	0.01%	0.12%	0.00%
	Wealthy HTM	WA	1.62%	0.62%	1.23%	1.13%	0.84%	1.02%	1.41%	1.04%	1.38%	1.52%
		RA	1.02%	0.98%	0.52%	0.30%	0.43%	0.22%	0.19%	0.25%	0.25%	0.13%
	Non HTM	WA	1.97%	2.06%	3.21%	4.17%	5.22%	5.14%	4.97%	6.06%	6.09%	6.16%
		RA	2.21%	4.38%	3.66%	3.45%	2.95%	3.20%	2.89%	2.54%	1.98%	2.10%
F	Effective π	WA	20.84%	18.56%	18.03%	17.73%	17.10%	16.53%	16.38%	15.75%	15.33%	14.74%
		RA	21.15%	19.90%	19.15%	18.62%	18.28%	17.71%	16.76%	16.68%	16.14%	15.63%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

Portugal

TABLE A.7: Population Distribution Across Income Deciles in Portugal

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	4.80%	4.21%	5.72%	5.49%	7.51%	7.27%	8.02%	8.40%	8.21%	8.17%
		RA	5.22%	5.78%	4.33%	4.45%	2.54%	2.74%	1.92%	1.61%	1.80%	1.82%
B	Home-owner	WA	2.24%	2.40%	3.69%	3.85%	5.32%	5.67%	6.57%	7.56%	7.13%	7.76%
		RA	3.78%	4.12%	3.37%	3.66%	2.30%	2.44%	1.79%	1.53%	1.61%	1.71%
	Non owner	WA	2.57%	1.81%	2.03%	1.65%	2.19%	1.60%	1.46%	0.85%	1.07%	0.41%
		RA	1.44%	1.66%	0.96%	0.79%	0.24%	0.30%	0.13%	0.08%	0.19%	0.11%
C	Mortgage	WA	0.80%	0.89%	2.00%	1.96%	3.15%	3.63%	3.99%	5.31%	4.88%	5.50%
		RA	0.15%	0.16%	0.16%	0.17%	0.08%	0.17%	0.17%	0.30%	0.30%	0.33%
	No mortgage	WA	1.44%	1.50%	1.69%	1.89%	2.17%	2.03%	2.58%	2.25%	2.25%	2.26%
		RA	3.63%	3.96%	3.21%	3.48%	2.23%	2.28%	1.62%	1.23%	1.31%	1.38%
	Non owner	WA	2.57%	1.81%	2.03%	1.65%	2.19%	1.60%	1.46%	0.85%	1.07%	0.41%
		RA	1.44%	1.66%	0.96%	0.79%	0.24%	0.30%	0.13%	0.08%	0.19%	0.11%
D	AR mortgage	WA	0.76%	0.84%	1.81%	1.70%	2.54%	3.20%	3.16%	4.76%	4.37%	4.47%
		RA	0.13%	0.11%	0.10%	0.15%	0.05%	0.06%	0.12%	0.23%	0.15%	0.20%
	FR mortgage	WA	0.04%	0.05%	0.19%	0.26%	0.62%	0.44%	0.83%	0.55%	0.51%	1.03%
		RA	0.03%	0.05%	0.06%	0.02%	0.03%	0.11%	0.04%	0.06%	0.15%	0.13%
E	Poor HTM	WA	1.50%	0.87%	0.88%	0.63%	0.84%	0.49%	0.29%	0.22%	0.33%	0.02%
		RA	0.63%	0.69%	0.42%	0.17%	0.02%	0.07%	0.04%	0.02%	0.00%	0.00%
	Wealthy HTM	WA	1.00%	1.33%	2.25%	1.68%	3.15%	3.35%	3.28%	3.91%	3.15%	2.72%
		RA	0.85%	0.92%	0.48%	0.40%	0.22%	0.60%	0.23%	0.14%	0.26%	0.15%
	Non HTM	WA	2.30%	2.01%	2.59%	3.19%	3.51%	3.43%	4.45%	4.27%	4.73%	5.42%
		RA	3.75%	4.17%	3.44%	3.88%	2.30%	2.08%	1.65%	1.44%	1.54%	1.67%
F	Effective π	WA	14.72%	14.73%	14.55%	14.55%	14.43%	14.21%	14.13%	13.99%	13.86%	13.66%
		RA	14.84%	15.19%	14.88%	15.04%	14.48%	14.59%	14.34%	14.27%	14.37%	13.82%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

Spain

TABLE A.8: Population Distribution Across Income Deciles in Spain

		Decile	1	2	3	4	5	6	7	8	9	10
A	All	WA	7.77%	3.89%	6.15%	6.15%	7.31%	6.82%	7.72%	7.75%	7.91%	8.27%
		RA	2.27%	6.07%	3.96%	3.90%	2.53%	3.18%	2.29%	2.36%	1.98%	1.72%
B	Home-owner	WA	3.46%	2.75%	3.95%	4.46%	5.31%	5.77%	6.57%	6.97%	7.44%	7.59%
		RA	1.61%	4.92%	3.41%	3.35%	2.37%	2.95%	2.18%	2.28%	1.92%	1.71%
	Non owner	WA	4.25%	1.15%	2.21%	1.69%	2.01%	1.06%	1.16%	0.79%	0.48%	0.69%
		RA	0.60%	1.16%	0.56%	0.56%	0.17%	0.23%	0.11%	0.08%	0.06%	0.01%
C	Mortgage	WA	1.16%	1.16%	1.63%	2.42%	3.41%	3.30%	3.96%	4.43%	5.47%	4.77%
		RA	0.08%	0.21%	0.21%	0.25%	0.19%	0.23%	0.28%	0.22%	0.52%	0.43%
	No mortgage	WA	2.30%	1.59%	2.32%	2.04%	1.91%	2.47%	2.61%	2.54%	1.97%	2.82%
		RA	1.52%	4.71%	3.20%	3.10%	2.17%	2.72%	1.90%	2.06%	1.40%	1.28%
	Non owner	WA	4.25%	1.15%	2.21%	1.69%	2.01%	1.06%	1.16%	0.79%	0.48%	0.69%
		RA	0.60%	1.16%	0.56%	0.56%	0.17%	0.23%	0.11%	0.08%	0.06%	0.01%
D	AR mortgage	WA	0.88%	0.80%	1.18%	1.94%	2.44%	2.59%	2.79%	3.26%	4.01%	3.03%
		RA	0.01%	0.08%	0.08%	0.09%	0.14%	0.06%	0.15%	0.10%	0.18%	0.06%
	FR mortgage	WA	0.28%	0.35%	0.45%	0.48%	0.97%	0.70%	1.17%	1.17%	1.46%	1.74%
		RA	0.07%	0.12%	0.14%	0.16%	0.06%	0.17%	0.13%	0.12%	0.34%	0.37%
E	Poor HTM	WA	2.22%	0.57%	0.94%	0.79%	0.70%	0.39%	0.33%	0.11%	0.02%	0.02%
		RA	0.30%	0.37%	0.18%	0.13%	0.07%	0.06%	0.01%	0.04%	0.02%	0.01%
	Wealthy HTM	WA	1.76%	1.45%	1.65%	2.33%	3.11%	2.88%	3.61%	3.32%	3.49%	2.81%
		RA	0.35%	0.84%	0.58%	0.50%	0.27%	0.46%	0.27%	0.20%	0.26%	0.18%
	Non HTM	WA	3.72%	1.88%	3.57%	3.03%	3.51%	3.56%	3.79%	4.33%	4.41%	5.44%
		RA	1.56%	4.87%	3.21%	3.28%	2.20%	2.67%	2.02%	2.12%	1.70%	1.53%
F	Effective π	WA	13.59%	13.23%	12.87%	12.94%	12.75%	12.61%	12.73%	12.58%	12.52%	12.27%
		RA	14.09%	13.88%	13.51%	13.72%	13.48%	13.45%	13.28%	13.05%	12.95%	12.70%

Notes: WA: Working-age (<65 years old) individuals, RA: Retirement-age (65+ years old) individuals.

D Additional Figures

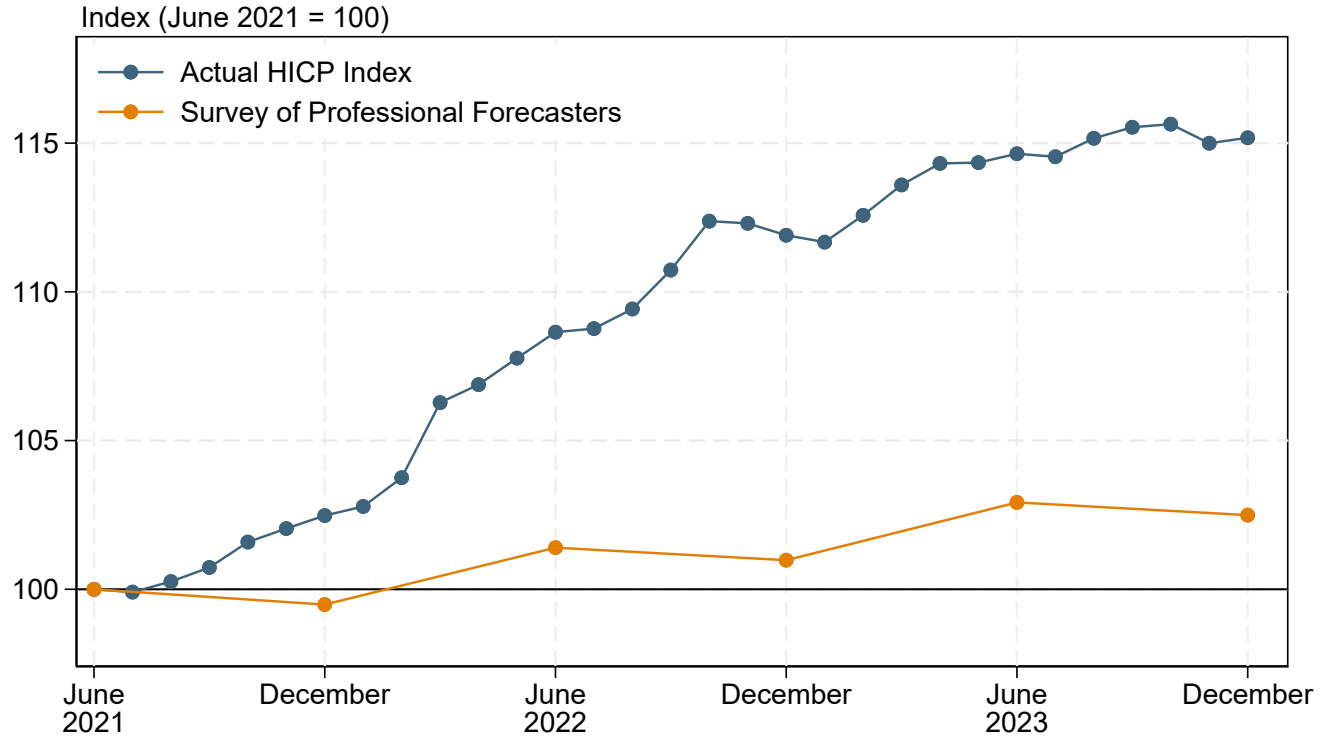
D.1 Actual and Expected Inflation Dynamics in the Euro Area

Figure (A.1) compares the realised path of inflation in the Euro Area during the period of our analysis (between June 2021 and December 2023) with the path implied by forecasts from the Survey of Professional Forecasters (SPF). We use forecasts from the SPF in the third quarter of 2021. Given that surveys among forecasters are conducted at the beginning of the respective quarter, this allows us to be as close as possible to the state of the knowledge about the Euro Area economy and expected price dynamics in June 2021.

The mean point estimates of forecast inflation one and two years ahead from mid-2021 among the surveyed forecasters were 1.4% and 1.5%, respectively. With the value of the index normalized to 100 in mid-2021, this yields values of the index in mid-2022 and mid-2023 of $100 \times 1.014 = 101.4$ and $100 \times 1.014 \times 1.015 = 102.921$, respectively.

From the realized inflation in the first half of 2021, which we assume to be known to all surveyed forecasters, and the forecast inflation for the entire year of 2021, we can infer the forecast inflation in the second half of 2021. While the mean point estimate for inflation in 2021 was 1.9%, prices had risen already by 2.43% since December 2020 until June 2021, suggesting that forecasters expected the HICP index to decline by around 0.513% in the second half of 2021. In terms of the price index, this is equivalent to a reading of 99.487 in December 2021. With an average expected inflation of 1.5% in both calendar years of 2022 and 2023, this yields values of the forecast price index of $99.487 \times 1.015 = 100.979$ and $99.487 \times 1.015 \times 1.015 = 102.494$. Thus, the cumulative price increase between June 2021 and December 2023, as forecast by the respondents of the SPF in the third quarter of 2021, was 2.494%.

FIGURE A.1: Actual vs. Expected Inflation Dynamics

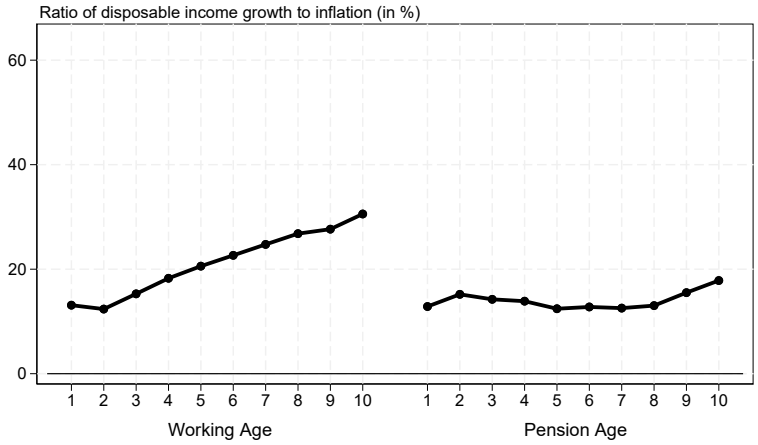


Notes: The blue line depicts the actual evolution of the HICP index for the Euro Area between June 2021 and December 2023, normalising its value in June 2021 to 100. The orange line makes use of the 2021Q3 wave of the Survey of Professional Forecasters (SPF) to infer the forecast price dynamics over the same time period.

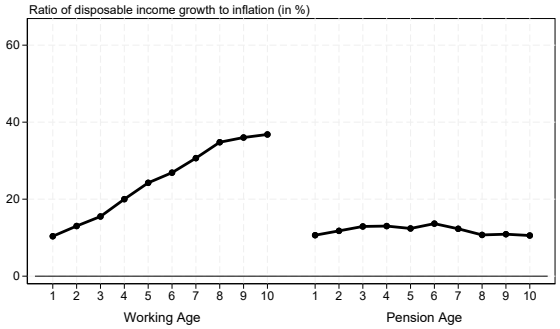
D.2 Other figures

FIGURE A.2: Ratio of Disposable Income Growth to Inflation (λ)

(A) Eurozone



(B) France

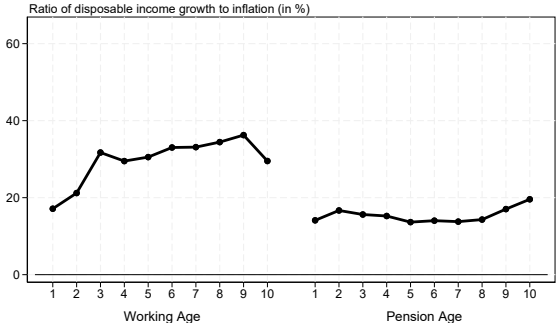


(C) Germany

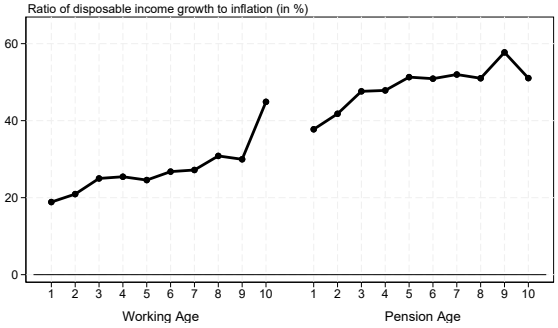
(D) Greece

(E) Italy

(F) Portugal

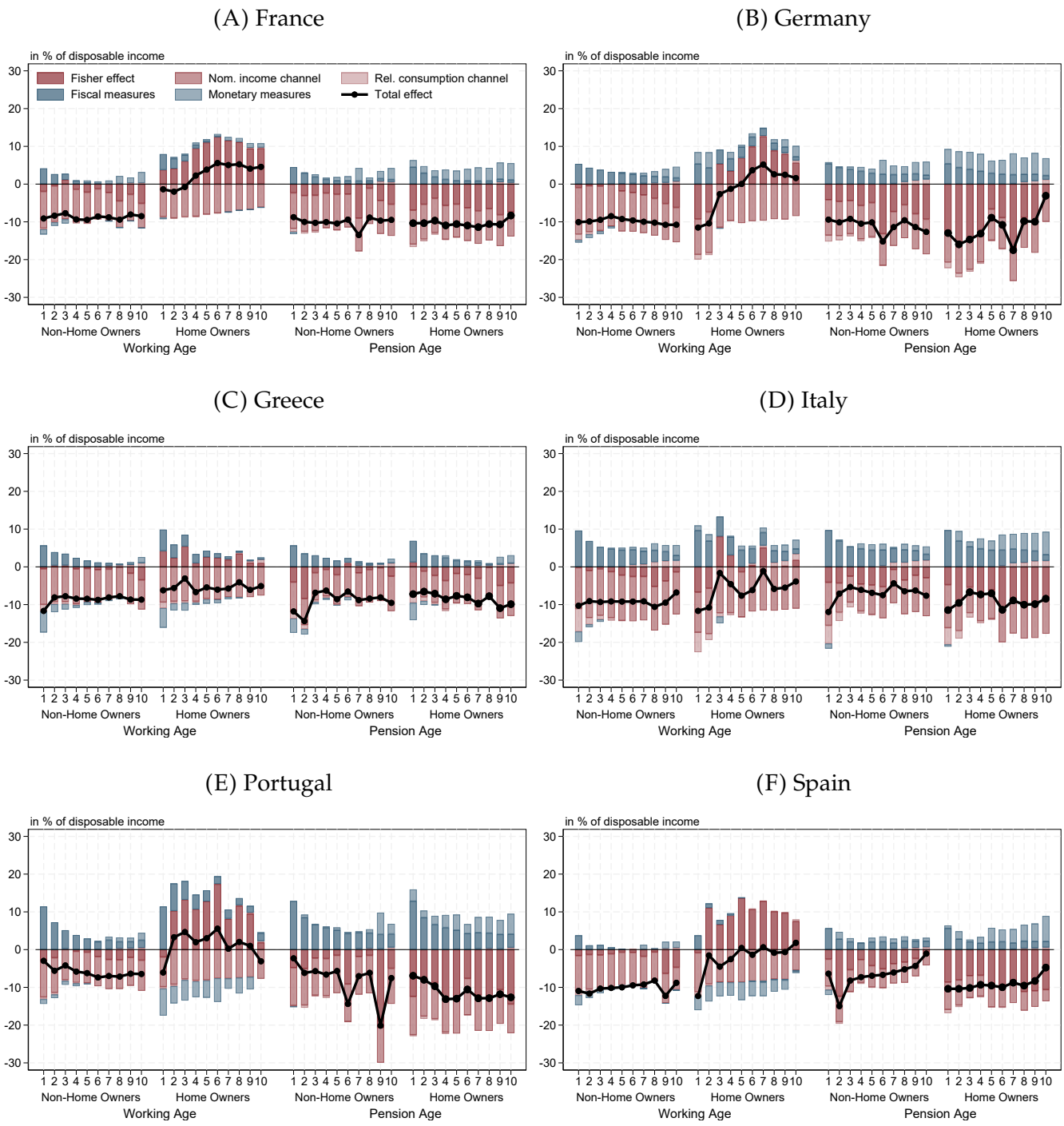


(G) Spain



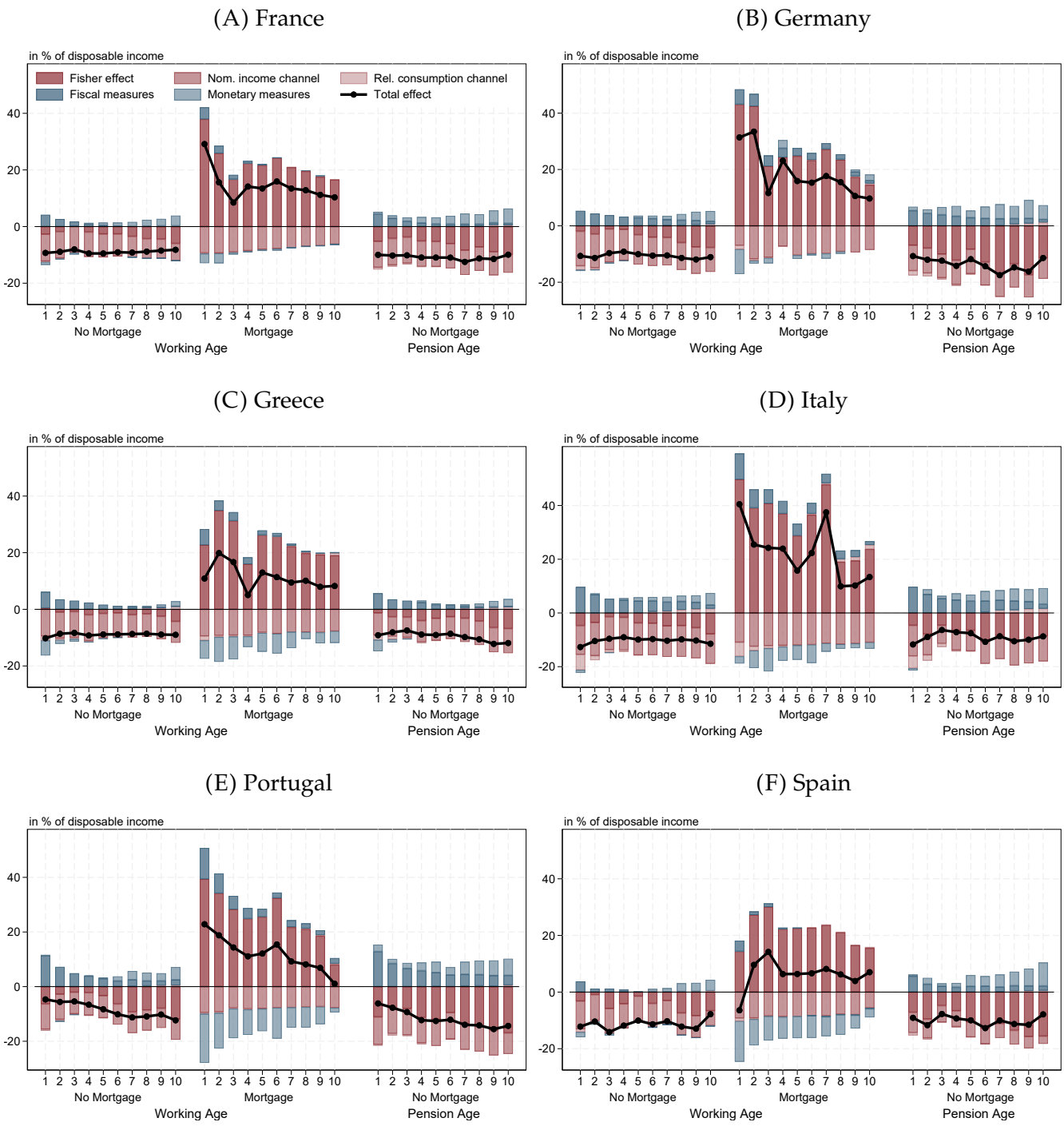
Notes: The figure shows for each income decile and for the working-age and pension-age population the ratio of growth in disposable income over the cumulative inflation at constant tax rates. Panel (A.2A) shows the weighted average across the six selected countries.

FIGURE A.3: Effects of Cost-of-Living Crisis Across Population Subgroups and Housing Status by Country



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.

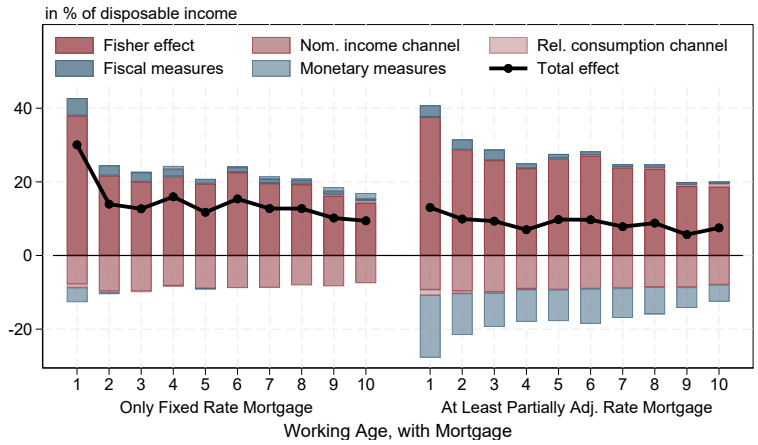
FIGURE A.4: Effects of the Cost-of-Living Crisis Across Population Subgroups and Mortgage Status by Country



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.

FIGURE A.5: Effects of the Cost-of-Living Crisis Across Population Subgroups and Mortgage Type by Country

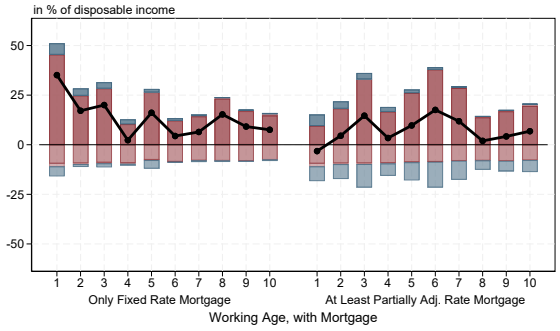
(A) Eurozone



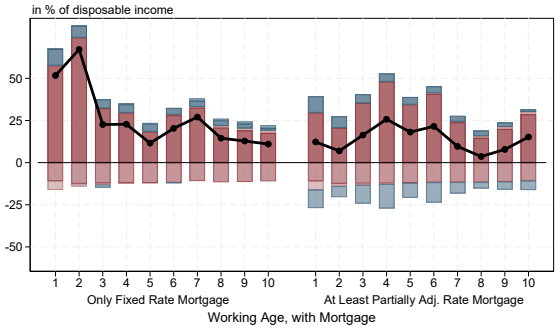
(B) France

(C) Germany

(D) Greece



(E) Italy



(F) Portugal

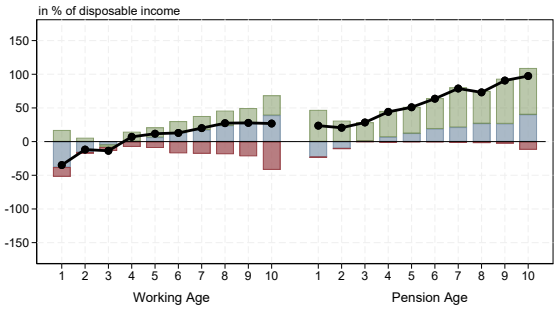
(G) Spain

Notes: The figure shows 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. Panel (A.5A) shows the weighted average effects across the six selected countries.

FIGURE A.6: Decomposition of the Unhedged Interest Rate Exposure (URE)

(A) Eurozone

(B) France



(C) Germany

(D) Greece

(E) Italy

(F) Portugal

(G) Spain

Notes: The figure shows for each income decile and separately for the working and retirement-age the decomposition of the URE. Panel (A.6A) 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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