INFLATION, FISCAL POLICY AND INEQUALITY. THE DISTRIBUTIONAL IMPACT OF FISCAL MEASURES TO COMPENSATE FOR CONSUMER INFLATION

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Abstract

This paper analyses the distributional impact of high consumer inflation in the euro area and government measures to compensate households in 2022. The study uses the tax-benefit microsimulation model for the European Union (EUROMOD) with microdata as the input – EU statistics on income and living conditions (EU-SILC) and household budget surveys (HBS) – to quantify the distributional impact of inflation, income support measures and measures aimed at containing prices. The analysis confirms that purchasing power and welfare were more severely affected by the 2022 inflation surge among lower-income households than among higher-income households. Fiscal measures compensated households for about a third of their welfare loss, though with significant differences across countries. At the same time, fiscal measures reduced the inequality gap between lower and higher-income households by around 60%. Most fiscal measures were not particularly well targeted at low-income households, resulting in a higher than necessary fiscal burden to cushion the distributional impact of the inflationary shock.

Keywords: inflation, fiscal policy, distributional effect, welfare effect, EUROMOD.

JEL classification: D12, D31, D60, E31, H20, I30.

Resumen

En este documento se analiza el impacto distributivo de la elevada inflación experimentada por los consumidores en la eurozona y las medidas que los Gobiernos han implementado para compensar a los hogares en 2022. El estudio utiliza el modelo de microsimulación de impuestos y beneficios para la Unión Europea (EUROMOD) basado en microdatos —estadísticas de la Unión Europea sobre la renta y las condiciones de vida (EU-SILC) y encuestas de presupuestos familiares (HBS)— para cuantificar el impacto distributivo de la inflación, de las medidas de apoyo a la renta de los hogares y de las medidas destinadas a contener los precios. El análisis confirma que el poder adquisitivo y la métrica de bienestar se vieron más gravemente afectados por el aumento de la inflación de 2022 en los hogares de menores ingresos que en los hogares de mayores ingresos. Las medidas fiscales compensaron a los hogares en alrededor de un tercio de su pérdida de bienestar, aunque con diferencias significativas entre países. Al mismo tiempo, las medidas fiscales cerraron alrededor del 60 % de la brecha de desigualdad que había entre los hogares de menores ingresos y los de mayores ingresos. La mayoría de las medidas fiscales no estaban bien focalizadas en los hogares de bajos ingresos, lo que dio lugar a un coste fiscal superior al necesario para amortiguar el impacto distributivo del *shock* inflacionario.

Palabras clave: inflación, política fiscal, efecto distributivo, efecto bienestar, EUROMOD.

Códigos JEL: D12, D31, D60, E31, H20, I30.

Índice

Non-technical summary

It is well known that high inflation has a detrimental impact on the purchasing power and welfare of households. Lower-income households tend to be more strongly affected, particularly in the case of the recent surge in energy and food prices. As a response to this surge in prices since 2021, governments adopted a large array of tax and expenditure measures to cushion the impact of the inflationary shock on households and firms. Often, these measures explicitly aimed to limit an increase in social inequality. In the euro area, discretionary fiscal measures, particularly in response to the energy and food inflation shock, are estimated to have been close to 2% of gross domestic product (GDP) in 2022 alone. Around half of the government measures are aimed at supporting household income ("income measures"), while the other half are aimed at containing the increase of prices ("price measures").

This paper assesses the impact of the inflationary shock and the fiscal policy response on the welfare distribution of households in the euro area. It uses the sample of the four large euro area countries – Germany, Spain, France and Italy – as well as Portugal and Greece. These six countries covered about 80% of the population of the euro area and more than three-quarters of euro area GDP in 2022.

Using EUROMOD and its Indirect Tax Tool (ITT) extension, we can simulate the impact of inflation on households' income distribution and analyse the counteracting effect of inflation compensation measures (ICMs) introduced by governments on household income and welfare in 2022. Microsimulation models allow for a very precise calculation of household-specific income and consumption, but do not account for general equilibrium or behavioural effects. While a growing number of contributions are investigating the impact of the inflationary shock in EU countries, to the best of our knowledge this paper is the first to assess the cushioning effect of the policy measures in a comparative way across euro area economies.

Simulations show that average consumer inflation in the euro area in 2022 would have been 1.6 percentage points higher without the government price measures alone. At the same time, we estimate that equivalised disposable household incomes in the euro area increased by 4.4% in 2022.[1] Government income support measures to compensate for high consumer price inflation contributed 1 percentage point to this increase.[2] Overall, fiscal measures compensated households for about one-third of their welfare loss on average.

We find that government price and income measures changed the distributional impact of the inflationary shock across households. A comparison with the assessed impact

1 Equivalised disposable income is the total income of a household, after tax and other deductions, divided by the number of adult household members.

2 The remaining 3.4% is made up of increases in market incomes (2.3%) and non-inflation-related income measures (1.1%).

of counterfactual inflation rates, i.e. inflation rates in the absence of price measures, reveals that the inflation rate differential between the richest and poorest deciles of the income distribution would have amounted to 0.7 percentage points. The government measures implemented on the price side reduced this inflation gap by half. Looking at nominal income growth distribution in 2022, richer households benefited mainly from growth in salaries, wages and pensions. At the same time, fiscal measures – both those implemented as a response to the inflation surge and non-related policies – were the most important contributors to disposable income growth among poorer households.

Our analysis underscores the importance of accounting for differences in consumption share of income together with differences in consumption composition across households. The differences in consumption composition mean that households face different effective rates of inflation, while a high consumption share of income means that poorer households that consume a larger share of their income are more severely affected by the increase in consumer prices. Taking account of the consumption share of income points to a much larger welfare gap of 8.4 percentage points between the lowest and highest income deciles as a result of the inflation surge. However, more than half of this was closed thanks to ICMs.

The inflationary shock played out quite differently across countries. Consumer inflation differed significantly across euro area countries in 2022. Model simulations suggest that it was more than twice as high in Germany as in France, for example. Similarly, the distributional impact of the inflation surge in 2022 varied across countries. The welfare loss prior to government measures was four times higher among the poorest than among the richest households in Italy, while it was only two times higher in France. Also, government responses to the inflation surge varied widely across countries. While some countries placed a strong focus on containing price increases (e.g. Greece), others took more measures to support households via transfer payments (e.g. Portugal). Notably, the adverse effect of the inflationary shock in inequality was broadly offset in all countries, with the exceptions of Germany and Spain.

Finally, the paper shows that both price and income measures helped to reduce the rise in inequality stemming from the consumer price inflation surge. However, given that price measures are far more difficult to target at vulnerable households, income measures are more effective in terms of reducing inequality. As a result, the fiscal cost of ICMs as a percentage of GDP was much higher in countries that focused on price measures than in those that employed income measures.

1 Introduction

High inflation is considered to have a detrimental impact on the purchasing power and wellbeing of households, with lower-income households affected disproportionately. Euro area inflation rose from 2.6% in 2021 to 8.4% in 2022. It is currently expected to decline towards the ECB target of around 2% by 2025; by then consumer price levels are expected to be almost 25% higher than in 2020. Lower-income households are expected to suffer most from this surge in inflation. First, lower-income households consume a higher share of their income – and in the lowest decile, often consume more than their total income. They typically do not own significant assets or savings, and are often credit-constrained, so higher inflation immediately constrains their consumption.[3] Second, a large proportion of lower-income households' consumption is attributable to basic goods and services, such as food and energy, which have experienced the largest price increases. These households therefore have little leeway to avoid inflation.

Governments have adopted a large array of fiscal measures to cushion the impact of the inflationary shock on households and firms since 2021. In the euro area, discretionary fiscal measures in response to the energy and inflation shock are estimated to be close to 2% of GDP in 2022.[4] About half of the total support in the euro area is directed at containing price increases ("price measures"). The other half is directed at supporting the income of households, for example in the form of transfers or tax credits ("income measures"). The impact of these measures, as well as their relative efficacy in curbing the expected negative impact of the inflationary shock on welfare distribution of households, is mostly unexplored to date.

This paper makes use of the EUROMOD microsimulation model and its ITT extension to assess the distributional impact of the inflationary shock and fiscal policy response on households in the euro area in 2022.[5] It focuses on the four largest euro area countries – Germany, Spain, France and Italy – as well as Portugal and Greece. The experience of these countries is studied both individually and aggregately as a proxy for the whole of the euro area. We simulate the inflation shock and ICMs introduced by governments to counteract its impact on the purchasing power and welfare of households for each of these countries. We assess the distributional impact of the ICMs on households' purchasing power and welfare and the extent to which they were able to curb the increase in inequality caused by surging prices. While there are a growing number of contributions investigating the impact of the inflationary shock in EU countries,[6] to the best of our knowledge this paper is the first to assess the cushioning effect of the policy measures in a comparative way across euro area economies.[7]

3 See Charalampakis, Fagandini, Henkel and Osbat (2022).

4 See Bankowski, Bouabdallah, Checherita-Westphal, Freier, Jacquinot and Muggenthaler (2023).

5 For information on EUROMOD, visit https://euromod-web.jrc.ec.europa.eu/ and see Sutherland and Figari (2013). The analysis is based on information about income growth and other uprating factors of spring 2023. Since then, some of the national accounts statistics have been revised, in some countries quite significantly. This paper does not account for these statistical revisions.

6 Among others: Menyhért (2022), Basso, Dimakou and Pidkuyko (2023), Sologon, O'Donoghue, Linden, Kyzyma and Loughrey (2022) and Bonfattia and Giarda (2023).

7 However, some recent contributions analyse the impact of government measures in individual countries. See Capéau et al. (2022), Curci , Savegnago, Zevi and Zizza (2022), García-Miralles (2023) and Kuchler, Renkin and Weissert (2023).

In its basic functionality, EUROMOD can simulate the impact of changes in gross income, taxes and benefits on household disposable income. It does not, however, directly account for changes in consumer prices or indirect taxes. Given that this feature is important in order to understand the impact of price measures, we used the EUROMOD ITT extension (ITTv4) in our analysis on top of the standard EUROMOD toolkit. The ITT allows us to calculate the impact of changes in consumer goods prices, the associated value added tax (VAT) and other indirect taxes, such as excises, and in the indirect tax rates themselves on household expenditure. For the purpose of this analysis, the tool was further enriched with simulations of the extraordinary price measures.

Our cross-country assessment of the inflationary shock and joint effect of income-side and price-side measures addresses a number of key policy questions. First, we look at how the inflationary shock affected euro area households across countries and income deciles. Here, we distinguish between the impact of inflation on the purchasing power of income and its impact on household consumption welfare. Given that the latter accounts for consumption and saving patterns, it allows us to better capture the disproportional effect of inflation on lower-income households due to low saving rates. Second, we ask to what extent the fiscal policy response, through price and income measures, sheltered households from the consumption welfare loss induced by the inflationary shock. In exploring this, we compare the experience of the different countries. Finally, we investigate the relative ability of different policy measures to close the inequality gap created by the price surge. It is generally accepted that targeted measures (typically income measures) are more cost-effective than untargeted measures (e.g. price measures). However, a full model of the tax-benefit system and its interactions is required in order to assess the extent to which this is true. As we show in our study, the cost-effectiveness of these measures varies enormously.[8]

The main findings of the paper can be summarised as follows:

1 **The analysis confirms the expected result that the consumption welfare of lower-income households was more severely affected by the 2022 inflation surge than that of higher-income households.** In quantitative terms, for the euro area aggregate the impact of the price increases alone would have meant a drop in consumption welfare of more than 13% for the lowest-income households, which is 2.8 times higher than the drop for the highest-income households. This welfare differential or "inequality gap" is driven by two factors. First, lower-income households have a higher weight of energy-intensive goods in their consumption baskets, and therefore generally face higher effective rates of inflation. Second, and more importantly, lower-income households suffer more from inflation due to spending a higher share of income on consumption. These households typically do not save a share of their income but often pile up debt to

8 Please note that the analysis does not account for general equilibrium or behavioural effects. For example, a policy that strictly redistributes and restores the initial income distribution might be more (or less) detrimental for public and private investment and have certain long-term consequences compared with a less incisive policy.

stabilise their real consumption (negative savings).[9] We show that it is crucial to account for differences in consumption shares of income among rich and poor households to fully understand the heterogeneous impact of inflation.

2 **Fiscal measures have made a significant contribution to mitigating the loss in purchasing power and rise in inequality, although there are some differences across countries.** Government measures to support household incomes and contain the rise in consumer prices – together with increases in market incomes – almost completely offset the consumption welfare loss created by the surge in consumer prices in France, Portugal and, to a large degree, Italy. For the euro area these measures compensated households for about a third of their welfare loss. Fiscal measures have also helped to alleviate the inequality gap that the inflation surge created between lower and higher-income households. More generally, for the euro area aggregate, the welfare gap between the lowest and highest income deciles was closed by around 60%. Only Spain and Germany still have significant differences in exposure to inflation across households.

3 **Most fiscal measures were not particularly effectively targeted at lower-income households, producing a relatively high fiscal burden.** Around half of the 2022 government measures in this sample were directed at containing price increases. Price measures, by their transversal nature, cannot easily be directed at households in need of support but benefit all consumers. By making use of income measures targeted at the lowest-income households, governments could have closed the welfare gap at a far lower fiscal cost. For the euro area as a whole, we conclude that the gap closed by income measures was three times as large as that closed by price measures, per euro spent. We also note that the cost-effectiveness of income-side measures varied significantly across countries. This suggests that the policy debate should go beyond the discussion of targeted versus untargeted measures and focus more on how best to design targeted measures.

The paper proceeds as follows. Section 2 briefly describes the microsimulation model employed for the analysis, namely the tax-benefit microsimulation model for EU countries, EUROMOD, along with the ITTv4 extension. It also discusses the fiscal measures simulated with EUROMOD and describes the data used for the six countries in the sample. Section 3 discusses the results of the analysis, namely the impact of inflation and the ICMs on household disposable income and expenditure distribution. Section 4 explores the effectiveness of the ICMs in tackling different measures of inequality, weighing their impact on inequality against their fiscal cost. Section 5 concludes the paper.

9 In HBS data, households in the bottom two deciles often display negative savings. While this can be partly caused by under-reporting of income, poorer households' reliance on credit to finance consumption is likely to be the main driver.

2 Analytical method and data

For this paper, the impact of inflation and government ICMs on the household welfare distribution in the euro area is assessed using EUROMOD, a tax-benefit microsimulation model for EU countries. Section 2.1 describes EUROMOD and the ITT extension employed to assess the effectiveness of ICMs in mitigating inflationary effects on households' purchasing power. For the non-expert, a primer on microsimulation models can be found in Box 1. Section 2.2 describes the household-level microdata from the EU-SILC and HBS that the microsimulation model used to run the simulations. Household income data stem from the 2019 (for Germany and France) and 2020 (for the rest of the countries) waves of EU-SILC with income data from 2018 and 2019, updated in nominal terms to the year 2022. The consumption-side analysis using the ITT runs on HBS data from 2010. Box 2 shows how the consumption expenditure shares in 2010 compare with more recent surveys of household consumption. Section 2.3 describes the government income and price measures that have been modelled in EUROMOD.

The paper covers Germany, Greece, Spain, France, Italy and Portugal, which together are also used as a proxy for the euro area. These six countries covered about 80% of the euro area population and more than three-quarters of euro area GDP in 2022. They therefore provide a reasonable proxy for the euro area aggregate, while offering a significant degree of variation in terms of demographics and fiscal policies.

2.1 EUROMOD and its extensions

EUROMOD is a static microsimulation model that contains detailed descriptions of the tax and benefit systems of all 27 EU Member States. EUROMOD is currently developed and maintained by the Joint Research Centre (JRC) of the European Commission. It uses microdata with information on different sources of income (gross earnings, pensions and social transfers), household composition and individual socioeconomic characteristics to simulate the impact of the tax and benefit system – including direct taxes, social security contributions and benefits – on disposable income for every individual and household included in the input dataset. The microsimulation model essentially replicates the calculations that a public authority would conduct to quantify tax due and benefit entitlements, using survey data that is representative of the country's population. As a result, EUROMOD allows the effects of changes in the taxes and benefit system on disposable income to be studied up to the level of the individual.

To assess the impact of inflation and fiscal measures that affect consumer prices, the EUROMOD ITT extension is used, which allows simulation of indirect taxes, introduction of price increases and modelling of price measures. To simulate indirect tax liabilities, the ITT uses household expenditure information for around 200 commodity categories. These come from the harmonised Eurostat HBSs. Starting from the household disposable income simulated by EUROMOD, the ITT applies the indirect taxation rules in place in each country (i.e. VAT, specific and ad valorem excises) to simulate adjusted

Box 1

A PRIMER ON MICROSIMULATION MODELS

The analysis in this paper is based on a tax-benefit microsimulation model. Tax-benefit microsimulation models contain detailed coding of the tax and benefit legislation that is specific to a country or region. These models enable researchers to simulate tax liabilities and benefit entitlements at both the individual and household levels, effectively replicating the often-complex interactions between tax and benefit rules in each country.

Calculations in these models require information on various factors, including market incomes earned by households, socio-demographic characteristics, household structure and various economic attributes, as well as tax and benefit rules. For instance, the level of a household's taxes and benefits is determined not only by its market or pension income but also by the number and ages of individuals in the household, the household's wealth, the size of the dwelling, and other relevant criteria. By considering all these factors, the model accurately replicates most components of the tax-benefit system and calculates the resulting household disposable, or net, income.

These models may simulate both the existing policy framework and counterfactual scenarios, such as hypothetical or expected changes in policy rules, demographic characteristics, and labour market conditions. Consequently, by comparing the outcomes under different policy scenarios, researchers can assess changes in various components of the tax-benefit system, as well as budgetary implications such as the fiscal cost associated with a policy reform scenario.

As these models rely on representative samples of the population, they are also well suited to providing disaggregated results that assess how a policy change can have a heterogeneous effect within the country's population. This capability is particularly useful for simulating the distributional impact of fiscal policies, such as changes in the tax code or benefit generosity. In addition, they help to identify the potential winners and losers of policy reforms and to understand the impact on poverty rates, income inequality and work incentives. Such information is crucial for policymakers to design more targeted tax and benefit measures, improving equity and fairness.

We employ EUROMOD in our analysis for two main reasons. First, EUROMOD allows for cross-country comparable analysis, providing a comprehensive assessment of the impact of fiscal measures across countries. This overcomes the limitations of using different national microsimulation models, which often use different methodologies, data sources and assumptions. Second, EUROMOD, with its ITT extension, is the only cross-country microsimulation model covering both direct taxes and benefits (e.g. personal income taxes and social benefits) and indirect taxes (VAT and excises). The fact that the EUROMOD simulation covers both direct taxes and benefits and indirect taxes is crucial for our analysis, which requires simulation of both income-side (e.g. increase in social benefits) and price-side (e.g. VAT cuts) measures.

household disposable income, i.e. income after direct taxes, cash benefits and indirect taxation. Consumption tax liabilities for households are therefore calculated on the basis of their reported consumption, by applying the excise duties and VAT rates foreseen by each country's tax code.

Although EUROMOD is a static tax-benefit simulator that abstracts from behavioural responses to policy changes, this approach is likely to effectively approximate the immediate impact of the inflationary shock and the government response on household income and consumption. In the context of our analysis of the inflationary shock, this assumes that households do not change their consumption following an inflationary shock or a variation in the relative prices of goods. Such an analysis looks at what is often referred to as the "morning-after" effect. Looking at the EU energy crisis of 2022, when the price surge was sudden and mostly driven by the increase in food and energy costs, this assumption can be rationalised considering the unexpected nature of the shock and the limited ability of households to switch away from necessity goods. Recent

literature[10] analysing demand responses to the inflationary shock supports this assumption. More generally, there seems to be some evidence that the total distributional impact of (relatively small) tax and benefit policy changes is close to their direct effect.[11]

10 See Sologon, O'Donoghue, Linden, Kyzyma and Loughrey (2022).

11 See Barrios et al.

2.2 Input data and its uprating to 2022

EUROMOD uses input data from EU-SILC to simulate household disposable income, direct tax liabilities and benefit entitlements.[12] EU-SILC is a representative sample of the EU population. It provides a yearly cross-sectional survey of households with regard to income, poverty, social exclusion and living conditions that is standardised across all EU Member States. Survey data are available for all EU Member States, mostly since 2004, for a household sample ranging from 11,000 households in Germany to about 15,000 households in Greece and Spain.

Since survey data are only available with a considerable time lag, one of the first key steps in this analysis is to adjust the historical input data to approximate household income in 2021 and 2022. The latest available input data in EUROMOD are based on EU-SILC 2020 (2019 for Germany and France), which reports income data from 2019 (2018 for Germany and France). Gross income from labour, capital income, pensions and other (non-simulated) benefits paid need to be adjusted to reflect nominal income in the base year 2021 and the analysed year 2022. This means updating key variables such as labour incomes or pensions based on information obtained from other data sources. This exercise is described as "uprating" of monetary variables in the EUROMOD jargon. EUROMOD includes uprating factors for all simulated years. The data are typically taken from Eurostat or provided by the statistical offices of the Member States, government authorities or national central banks. The exact uprating process differs depending on data availability and the institutional frameworks of each country. For instance, industry-specific uprating factors are used to uprate wages in some countries (Germany), while other countries only differentiate wage growth according to private and public sector employment (Greece and Portugal), as shown in Table 1.[13]

Table 1
Uprating mechanism: wages and earnings (2021 to 2022)

	Germany	Greece	Spain	France	Italy	Portugal
Wages/earnings	Gross income: +8.7%	Employment earnings: +1.8% for private sector 0% for public sector	Wage cost, private sector: +3.4%, public sector: +2%	Net full-time salary: +3.9%	Salary index, private sector: +0.8%	Average wages of dependent employees: +2.0% for private sector and 1% for public sector
Source	Federal Statistical Office of Germany	Estimates using Eurostat data	Spanish National Statistics Institute	French National Institute of Statistics and Economic Studies	Italian National Institute of Statistics	Portuguese State Budget
Differentiation of income groups in uprating	Sector-specific uprating	Separate uprating for public/private sector	Separate uprating for public/private sector	Quartile-specific uprating	Separate uprating for public/private sector	Separate uprating for public/private sector

SOURCE: Data collected from EUROMOD country reports and model files.
NOTES: The usual sources and figures of the uprating in EUROMOD may have been changed for this exercise. In many cases they are initially approximated by central banks and forecasts by the annual macroeconomic database of the European Commission (AMECO), and then corrected according to the available information.

12 For more details on EU-SILC, see Eurostat's EU statistics on income and living conditions.

13 The JRC publishes annual country reports that describe in more detail the uprating exercise, policy changes and the institutional set-up of each EU country: EUROMOD Country Reports.

Box 2

THE CHANGE IN HOUSEHOLD CONSUMPTION BASKETS OVER TIME

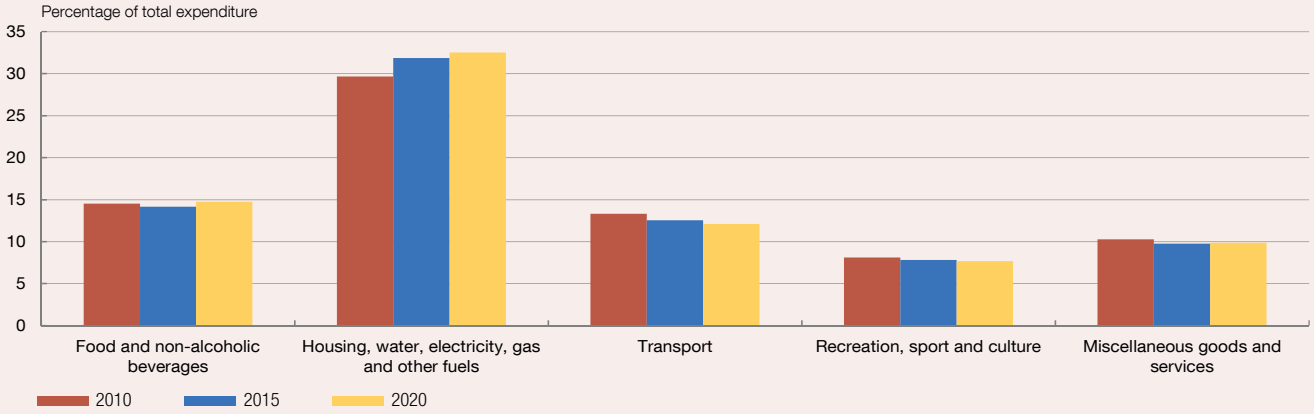
To extend EUROMOD to consumption-side measures and indirect taxes using the ITT, the EU-SILC microdata must be merged with expenditure data from the HBS. At the time of drafting, consolidated EU-SILC and HBS microdata were only available for the 2010 wave of the HBS (see footnote 12 for details of the merging process). This box explores to what extent consumption expenditure at the household level has changed since 2010.

The HBS provides household consumption expenditure, broken down into 12 consumption categories according to the Classification of Individual Consumption According to Purpose (COICOP).[1] Chart 1 depicts the expenditure share of the five COICOP categories making up the largest share of total consumption expenditure for the 2010 wave of the HBS and the two subsequent collection rounds in 2015 and 2020. The expenditure shares remained stable across all three waves, with relative differences of 10% at most.

In terms of analysing price-side energy-related government measures, expenditure on energy-intensive goods is particularly relevant. Expenditure on electricity, gas and other fuels (COICOP category CP04.5) remained relatively stable across all quintiles of the income distribution. The overall picture is consistent across all three waves. Households with lower income spent a larger share of their income on electricity, gas and other fuels. Relative to their income, the first quintile spends about 60% more on energy-intensive goods than the fifth quintile (Chart 2).

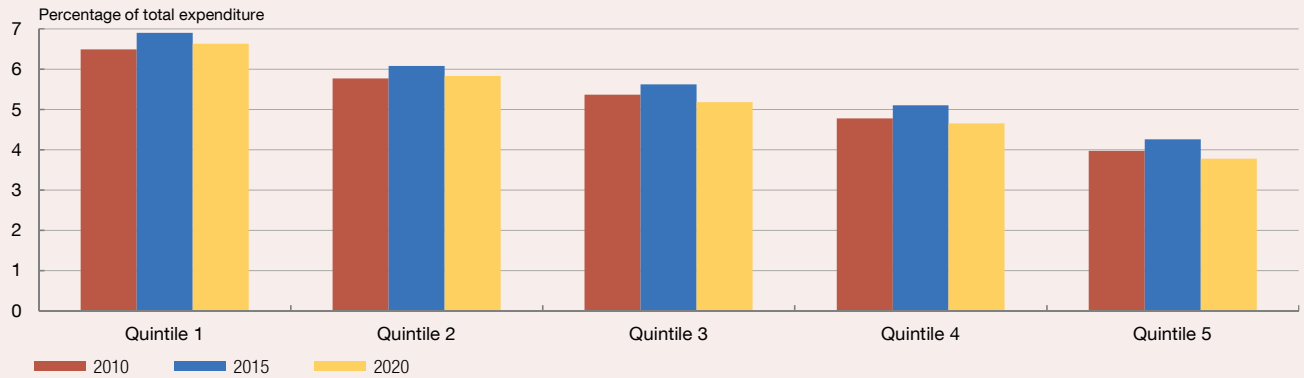
Since there are only small changes in the structure of household expenditure, the use of the 2010 HBS data to approximate current household consumption preferences and assess the impact of price measures in 2022 should not significantly bias results. If anything, the slight upward trend in expenditure on energy-intensive goods seen before the pandemic could point to a small underestimation of the effect of price measures on household income.

Chart 1
Expenditure share of top five COICOP expenditure categories (2010-2020). Euro area average approximation



SOURCE: Own calculations based on Eurostat's 2010, 2015 and 2020 waves of HBS.
NOTE:The five categories shown are the COICOP categories with the highest share of total expenditure. The expenditure shares are expressed as a percentage of total expenditure and correspond, from left to right, to COICOP categories CP01, CP04, C07, CP09 and CP12. The bars show the euro area approximation used in this paper, consisting of the GDP-weighted average of Germany, Greece, Spain, France, Italy and Portugal.

Chart 2
Share of expediture on electricity, gas and other fuels in the total expediture of each quintile (2010-2020). Euro area average approximation



SOURCE: Own calculations based on Eurostat's 2010, 2020 and 2020 waves of HBS.
NOTE: The lines show the evolution of expenditure on energy-intensive goods (COICOP category CP04.5) across quintiles from 2010 to 2020. The GDP-weighted average of Germany, Greece, Spain, France, Italy and Portugal is shown.

1 Classification of Individual Consumption According to Purpose (COICOP) as defined by the United Nations Statistical Commission. The HBS uses the COCIOP 2003 definition. See also the UN's report regarding the latest revisions to COICOP in 2018 for more details.

For the second part of the EUROMOD exercise, the ITT is used, which requires consumption data to model inflation and the government policies that affect prices directly. To study the distributional effects of consumption-side measures as well as of inflation itself, we rely additionally on the harmonised Eurostat HBSs. The HBS is an EU-wide survey that collects detailed data on households' expenditure on goods and services and is compiled by Eurostat every five years.[14] Survey data, which are available for all EU Member States, serve to compute the basket weights used for the calculation of the consumer price index. The HBS is matched with the EU-SILC from the same year (2010) to obtain an internally consistent dataset with income and consumption data, using a semi-parametric procedure developed by Akoğuz et al. (2020).[15] See Box 2 for more details on the pros and cons of using these data.

Please note that the data are not affected by the COVID-19 pandemic crisis. The policy systems of both 2021 and 2022 were run using the latest available EU-SILC data at that time, i.e. the 2020 or 2019 waves. However, the EU-SILC survey refers to income data from the previous year (2019 or 2018 respectively), which are not affected by the pandemic crisis.

2.3 Modelling household income and price measures

Having adjusted the input data, the second central step of the analysis is to model the ICMs. ICMs on the income side are assessed through a counterfactual analysis using EUROMOD's Policy Effects Tool, which isolates the policy changes from other changes in the income distribution. On the consumption side, ICMs are analysed using the ITT. Observed commodity prices are compared with a counterfactual scenario in which governments hypothetically did not implement measures to reduce or cap the increase in prices for energy, food and other consumer goods.

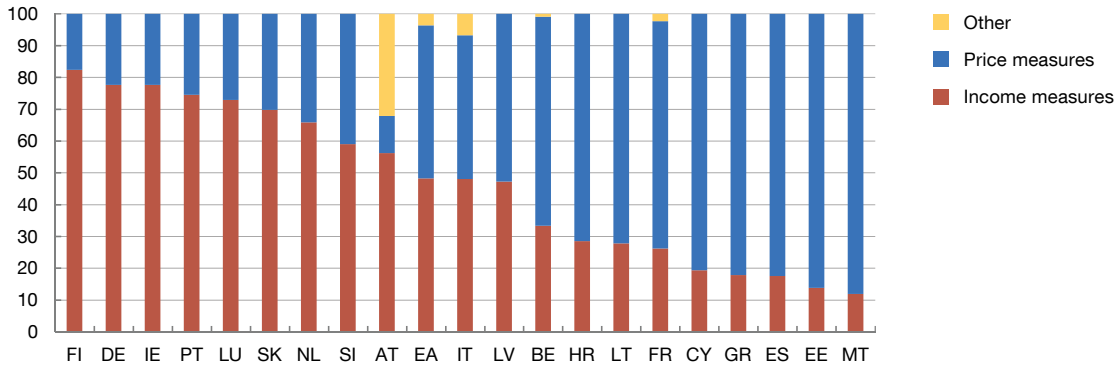
Around half of the measures implemented by euro area governments in 2022 aimed to support household income ("income measures"), while the other half aimed to contain the increase in prices ("price measures"). The discretionary policy response to the inflationary surge has been quite diverse across countries, in terms of both size and composition. As documented in Chart 1, some euro area countries – Germany, Ireland, Slovakia and Finland – adopted more income measures. These included lump-sum transfers to households, income tax reductions, social benefit increases, etc. In other countries – including Estonia, Greece, Spain and Malta – 80% or more of the measures were

14 For more details on the HBS, see Eurostat's Household budget survey.

15 This procedure combines the estimation of Engel curves used in earlier studies (such as Decoster, Loughrey, Donoghue and Verwerft, 2010) with matching techniques. It consists of three main steps. First, a common set of relevant covariates is identified in the source and recipient datasets. Second, in the source dataset, consumption goods are aggregated into 20 macro-categories and expressed in terms of consumption shares of income. These aggregated consumption shares are regressed against the set of covariates identified in the first step. Third, the estimated coefficients are used to construct fitted shares of consumption in both the source and recipient datasets (i.e. in each of these datasets, 20 fitted consumption shares will be constructed for any household, based on the regression model above). A Mahalanobis distance metric is used to find the closest match between any household in the source and recipient datasets. Once households from the recipient (EU-SILC) and source (HBS) datasets are matched, the consumption shares of the full consumption basket from the latter are imputed to the former. See Akoğuz et al. (2020) for more details on the matching procedure.

Chart 1

Price versus income measures in 2022



SOURCE: Working Group on Public Finance of the European System of Central Banks (ESCB), June 2023.
NOTES: The classification of budgetary policy measures to mitigate the impact of high energy prices on households and firms is based on the European Commission methodology. The shares of price and income measures are calculated based on the discretionary fiscal measures in response to the energy and inflation shock in 2022. The "Other" category includes, for example, government purchases to fill gas storage.

aimed at containing the increase in consumer prices. These included price caps on fuels and gas and VAT reductions.

We analysed the government income measures by breaking down the change in nominal disposable household income between 2021 and 2022. The total effect can be split into three components.

Nominal disposable income growth = Market income growth + ICMs + Other income measures

The total change in nominal disposable income (left-hand side) is obtained by comparing the disposable income simulated under the 2022 and 2021 policy systems. First, disposable income grows on account of "market income" growth, which takes into account salaries growth and pensions revaluation. Note that since household-level incomes are not available for 2022, this effect reflects the uprating between 2021 and 2022. Second, disposable income growth reflects government measures. Government policies themselves are further disaggregated into (i) ICMs and (ii) other policy changes not introduced on account of the inflation surge, such as policy changes relating to other social benefit rules and/or amounts, or income tax schedules. We simulated the effect of policy changes by running the 2022 scenario, including all adjustments to the tax and transfer system and income measures using gross market incomes of 2021.[16]

To replicate the effects of income measures, it is crucial to precisely model the eligibility criteria and taxation rules that apply to the newly adopted measures.

16 The EUROMOD Policy Effects Tool (PET) is employed to isolate the impact of the ICMs on disposable income at each decile of the distribution. The PET estimates the first-order effects of policies on household incomes, allowing us to disentangle the policy effects from nominal income growth. More specifically, in order to isolate the policy effect from other changes in the income distribution, household disposable incomes under the actual system and a counterfactual system are assessed, keeping household characteristics and market incomes constant.

Table 2
Measures modelled by type

Type	Sub-type	Germany	Greece	Spain	France	Italy	Portugal	Grand total
Income	Direct taxes by households	2	—	—	1	—	—	3
	Social security contributions	—	—	—	—	1	—	1
	Old-age pensions	—	—	—	—	1	1	2
	Unemployment benefits	—	1	—	—	—	—	1
	Social transfers in kind	—	—	—	2	—	—	2
	Other social benefits other than in kind	5	5	2	1	3	3	19
Income subtotal		7	6	2	4	5	4	28
Price	VAT	1	2	2	—	1	1	7
	Excise	1	1	1	1	1	1	6
	Price cap	—	—	1	2	—	—	3
	Reimbursement	1	1	—	—	—	1	3
	Discount/subsidy	—	4	1	1	2	—	7
	Social transfers in kind	—	1	—	—	—	—	1
Price subtotal		3	9	5	4		3	28
Total		10	15	7	8	9	7	56

SOURCE: Working Group on Public Finance of the European System of Central Banks (ESCB).

For instance, an initially untargeted lump-sum transfer could lead to some degree of redistribution if it is taxable. This detailed representation of the tax and transfer system helps us to capture interactions of the income measures with existing tax and benefit rules. We based our implementation of the income measures on EUROMOD version 4.109+, with modifications to include the latest policy changes and income measures in each country.[17]

In a nutshell, income measures consisted mainly of cash transfers, which were to a greater or lesser extent targeted at lower-income families or other vulnerable groups, such as pensioners, the disabled and the unemployed. These were extraordinary measures in the form of either one-off payments or supplements to existing benefit schemes. Benefits in kind, such as energy vouchers that can be used to lower the cost of utilities in general for a large majority of households, were considered ICMs in countries like France, while they were classified as price measures in other countries like Greece.

Overall, the paper models 56 fiscal measures, which cover close to all income and price measures in the six euro area countries (Table 3). For example, the Portuguese

17 For Greece, about half of the income ICMs (in terms of cost) were added to the model. Some measures were announced in September and had not yet been voted on – these were basically extensions of a similar first package. In the case of France, some of the income ICMs were already simulated in the EUROMOD 2022 tax and benefit system. For example, the energy voucher scheme was already in place in 2021 and was retained in 2022. The "back to school" bonus, on the other hand, had to be introduced. The Portuguese EUROMOD system for 2022 did not yet include the income ICMs, since these were announced in September and December 2022. Some other government measures, such as the reinforcement of the child benefit scheme and the extraordinary update of pensions, were also implemented in the 2022 tax and benefit system to represent the 2022 Portuguese fiscal situation more accurately. In Italy, the social bonus directed at poor households for gas and electricity consumption was included, while ICMs that were already modelled in EUROMOD were adjusted. In Spain, income ICMs were already in the model, but were adjusted to improve their accuracy.

Table 3
ICMs modelled in EUROMOD

(percentage and billion euro)	Germany	Greece	Spain	France	Italy	Portugal	Total
Share of income measures simulated in EUROMOD	100%	100%	49%	100%	94%	100%	96%
Total income measures	42	1.0	1.2	8.4	18.8	2.2	73.6
Share of price measures simulated in EUROMOD	100%	98.3%	100%	99%	100%	100%	95%
Total price measures	11.8	4.4	7.9	35.5	23.8	1.0	84.4

SOURCE: Working Group on Public Finance of the European System of Central Banks (ESCB).
NOTES: The extraordinary revaluation of pensions in France in 2022, amounting to around €4.9 billion, is included in the income measures reported in this table. However, in the simulations implemented in the next sections, this measure was modelled as part of the nominal income growth between 2021 and 2022.

and German measures were fully covered by the EUROMOD simulations. All the French measures except the incentives available for purchasing low-emission vehicles were simulated. All Greek measures targeting households were covered, except for some minor data-intensive subsidies. In Italy, all measures were modelled except for minor subsidies for public transportation and subsidies targeted at workers in specific sectors (e.g. the entertainment and sport industries). In the case of Spain, all price measures and half of the income measures were modelled. Income measures in Spain were quantitatively small, and half of them were left out of this exercise as a result of not modelling a small heating subsidy and a one-off increase in student scholarships. Price measures directed at firms, such as subsidies, are not accounted for in this analysis. For a detailed summary of all the measures covered, please refer to Section A.7 in the annex.[18]

To comprehensively analyse the effectiveness of measures in response to the surge in inflation, government "price measures" also need to be considered in the analysis. Household spending in the scenario where the price measures are in place, assuming a full pass-through, is compared with a counterfactual scenario where these measures are absent (and effective rates of inflation are therefore higher). We used EUROMOD and its ITT extension to account for measures such as price caps, price subsidies and discounts, and VAT reductions.

We captured the effect of inflation on households using two different measures: real disposable income and household consumption welfare. The first measure simply captures the impact of inflation in terms of the erosion of household income purchasing power, whether consumed or saved. It is simply the difference between the change in nominal disposable income and actual inflation. In the case of the second measure, we followed the relevant literature in defining consumption welfare as the monetary amount that households need to purchase their reported consumption basket at the inflated prices – net of any

18 The annex also includes a comparison of the fiscal cost of measures according to the EUROMOD simulation and official government estimates. In most cases, EUROMOD and government estimates are similar. Divergences can be attributed to several factors, such as limited survey information to simulate eligibility conditions and only partial information to construct counterfactual scenarios (most notably in the case of price cap measures).

nominal income variation.[19] Note that this second measure captures not only the effect of household-specific inflation (which depends on the household-specific consumption basket) but also the effect of the household-specific share of consumption in total income (which depends on household-specific saving rates). Given that consumption constitutes a larger share of income for poorer households, the negative effect of any price increase will be amplified for these households under the second measure.

We used EUROMOD and its ITT extension to simulate household spending under three scenarios:

1 The baseline, which considers household spending in 2021 given the direct and indirect tax and benefit rules in place at that time.

2 The actual 2022 scenario, which considers household spending in 2022 given the actual inflation increase and the discretionary price measures introduced by the government.

3 The counterfactual 2022 scenario, which considers household spending under a hypothetical 2022 system including inflation, but where the discretionary price measures introduced by the government were not implemented.

Comparing household spending under the impact of price growth between (1) and (2) will give us the effective rates of inflation experienced by households across the distribution. Comparing household spending under the impact of price growth between (1) and (3) will give us the effective rates of inflation that households would have experienced if the price mitigation measures had not been in place.

19 For a formal definition of this measure, also known as "compensatory variation", see Sologon, O'Donoghue, Linden, Kyzyma and Loughrey (2022). Note that, in contrast to their approach, we assume constant quantities in our paper, which is equivalent to assuming a Leontief utility function in their framework.

3 Simulation results

The following section describes and discusses the simulation results obtained from EUROMOD and its ITT extension. The simulations provide results for every household included in the EU-SILC/HBS database, which are aggregated by country and for the euro area. Section 3.1 describes the results of the aggregate impact of inflation and ICMs for the six euro area countries and the euro area as a whole. Sections 3.2 and 3.3 provide results for the impact of inflation and of price and income measures for households by income decile, for the euro area and the six countries respectively.

3.1 The impact of inflation and fiscal measures on income and consumption

Looking first at price developments, government price measures significantly lowered consumer inflation for the euro area and – to varying degrees – also in the six euro area countries.[20] More specifically, according to EUROMOD simulations, euro area consumer price inflation in 2022 would have been 1.6 percentage points higher without the government price measures (simulated consumer price inflation of 6.6% versus simulated counterfactual consumer price inflation without price measures of 8.2%, Chart 2). Variation across the euro area countries is significant. In a counterfactual environment without government measures, model simulations show that consumer price inflation would have reached 8.4% in Germany but only 3.6% in France. At the same time, government measures to contain prices had the largest impact in Greece, France and Italy, where they reduced consumer inflation by at least 2 percentage points.

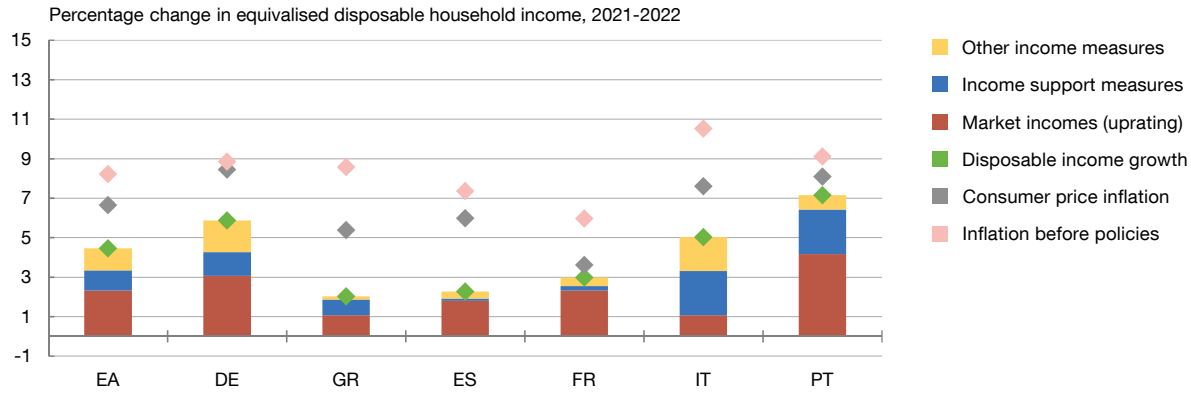
Second, changes in nominal disposable income significantly added to household purchasing power in the euro area countries and the aggregate. We estimate that equivalised household disposable incomes increased by 4.4% in 2022 (Chart 2). This change can be broken down into three components. First, the increase in market incomes from salaries, wages, pensions, etc. added the largest component. Second, the introduction of ICMs on the income side contributed 1.0 percentage points to the increase in household income. Third, the effect of policy changes in the tax and transfer system not related to the inflation surge added to household disposable income to a similar degree. Among the simulated countries, Greece and Spain show relatively low increases in nominal disposable income of below 2.5%, while Germany, Italy and Portugal are simulated to have had increases of more than 4%. Contributions from government measures to support household income were largest in the latter three countries.

Despite government measures and rising disposable incomes, household purchasing power is simulated to have dropped significantly in 2022. For the euro area aggregate this gap – the difference between the increase in equivalised household disposable incomes and the effective consumer prices increase – amounts to 2.2 percentage points (Chart 2). There are, however, large differences across euro area countries. Households faced

20 The euro area aggregate is approximated by the GDP-weighted sum of Germany, Greece, Spain, France, Italy and Portugal.

Chart 2

Disposable income growth and consumer inflation in the euro area and euro area countries



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Equivalised disposable income is computed by dividing the household's disposable income by its size on the modified equivalence scale produced by the Organisation for Economic Co-operation and Development (OECD), which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

Table 4

Nominal disposable income growth and price increases according to simulations and official statistics (2021-2022)

(percentage)	Germany	Greece	Spain	France	Italy	Portugal	Euro area
Nominal disposable income growth (simulated)	5.9	2.0	2.3	3.0	6.3	7.2	5.5
Nominal disposable income growth (statistics)	7.8	7.9	3.6	5.2	6.2	8.3	7.7
Consumer inflation including price measures (simulated)	8.4	5.0	6.0	3.6	7.7	8.1	6.6
Counterfactual consumer inflation excluding price measures (simulated)	8.9	8.6	7.4	6.0	10.5	9.1	8.2
HICP	8.7	9.3	8.3	5.9	8.7	8.1	8.4

SOURCE: Own calculations based on EUROMOD ITT extension simulations, EU-SILC and HBS data, national statistical offices and Eurostat.
NOTES: Official statistics for nominal disposable income growth are based on national accounts data on quarterly non-financial sector accounts. Sector accounts data are not directly comparable with EU-SILC data as they also include unincorporated household enterprises. These cover most sole proprietorships and most partnerships that do not have a legal status independent from their owners. Therefore, the household sector also generates output and entrepreneurial income. This is important for Greece, for example, and may explain why gross disposable income growth in 2022 based on sector accounts data was 7.9%, i.e. much higher than the simulated 2%, as sole proprietorships did very well in 2022. Finally, in the European accounts, non-profit institutions serving households, such as charities and trade unions, are grouped with households. Their economic weight is relatively limited.

the highest losses in Spain and Greece, where losses in purchasing power amounted to more than 3%. France, on the other hand, was characterised by low inflation, a low number of income measures and significant price measures, resulting in the smallest purchasing power loss among the simulated countries, at just 0.6% among the simulated countries.

Simulated results for nominal disposable income growth and consumer inflation are broadly similar to the official statistical recordings. The average annual inflation rate in the euro area in 2022 amounted to 8.4%, which is broadly in line with the counterfactual consumer price increases simulated with EUROMOD excluding the

government price measures.[21] Similarly, nominal disposable income growth according to the EUROMOD simulations is similar to official government statistics, where these are already available for 2022.

3.2 The distributional impact of inflation and government policies for the euro area aggregate

We assessed the distributional effects of the inflationary shock and related fiscal policy response from two different perspectives: first, looking at their impact on real disposable income and second, focusing on household expenditure to measure the impact on welfare. We started by comparing changes in total nominal disposable income and consumer inflation by income decile. This exercise provided a general overview of the effects of the shock and policy interventions, since inflation erodes the real value of both consumption expenditure and savings. In a second step, we jointly evaluated price and income changes by measuring the variation in expenditure – net of any income increase – needed for households to retain their level of consumption welfare, i.e. how much extra money would households need at the inflated prices to afford the same basket of goods as in the baseline scenario.

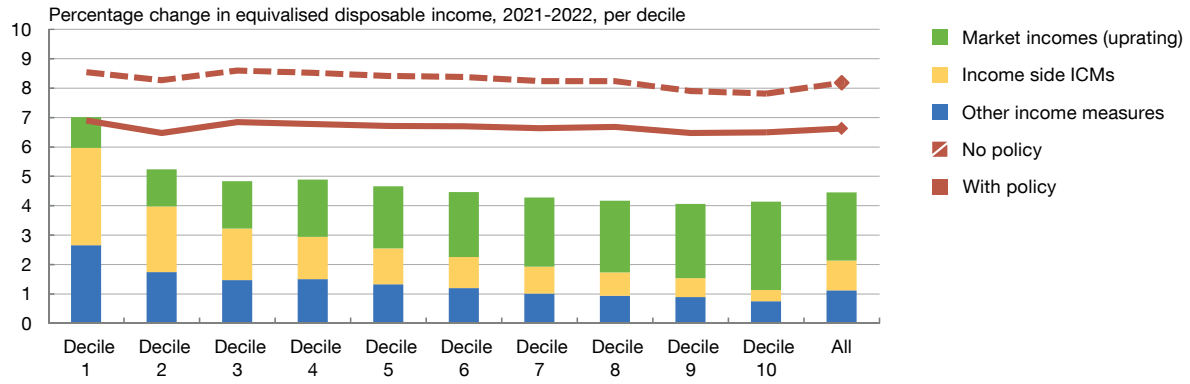
Government price measures have significantly reduced consumer price inflation across the income spectrum and reduced the inflation gap between poorer and richer households (Chart 3). Actual inflation – including government measures – was around 20% lower than in a counterfactual scenario without the fiscal policy measures. In the counterfactual scenario, inflation would have been slightly higher (by around 0.7 percentage points) for the poorest than for the richest households. This higher inflation faced by poorer households reflects the higher energy share in their consumption baskets.[22] While lower-income households are more affected by energy and food inflation, they also profit, in relative terms, to a larger extent from price measures. Post-government price measures, the actual inflation rate across households is simulated to be widely equalised, even though price measures are not effectively targeted at lower-income households and benefit them only marginally more than richer households.

21 Depending on measure-specific characteristics, the Eurostat Harmonised Index of Consumer Prices (HICP) may or may not include the impact of government price measures. Eurostat's general methodological advice is that the subsidised price is recorded in the consumer price index if the subsidy affects the quantity of the specific product/service that will be consumed in the specific reference month. This suggests that it could be more appropriate to compare the HICP with simulated "actual" inflation, including rather than excluding price measures, since the majority of the measures could potentially affect the consumed quantities. However, detailed information on which measures were included by national statistical agencies is not available. Our results may point to the fact that national statistical agencies have not included price measures in the official HICP measure. Furthermore, discrepanices between the official HICP number published by Eurostat and the simulated inflation rate result from differences in the underlying consumption basket. Our simulation relies on data from the 2010 wave of the HBS. In addition, the simulation only considers inflation for goods consumed by households. Goods consumed by, for example, small firms are not included in the calculation of the simulated inflation rate.

22 Price increases for energy and – to an even greater extent – food will increase the subjective inflation rate of poorer households more than that of richer households, as these goods account for a larger share of their consumption. At the same time, energy price hikes also strongly affect transportation and discretionary spending (recreation, culture, restaurants and hotels), which have a stronger weight in the consumption baskets of high-income households. See Bobasu, Di Nino and Osbat (2023) and Battistini, Di Nino, Dossche and Kolndrekaj (2022).

Chart 3

Distribution of disposable income growth and consumer inflation in the euro area



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: This shows the simulation results for the euro area aggregate, separately depicting the growth in nominal disposable income and prices by income decile. More technically, changes in prices and incomes are presented as a proportion of their own bases. Accordingly, the change in price is related to the price level and can be interpreted as "consumer inflation". The bars in the chart show the change in nominal disposable income growth by decile, with the top part of the bar, shaded dark blue, showing the contribution of government inflation-related measures to income growth. The solid line shows the change in decile-specific household consumer prices. Inflation rates are different for each decile, as they take into account household-specific consumption baskets aggregated by decile and product-specific changes in prices from 2021-2022. The dotted line shows the inflation rate in a counterfactual scenario without the government price measures. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

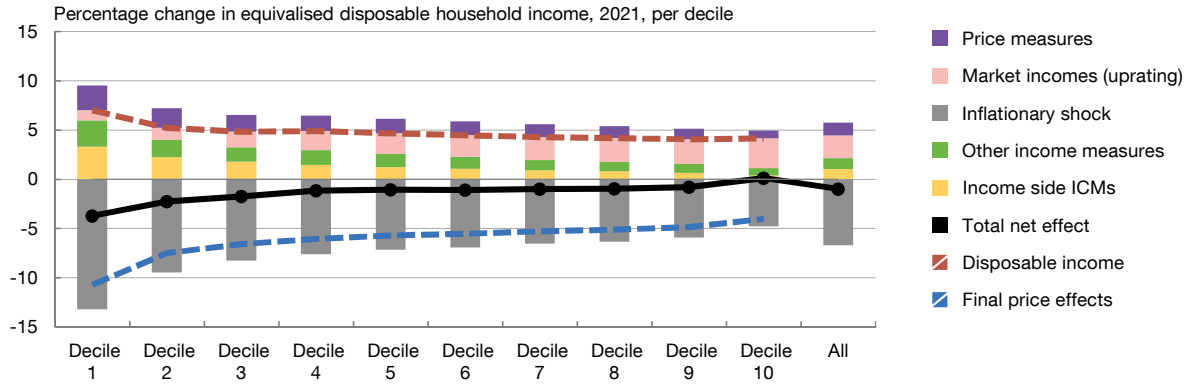
Disposable income grew relatively equally across income groups, except for in the poorest income bracket. Taking into account all sources of disposable income growth – market income growth and the two types of government measures – household income grew by around 4% to 5% in the second to tenth income brackets. Disposable income growth in the lowest income bracket was significantly higher, at 7%.

Sources of income growth resulting from nominal uprating and income support measures are inversely related across the household income spectrum (Chart 3). The simulated contribution of income measures to household income gradually decreases from 3% in the first decile to 0.4% for the richest 10% of households. Among other factors, this is because eligibility for a large proportion of the income measures is bound to income thresholds, or they are phased out with increased income. Government measures to compensate households for the inflation surge therefore contributed to closing the gap in disposable income growth across the household income spectrum. Income from employment often contributes less to the disposable income of poorer households than unemployment benefit or other social benefits. Furthermore, increases in nominal earnings lead to "bracket creep", resulting in higher tax rates if tax brackets are not adjusted.[23] At the same time, government income policies not explicitly linked to the inflation surge – such as increases in pensions and unemployment benefits – grew significantly stronger in the lower deciles.

23 The magnitude of the bracket creep effect depends on the difference between an individual's effective marginal and average tax rates. Households in the lower half of the income distribution face particularly strong tax progression, with low effective average tax rates but often very high effective marginal tax rates due to phasing out of transfers.

Chart 4

Price and income effects based on households' welfare



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Market outcomes (before any government policies) are shaded. Government policies are shown in solid colours. Contributions to changes in disposable income pertaining to the price (income) side are shown in red (blue) tones. The dashed lines show the total effect on the income (price) side in blue (red). Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

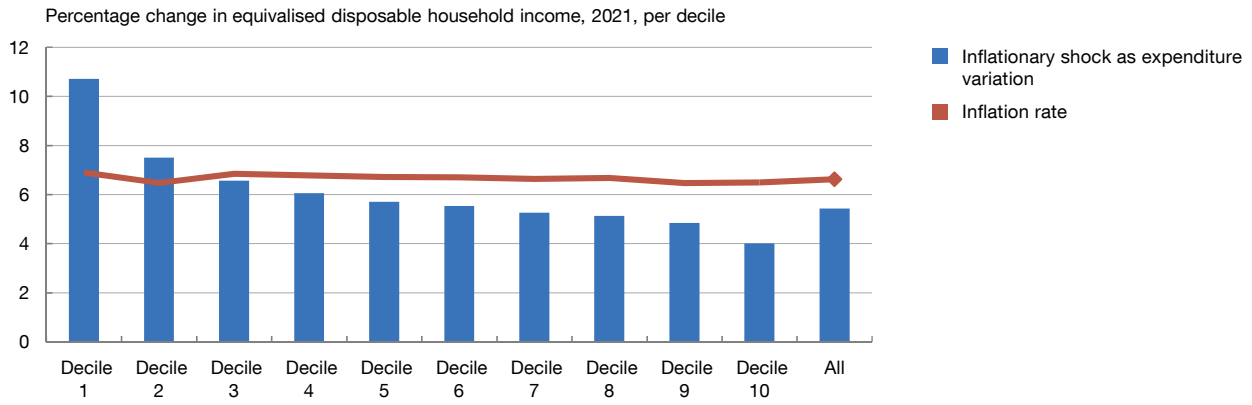
Chart 4 shows the results of our second approach, which combines the effects of inflation, income growth and government policies on households' welfare across income deciles.[24] Negative bars show the impact of the inflationary shock on the decile-specific consumption basket, i.e. the increase in household expenditure as a share of household disposable income, before considering compensating government policies on the price side. Positive bars show the positive impact on household purchasing power of (i) market income growth, (ii) government measures unrelated to the inflationary shock and (iii) the ICMs, both on the income and price side. The total net effect is obtained by deducting the inflationary shock from the total positive impact of market income growth and government measures.

The expenditure-based measure amplifies the distributional effect of the 2022 inflationary shock, where poorer households suffered greater losses due to inflation than richer households. Since disposable income and expenditure are generally not equal, the expenditure impact of a consumer price shock on disposable income can be larger or smaller than the inflation rate itself. This depends on the ratio of disposable income to expenditure. In the euro area, households in the first and second deciles spend more than they earn (implying negative savings). As a result, the impact of the increase in expenditure relative to disposable income in the first decile is larger than the effective inflation rate. The opposite holds true for deciles 3 to 10, where households earn more than they consume, and savings are therefore positive (Chart 5).

24 Chart 4 can be interpreted as changes in household welfare measured as "compensating variation", assuming a Leontief utility function (i.e. how much money a household would need to spend to maintain a given level of utility).

Chart 5

A measure of household welfare vis-à-vis the inflation rate



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: The inflationary shock, defined as the additional expenditure necessary to keep the consumption bundle unchanged before policies, is shown in red. The distance between the inflationary shock as expenditure variation and the inflation rate is indicative of the share of income consumed in each decile. In deciles 1 and 2, the increase in expenditure to afford the same consumption bundle exceeds the inflation rate, implying that consumption exceeds the household's income (negative savings).

Government measures helped to close the inequality gap by offsetting the unequal effects of increases in consumer prices and market incomes. First, the welfare of all but the tenth (richest) decile decreased, even considering the impact of government compensation measures, as shown by the black line in Chart 4. The bottom three deciles suffered the strongest welfare impact. Second, the welfare gap of 8.4 percentage points between the lowest and highest income deciles created by the inflation surge was closed by only 1.7 percentage points due to price measures. Price measures were far less targeted at the poorer households most affected by inflation compared with income measures.

However, taking into account all effects, a gap of 3.8 percentage points in welfare remains between the poorest and richest households. The first three deciles experienced a welfare decline of up to 3.7%. Closer to the median, equivalised disposable incomes marked milder decreases of approximately 1%. All deciles except for the top decile suffered a net loss. Richer households mainly benefited from strong increases in market incomes, while for lower-income households, ICMs on both the income and price sides did not fully offset the increase in consumer prices.

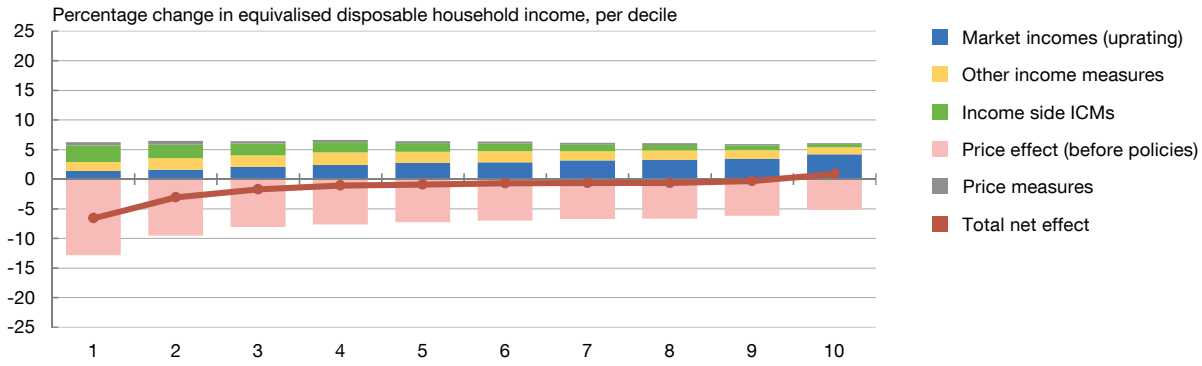
3.3 The distributional impact of inflation and government policies for the euro area countries

In this section, we take a closer look at the inflationary shocks and government responses across countries (Chart 6). We will focus on three main types of difference: (i) the size and distribution of the inflationary shock and the government response, (ii) the use of income versus price measures and (iii) the distributional outcome after taking into account market income growth and the government response.

Chart 6

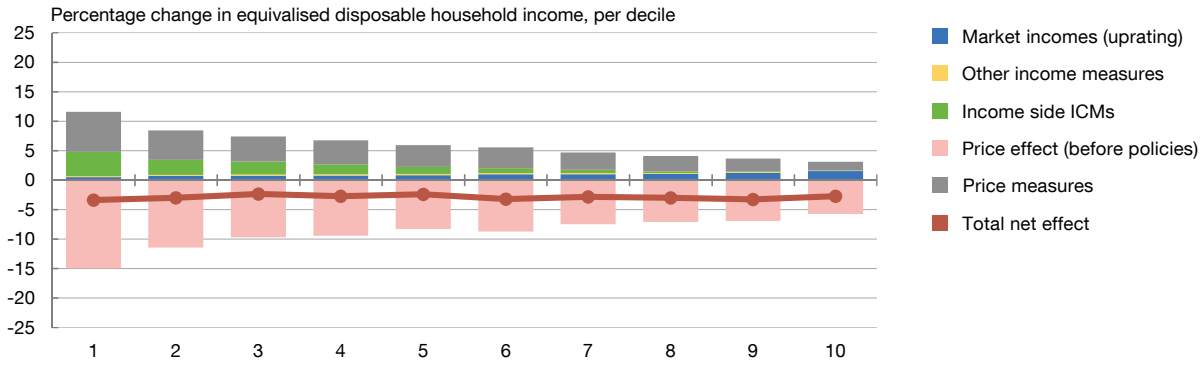
Price and income effects based on households' welfare in the euro area countries

6.a Germany



6.b Spain

6.c Greece



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Market outcomes (before any government policies) are shaded. Government policies are shown in solid colours. Contributions to changes in disposable income pertaining to the price (income) side are shown in red (blue) tones. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

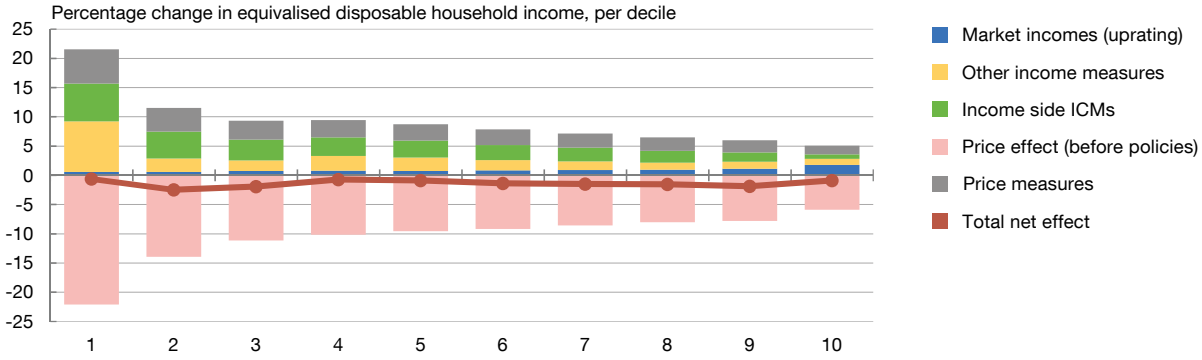
First, governments seem to have geared their policies towards compensating for the welfare of households across the income spectrum. France and Italy serve as illustrative examples, where the 2022 inflationary shock plays out differently in terms of its impact on the distribution of disposable household income. Poor households were

Chart 6

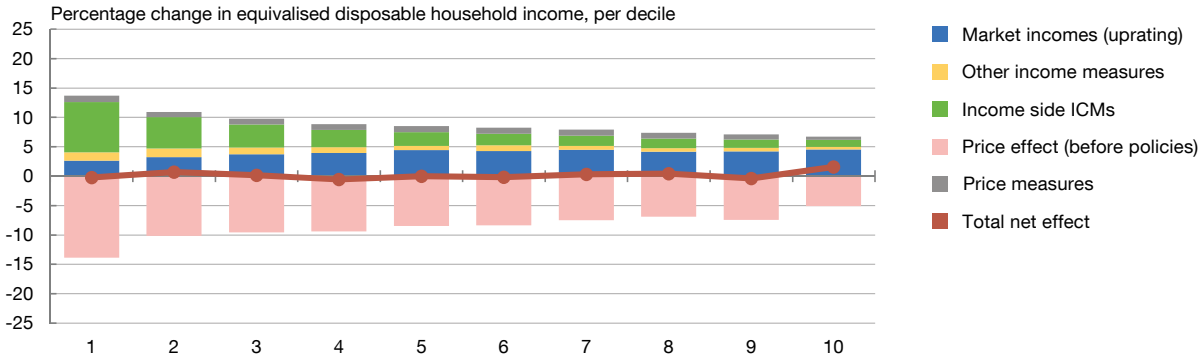
Price and income effects based on households' welfare in the euro area countries (cont'd)

6.d France

6.e Italy



6.f Portugal



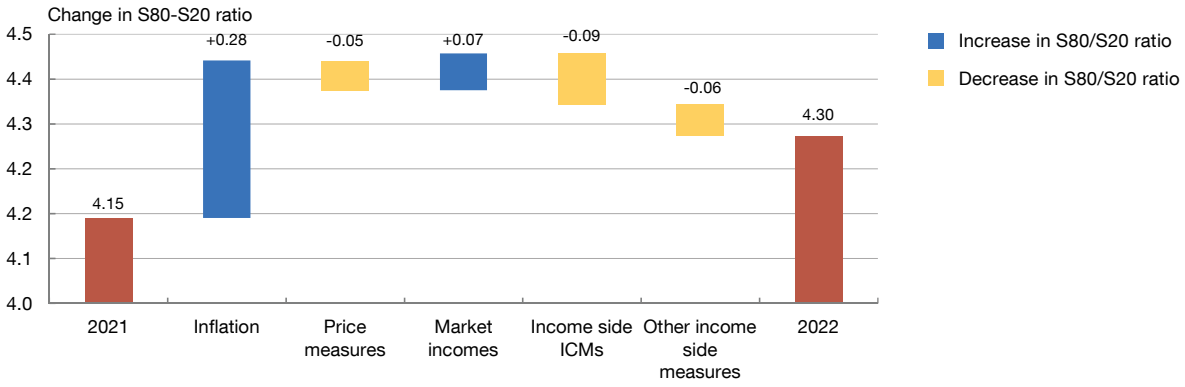
SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Market outcomes (before any government policies) are shaded. Government policies are shown in solid colours. Contributions to changes in disposable income pertaining to the price (income) side are shown in red (blue) tones. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

particularly severely hit by the inflationary shock in Italy, which reduced their welfare by almost 25%. By contrast, the year-on-year loss in welfare in France was much smaller, ranging between 7% in the lowest income decile and 3% in the highest income decile. However, in both countries the final welfare loss was almost completely equalised between the top and bottom deciles, mainly on account of fiscal measures. Italy implemented both price and income measures that strongly supported households, which helped to offset the loss in welfare by around 12 percentage points in the lowest decile and 2.2 percentage

Chart 7

Breakdown of changes in inequality for the euro area (2021-2022)

7.a Average effect



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

points in the highest decile, even after taking account of income growth and other measures. In France, price and income measures offset the loss in welfare by around 4.5 percentage points in the lowest decile and 1.2 percentage points in the highest decile.

Second, while some countries placed a strong focus on containing price increases, others took more measures to support households via transfer payments. Here, Greece and Portugal serve as two almost polar cases. Greece resorted mainly to price measures, which compensated for the purchasing power loss in the first income decile, while income measures played a much smaller role. By contrast, price measures in Portugal only compensated for about 1 percentage point of the poorest households' welfare losses, while income measures played a much larger role. It is worth noting that these income measures in Portugal declined quickly towards the higher-income deciles. By contrast, price measures were more evenly spread throughout the deciles both in Greece and Portugal. In France, too, price measures played a bigger role than income measures.[25]

Third, the distributional impact of the inflationary shock was broadly offset in all countries, except Germany and Spain. While the a priori distributional impact of inflation was quite different across countries, government measures are simulated to have largely closed the gap in welfare loss across the distribution in France, Italy, Portugal and Greece. In France, Italy and Portugal, the negative impact of inflation on welfare was almost fully offset. Italy, Portugal and Greece experienced strong redistribution through fiscal measures. In the case of France, the inflation shock was smaller, requiring a smaller effort to compensate for unequal price increases. In Greece a welfare loss of around 3% remains.

25 Recall that in the case of France, the extraordinary revaluation of pensions is included in the nominal income growth category and not in the set of income support measures.

Box 3

CHECKING THE ROBUSTNESS OF PRICE MEASURES

The EUROMOD ITT requires detailed data on the consumption patterns of each household. In addition, each of the price measures needs to be modelled in the tool. In many cases, the benefit of a policy for a given household depends not only on household characteristics but also on external factors such as the market price of subsidised energy. As a robustness check, this box benchmarks the detailed analysis using EUROMOD's ITT against a much simpler approach, which relies on estimates of the volume of price measures in each country and a simple exposure measure derived from the HBS to calculate the distributional impact of the price measures.

Since most price measures are aimed at containing the increase in energy prices, households that spend more on energy (relative to their income) benefit more in relative terms. This effect is captured by the relative exposure to energy-intensive products defined as follows, where "q" stands for the percentile:

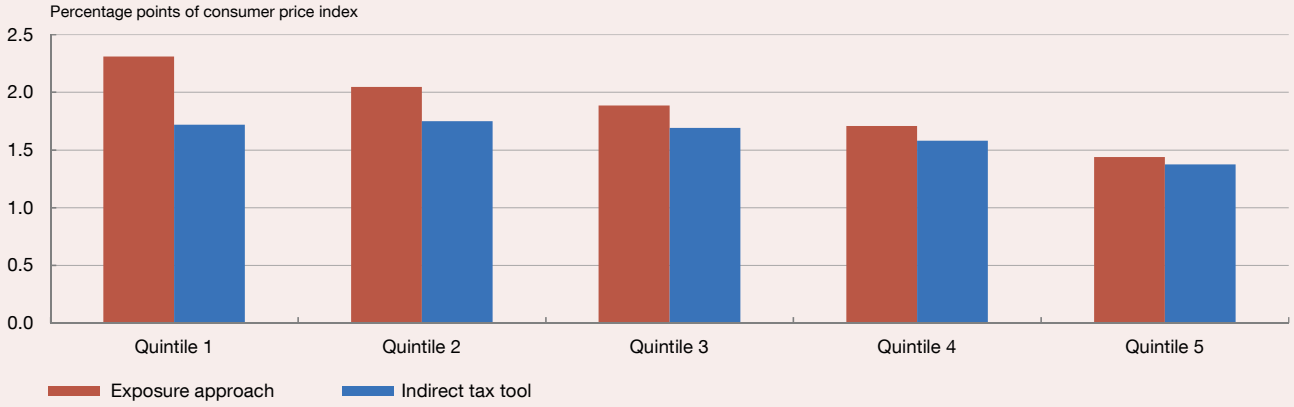
$$\text{Exposure}_q = \frac{\text{Share spent on energy intensive goods}_q}{\text{Average share spent on energy intensive goods}}$$

The exposure measure to energy-intensive goods is calculated from the 2015 wave of the HBS based on the household's consumption share of electricity, gas and other fuels.[1] There is considerable heterogeneity in the consumption shares, ranging from 3.5% (fifth quintile in Spain) to 9.5% (first quintile in Portugal). Across all countries, the consumption shares of energy-intensive goods decrease with income. In the euro area average, the first quintile spends about 60% more of their consumption on energy-intensive goods than the richest 20% of the income distribution.

The total value of price measures summed over Germany, Greece, Spain, France, Italy and Portugal amounts to €96.3 billion.[2] To determine the effect of the price measures on consumer prices, a simplifying assumption of perfect pass-through of government expenditure on price measures to consumer prices is made, which is consistent with the microsimulation analysis. Assuming further that consumers would have opted for the same consumption bundle had there been no price measures, it can be inferred that price measures prevented an additional increase of 1.7% in consumer prices.[3] Finally, the aggregate effect is distributed to quintiles according to their specific exposure to energy prices (see previous paragraph).

Both approaches deliver broadly similar results. In terms of volume, the much-simplified exposure-based approach shows a slightly higher overall reduction in consumer prices. The ITT-based approach exhibits less progressivity with regard to the distributional impact of the price measures (Chart 1). The exposure-based approach is likely to draw an over-optimistic picture of the price measures, as it assumes very strong targeting of price measures towards energy. In practice, price measures, e.g. a VAT cut on a broad class of goods, also reduce prices for goods that exhibit more equal weighting in consumption baskets across income groups. This shows that price measures, which are less able to target the most vulnerable income groups by design, should aim to reduce prices for goods that are – relative to income – predominately consumed by less wealthy income groups.

Chart 1
Policy effect of price measures on consumer prices according to ITT and exposure approach. Per quintile, euro area average



SOURCE: The exposure-based approach relies on the Working Group on Public Finance Questionnaires from March 2023 MPE and HBS (2015).
NOTE: Bars show the euro area approximation of the reduction in consumer prices achieved by the price measures introduced in Germany, Greece, Spain, France, Italy and Portugal. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

1 While the 2020 wave of HBS is also available, data for Portugal is missing and consumption shares may be distorted due to the COVID-19 pandemic.
2 Data from the ESCB Working Group on Public Finance fiscal questionnaires and March 2023 Macroeconomic Projection Exercise for the euro area (MPE).
3 This back-of-the-envelope approach assumes that every euro spent on price measures reduces the actual prices faced by consumers by one euro. This futher implies that in the absence of the price measures, an additional €96.3 billion of expenditure would have been needed to afford the same consumption bundle. Aggregate consumption of households summed over Germany, Greece, Spain, France, Italy and Portugal in 2022 is estimated to be €5,598 billion (AMECO Autumn Forecast). Consequently, without the price measures, prices would have been another 1.7% higher in 2022.

In Germany inflation was mostly offset by nominal wage growth, from which higher-income households gained more in terms of changes in disposable income (which, to some extent, also happened in France). Similarly, the amount of redistribution attained with the fiscal measures implemented in Spain was limited. In Germany and Spain in particular, lower-income households lost a higher share of their disposable income. A significant gap of around 7.5% and 5.1% remains between the first and tenth deciles in Germany and Spain respectively, while all households experienced a significant loss from the inflationary shock, ranging from 3% to 7%.

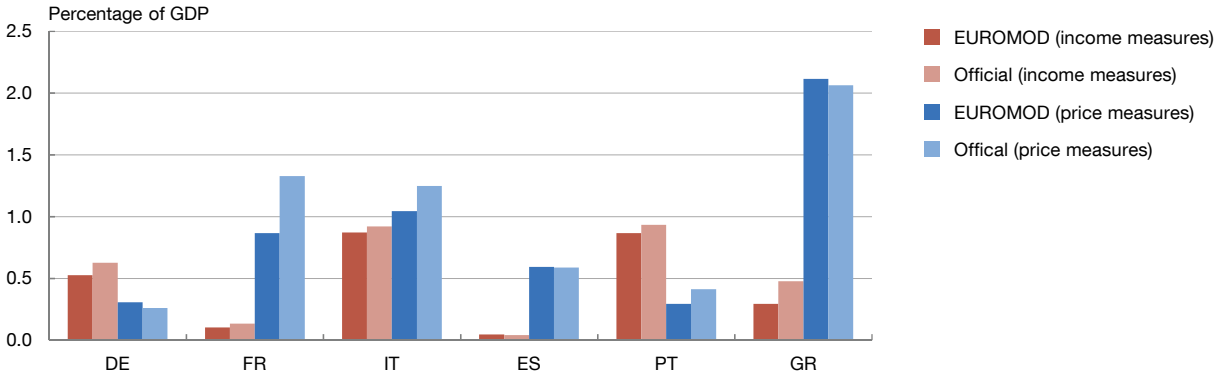
4 Measures of inequality and fiscal cost

By examining the change in inequality measures for the euro area, we can see that ICMs have made a significant contribution to limiting the inequality-increasing pressures created by the 2022 inflationary shock in the euro area. Chart 7 breaks down changes in the quintile share ratio (S80-S20) calculated on the basis of the welfare measure introduced in Section 3.2. Inflation has – together with the uneven effects of growth in market income – increased inequality in the euro area. The S80-S20 ratio increased by around 7% on account of inflation and by around 2% on account of market income growth. However, government ICMs on the income and price side have reduced the S80-S20 ratio by around 5%. Other policy changes on the income side, e.g. adjustments of income tax brackets, also helped to reduce inequality.

ICMs tend to decrease welfare inequality across the six euro area countries presented in this paper. Although their impact may be stronger in some countries than in others, the ICMs generally help to reduce inequality in all countries (Table 5). More

Chart 8
Comparison of EUROMOD cost estimates with government estimates

8.a Average effect



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES:The relatively large discrepancy between the simulated and official cost of the price measures for France is mainly attributable to underestimation of the cost of the gas price growth cap simulated by EUROMOD vis-à-vis the amount of subsidies to compensate gas firms (used as a reference for the official budgetary cost of the measure).

Table 5
Impact of ICMs on inequality in six euro area countries

Inequality measure: 80/20 income ratio	DE	GR	ES	FR	IT	PT
Change in 80/20 income ratio due to inflation-related government policies (in points)	-0.10	-0.36	-0.11	-0.09	-0.32	0.27
Contribution from income measures (percentage)	83	45	45	57	58	95
Contribution from price measures (percentage)	17	55	55	43	42	5

SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

progressive ICM profiles result in higher inequality reductions, such as in the case of Greece, Italy and Portugal and, to a lesser extent, Germany and France. Given that income measures are typically more targeted at lower-income households, they are generally more effective at reducing inequality than price measures.

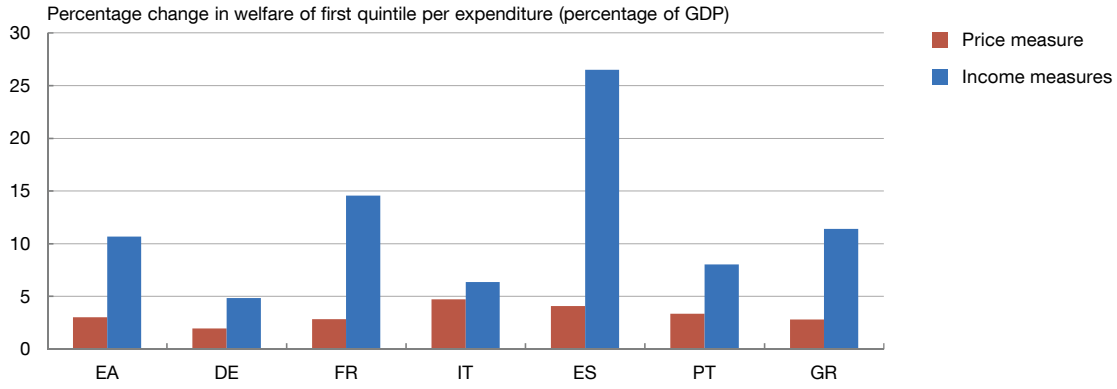
The finding that income-side ICMs have reduced inequality does not mean that government measures were generally effectively targeted. Income measures were targeted at lower-income households to varying degrees (see Section 3.3). However, most of the price measures adopted by governments were not targeted at lower-income households. Untargeted price measures dampen price increases for all consumers and incur high fiscal costs compared with income measures. Additionally, it is not fully clear whether they achieve their initial objective of containing prices, since the majority are dependent on firms deciding to pass through prices. They are, for this reason, a relatively inefficient instrument to support the most vulnerable.

The detailed modelling of ICMs in EUROMOD allows us to quantify the fiscal cost associated with each measure. We validate the simulated fiscal cost of the measures against government estimates. EUROMOD estimates are, in general, close to and, in many cases, practically equivalent to government projections (Chart 8). For a more detailed comparison of the fiscal cost of individual income and price measures, please refer to Section A7 in the annex.

Overall, governments could have reduced the negative impact of the inflation surge on inequality at a lower fiscal cost by targeting income measures at vulnerable households. Chart 9 depicts a cost-benefit metric of income and price measures across the six countries, namely the increase in welfare for the bottom 20% divided by the fiscal cost

Chart 9
Change in disposable income of first quintile per euro spent

9.a Average effect



SOURCE: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES:The bars show the change in disposable income of the bottom 20% of the income distribution (first quintile) divided by the cost of the price and income measures as a percentage of GDP. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

by type of measure as a percentage of GDP. Price measures are inefficient in all countries to similar degrees. For every additional 1% of GDP in expenditure, the welfare of the first quintile is raised by less than 5%. In contrast, income measures can be targeted much more effectively, with the first quintile in Spain gaining over 25% for a similar increase in spending. While price measures still raise welfare progressively throughout the income distribution, lower-income households could have been protected against inflation at a much lower cost, had governments made more use of targeted income measures.[26]

26 Please note that targeted income measures may not be very effective when there is a large degree of tax evasion and households report less than they truly earn to be eligible for income support.

5 Conclusions

This paper assesses the distributional impact of the inflation surge in the euro area since 2021 and the ICMs taken by euro area governments. It applies the EU microsimulation model EUROMOD and its ITT extension to assess how inflation and government measures to support households have affected purchasing power and welfare across the income distribution. Results are presented for a proxy of the euro area aggregate and separately for Germany, Greece, Spain, France, Italy and Portugal. The paper shows that the inflationary shock had a more detrimental impact on lower-income households than on higher-income households. At the same time, and even though measures were not strongly targeted towards lower-income households, government measures made a significant contribution to reducing the welfare loss on account of the inflation surge.

Our analysis underscores a number of important policy messages. First, differences in consumption patterns among richer and poorer households often meant that the latter suffered higher effective rates of inflation in 2022. However, the disproportionate impact of inflation on poorer households was mainly attributable to their higher consumption shares of income. High consumption shares of income meant that the total nominal income that poorer households would have needed to sustain pre-inflation consumption often exceeded their actual income, resulting in large welfare losses. Our analysis therefore stresses the importance of accounting for saving patterns when assessing the impact of inflation on households. Second, the use of untargeted measures was largely not cost-effective. For the euro area as a whole, we estimate that the offsetting effect on our measure of inequality, i.e. the reduction in the inequality gap, achieved by the income measures was three times as large as that achieved through price measures. Third, while price measures were similarly inefficient across countries, the cost-effectiveness of income-side measures varied dramatically. This suggests that the policy debate should move beyond discussing targeted versus untargeted measures and focus more on how best to design targeted measures.

The limitations of our analysis relate mainly to the ceteris paribus nature of the exercise, the focus on the household sector and data availability. First, because EUROMOD is a static tax-benefit simulator, it does not account for households' reactions to changes in prices, nor firms' pass-through responses to any increase in production cost or government subsidy, other than a full pass-through. To understand the full macroeconomic implications of government measures to compensate for high inflation, a general equilibrium model needs to be employed. Second, the analysis is limited to support made directly available to households. Many of the measures taken by governments were, however, directed at firms. These measures also affected households, albeit indirectly, but are not part of this analysis. Third, the paper faces some data limitations. In particular, we had to make recourse to the 2010 wave of the HBS. However, as Box 2 shows, this should not significantly alter the results of the analysis.

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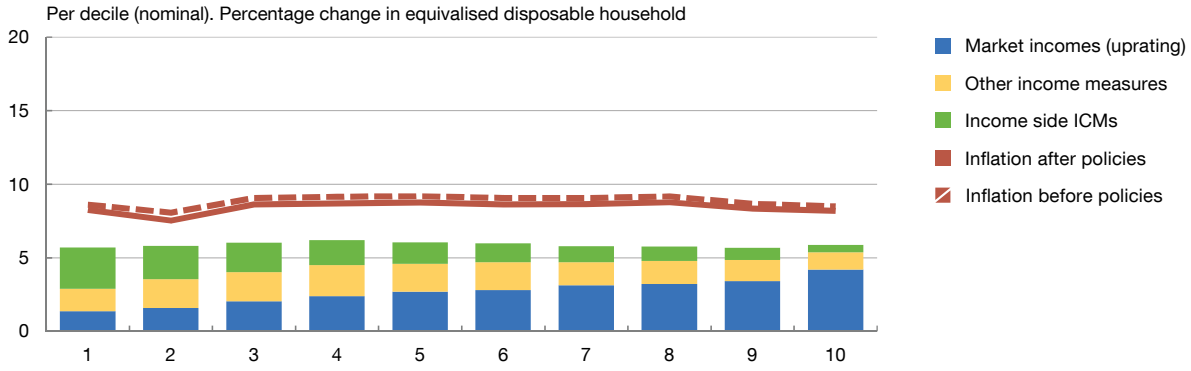
Annex

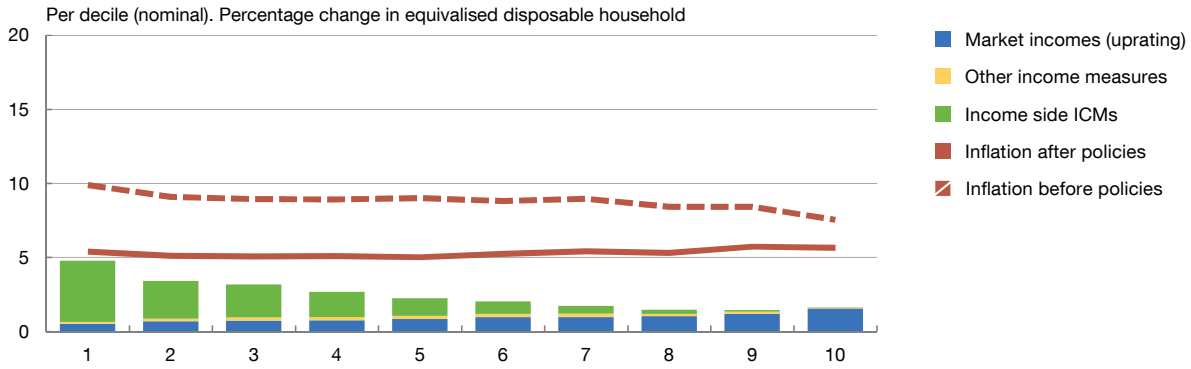
A.1 Additional charts

Chart A.1
Distribution of disposable income growth and consumer inflation across countries

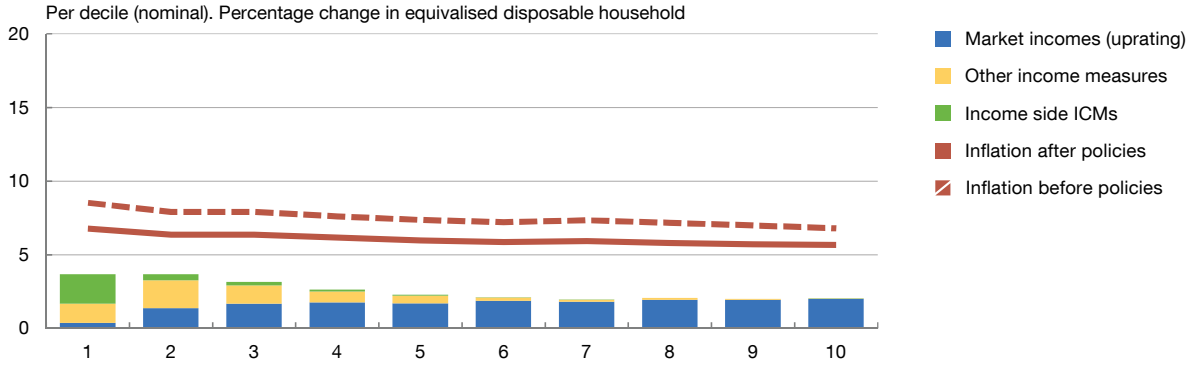
A.1.a Germany



A.1.b Greece



A.1.c Spain

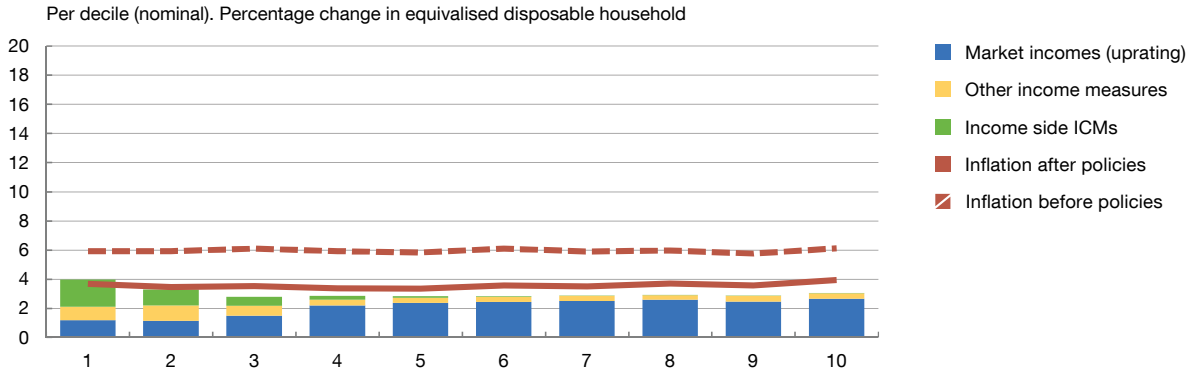


SOURCES: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Market outcomes (before any government policies) are shaded. Government policies are shown in solid colours. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

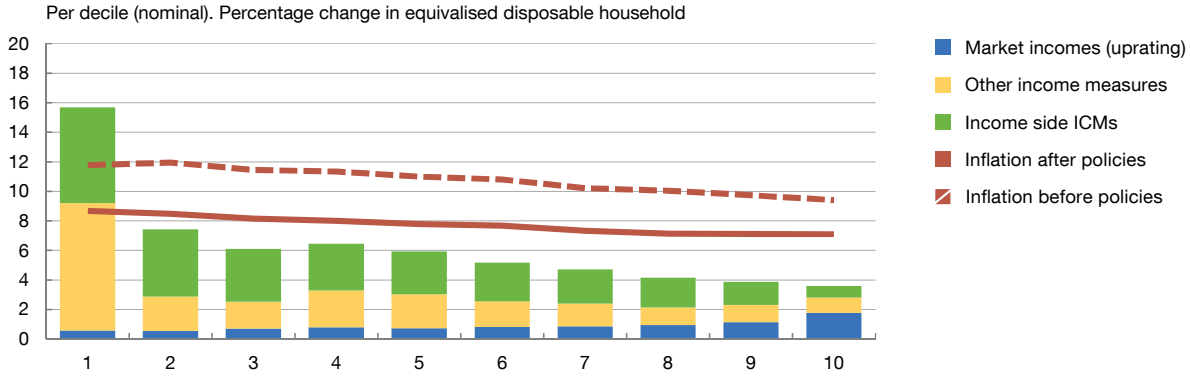
Chart A.1

Distribution of disposable income growth and consumer inflation across countries (cont'd)

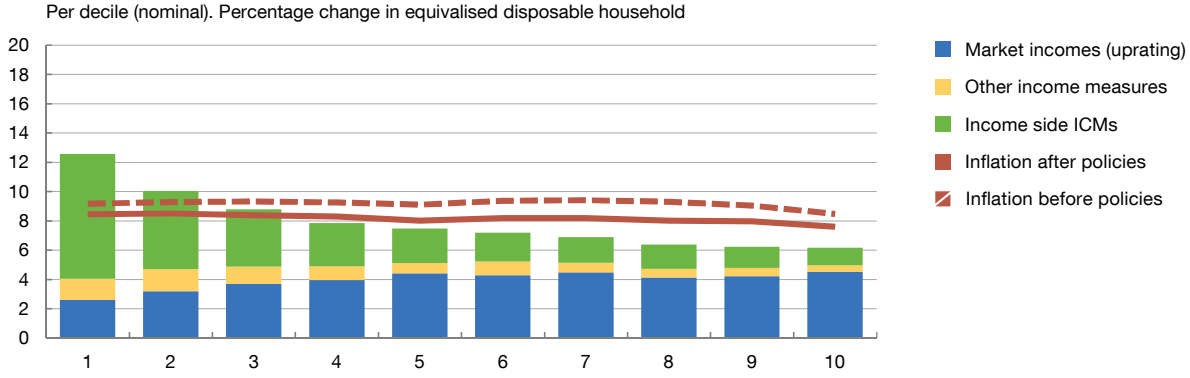
A.1.d France



A.1.e Italy



A.1.f Portugal



SOURCES: Own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Market outcomes (before any government policies) are shaded. Government policies are shown in solid colours. Equivalised disposable income is computed by dividing the household's disposable income by its size on the OECD's modified equivalence scale, which assigns a weight of one to the first adult of the household and a weight of 0.5 (0.3) to each additional household member over (under) the age of 14.

A.2 Government measures in Germany

Income measures: Income measures in 2022 consisted mainly of lump-sum transfers. The government introduced a taxable lump-sum payment of €300 as a one-off energy allowance for employed individuals liable to income tax, and a similar lump-sum payment for pensioners (both from statutory pension insurance and federal pension recipients) on 1 December, with a requirement of domestic residence. Means-tested transfers consisted of a one-off payment of €200 for social benefit recipients and €100 for unemployment benefit recipients. Families received a child bonus payment of €100 per child. Housing allowance recipients for the period from September to December 2022 were eligible for a one-time heating allowance, with amounts ranging from €415 for one person to €540 for two persons, and €100 per additional person. Trainees, pupils and students entitled to a subsidy each received a heating cost subsidy of €345. At the same time, on the revenue side, income tax allowances were increased retroactively from 1 January 2022, with the employee allowance rising by €200 to €1,200 and the basic allowance increasing by €363 to €10,347. Finally, from the end of October 2022, employers could pay inflation compensation bonuses up to €3,000, which are exempt from tax and social contributions.

Table A.1
Government measures in Germany

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
Income tax allowances increased	Income	Direct taxes by households	4,500	
Child bonus payment	Income	Direct taxes by households	1,000	1,478
Child bonus payment	Income	Other social benefits other than in kind	800	Child bonus payments modelled together
Means-tested transfers (one-off payments)	Income	Other social benefits other than in kind	1,500	Modelled as part of taxable lump-sum payment for pensioners
Taxable lump-sum payment for economically active people	Income	Other social benefits other than in kind	10,000	11,891
Taxable lump-sum payment for pensioners	Income	Other social benefits other than in kind	6,000	6,693
Heating allowance	Income	Other social benefits other than in kind	380	206
Temporary reduction of VAT on gas	Price	VAT	2,400	
Temporary reduction of excises on vehicle fuels	Price	Excise	3,200	
One-off reimbursement (payment of the December gas bill: direct transfer to private households)	Price	Reimbursement	4,450	

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

Price measures: (i) Temporary reduction of the VAT rate on natural gas from 19% to 7% (October-December 2022), (ii) temporary reduction of excises on vehicle fuels (June-August 2022), (iii) one-off reimbursement of the December gas bill (a discount of one-twelfth was applied in the model, as we do not have monthly estimates), and (iv) the levy for renewable energies normally paid by electricity consumers was set to be subsidised and paid from the Energy and Climate Fund as of 1 January 2023 (but this was brought forward to 1 July 2022, as a reaction to heightened energy prices in 2022). The first three policy measures are included in this analysis and represent about 80% of the total estimated government budget allocated to these policies.

A.3 Government measures in Greece

Income measures: The government adopted a number of lump-sum transfer measures. First, the most important measure in fiscal terms were extraordinary payments of €200 in April and €250 in December, which were provided to low-paid pensioners, recipients of disability benefits and senior uninsured citizens. Second, an additional 1.5 months' worth of child benefit was paid in April and December. Third, there was an increase in the heating allowance by approximately

Table A.2
Government measures in Greece

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
Extraordinary one-off payment to the long-term unemployed	Income	Unemployment benefits	18	52
Extraordinary one-off payment to low-paid pensioners	Income	Other social benefits other than in kind	367	280
Extraordinary one-off payment to vulnerable groups	Income	Other social benefits other than in kind	80	40
Minimum guaranteed income (two extra payments)	Income	Other social benefits other than in kind	94	14
Child benefit (three extra payments)	Income	Other social benefits other than in kind	243	222
Increase in the heating allowance	Income	Other social benefits other than in kind	189	3
Reduction of VAT rate (from 13% to 6%) on fertilisers	Price	VAT	15	33
Reduction of VAT rate (from 13% to 6%) on animal feed	Price	VAT	15	12
Return of excise duty on diesel to farmers	Price	Excise	76	65
Subsidy on household natural gas consumption	Price	Discount/subsidy	94	55
Heating oil subsidy	Price	Discount/subsidy	90	93
Diesel subsidy	Price	Discount/subsidy	217	251
Prepaid card for households to purchase motor fuel	Price	Social benefits in kind	300	447
Subsidy for household electricity consumption	Price	Discount/subsidy	3,187	3,441
Return of 60% of the increase in electricity prices	Price	Reimbursement	296	—

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

15%. Other less-prominent measures included an extraordinary one-off payment of €250 in December for long-term unemployed individuals and a doubling of minimum guaranteed income in April and December. All measures are covered by the modelling excise.

Price measures: On the revenue side, there were measures aimed at supporting farmers, including a return of excise duty on diesel. Additionally, the VAT rate on fertilisers and animal feed was reduced from 13% to 6%. On the expenditure side, various subsidies were put in place. Flat-rate subsidies included a diesel subsidy of 12 cents per litre and a heating oil subsidy of 20 cents per litre. For household natural gas consumption, there was a progressive subsidy of €20 per MWh for January to June 2022, except for April 2022, when it was €40 per MWh. A private supplier, DEPA, also provided a subsidy. Furthermore, there were progressive subsidies for household electricity consumption. The "Power pass" programme involved a one-off return of 60% of the increase in electricity bills between December 2021 and May 2022 for households' primary residence, with eligibility based on 2020 net family income up to €45,000 and a maximum ceiling of €600. The "Fuel pass" programme included two lump-sum payments in 2022, through either a bank deposit or a specially assigned digital debit card. In May, eligibility criteria included a family taxable income of less than €30,000, and car owners received €45 on a digital debit card or €40 in a bank account. In August/September, eligibility criteria included a family taxable income of less than €30,000 (with additional allowances for a married partner and dependent children, and up to a ceiling of €45,000), and car owners received €80 on a digital debit card or €65 in a bank account. There were lower rates for motorcycle owners and higher rates for residents in the islands. Finally, a significant portion of the price measures were targeted at enterprises.

A.4 Government measures in Spain

Income measures: The income measures modelled were a lump-sum transfer of €200 targeted at individuals with low income and low wealth, as well as a one-off increase of 15% in non-contributory pensions and a minimum income scheme. Two other income measures

Table A.3
Government measures in Spain

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
One-off increase in non-contributory pensions and minimum income scheme	Income	Other social benefits other than in kind	425	470
Lump-sum transfer to low-income households	Income	Other social benefits other than in kind	120	134
Reduction in VAT on gas	Price	VAT	190	183
Reduction in VAT on electricity	Price	VAT	1,995	2,739
Reduction of ad valorem excise on electricity	Price	Excise	1,865	1,117
Iberian price cap	Price	Price cap	No fiscal cost	—
Fuel subsidy	Price	Discount/subsidy	3,774	3,822

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

that could not be modelled using EUROMOD were a one-off increase in student scholarships and a small increase in the heating subsidy to lower-income households.

Price measures: Fuel subsidy of 15-20 cents per litre of fuel for nine months. Reduction of VAT on electricity from 21% to 10% for six months, and to 5% for the following six months. Reduction of VAT on gas from 21% to 5% for three months. Reduction of ad valorem excise on electricity from 5.11% to 0.5% for the full year. Iberian cap mechanism to limit the price of electricity.

A.5 Government measures in France

Income measures: On the expenditure side, these measures included benefits in kind such as an "additional" energy voucher[27] and assistance with household heating, as well as a cash bonus. Lower-income households with an annual reference tax income per consumption unit[28] between €10,800 and €17,400 were awarded an energy voucher worth €100, while those below €10,800 received €200. Additionally, lower-income households received assistance with household heating amounting to €100 or €200 respectively.[29] Since these vouchers had a "general purpose" use, we considered them as close to a general support income transfer and simulated them together with the other income measures in

Table A.4
Government measures in France

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
Increase in the cap for personal expenses	Income	Direct taxes by households	400	117
"Back to school" bonus	Income	Other social benefits other than in kind	1,100	994
Additional energy voucher	Income	Social transfers in kind	1,800	1,574 (a)
Assistance with household fuel oil heating	Income	Social transfers in kind	230	
Reduction in energy tax (taxe intérieure sur la consommation finale d'électricité, TICFE)	Price	Excise	7,400	3,122
Cap on growth in electricity prices	Price	Price cap	11,600 (b)	11,551
Cap on growth in gas prices	Price	Price cap	8,500 (b)	3,121
Fuel discount (€142/1,000 litres, yearly average)	Price	Discount/subsidy	7,600	5,070

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

a The "additional" energy voucher and assistance with household fuel oil heating were simulated together and the EUROMOD estimate presented in the table is the total simulated budgetary cost of the two measures.
b The announced budgetary cost of the price caps on electricity and gas was approximated by the amount of the subsidies foreseen to compensate electricity

27 There was already a similar in-kind benefit in place in 2021.

28 The value of the consumption unit is calculated as follows: the first person in the household counts as one consumption unit; the second person of the household as 0.5 consumption units; and the third and any additional persons as 0.3 consumption units.

29 The fuel aid, which also took the form of an energy voucher, could be used to pay all types of energy bills (gas, electricity, fuel oil, wood pellets, etc).

EUROMOD. The "back to school" bonus of €100, plus an additional €50 per dependent child, was targeted at lower-income households receiving minimum social benefits. On the revenue side, there was a 10% increase in the cap of the personal expenses allowance included in personal income tax. The extraordinary 4% pensions revaluation was modelled as part of the uprating exercise and its impact appears in nominal income growth.

Price measures: On the revenue side, there was a tax reduction on electricity, bringing taxes on this utility to their legal minimum. On the expenditure side, several measures were implemented. There was a fuel discount of 18 cents per litre from April to August, 30 cents per litre from September to October, and 10 cents per litre from November to December. Additionally, caps of 4% on growth in electricity prices and 0% on growth in gas prices were implemented in the regulated market of these energy sources. The price caps were simulated in the ITT based on assumptions of the shares of the regulated and non-regulated markets and counterfactual prices estimated by the French Energy Regulatory Commission (CRE).

A.6 Government measures in Italy

Income measures: First, there was an increase in subsidies for the "social bonus" for electricity and gas bills. Second, employees, pensioners, the unemployed, minimum income scheme recipients and other categories of work were paid one-off lump-sum bonuses of €150 and €200. Third, there was an advance reconciliation payment for cost-of-living adjustments to pensions and an increase in pension payments. Fourth, relief on social

Table A.5
Government measures in Italy

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
Advance reconciliation payment for cost-of-living adjustments to pensions and increase in pension payments	Income	Old-age pensions	1,965	1,300
Relief on social security contributions for payroll employees	Income	Social security contributions	3,734	4,215
"Social bonus" for electricity and gas bills	Income	Other social benefits other than in kind	3,222	1,400
One-off (€150 and €200) supplements	Income	Other social benefits other than in kind	9,878	9,678
Increase in the value of welfare bonuses to €600	Income	Other social benefits other than in kind	86	n.a.
5% VAT on gas	Price	VAT	5,606	4,268
Reduction in excise duty rates on fuels	Price	Excise	9,208	8,298
Reduction in general system charges for electricity and gas use	Price	Discount/subsidy	9,015	7,373

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
NOTES: Reduction in general system charges for electricity and gas users; application of a reduced VAT rate (at 5%) for gas users; reduction in excise duty rates on fuels (including the effect on VAT revenues).

security contributions for payroll employees was increased. Fifth, the value of welfare bonuses was increased to €600. Energy-related support to transporters and hospitals is not included.

Price measures: Reduction in general system charges for electricity and gas users; application of a reduced VAT rate (at 5%) for gas users; reduction in excise duty rates on fuels (including the effect on VAT revenues).

A.7 Government measures in Portugal

Income measures: Income measures modelled included income support of €360, targeted at lower-income families. Additionally, individuals with a gross income of up to €2,700 per month received a transfer of €125. Recipients of certain social transfers, including unemployment benefit, were also eligible for this income support. There was an additional transfer of €50 per child for recipients of child benefit. Recipients of public pensions received a one-time payment equivalent to 50% of one monthly old-age pension amount.

Price measures: On the revenue side, measures aimed at reducing taxes and promoting energy cost savings were implemented. These included a discounted tax on oil products – more specifically, a reduction in the tax on petrol goods (imposto sobre o petróleo, ISP) for transportation purposes. Additionally, the VAT rate on the first 100 kWh/30 days of energy consumption was reduced (for large families with more than four people, the reduced rate applies to the first 150 kWh/30 days); this applies between October 2022 and December 2023. On the expenditure side, there was a refund of 10 cents per litre on oil products, known as the "autovoucher", with a monthly limit of 50 litres, in place between January and March 2022.

Table A.6
Government measures in Portugal

	Price/income	Type of measure	Government announcement (in million euro)	EUROMOD estimate (in million euro)
One-off supplement for pensioners	Income	Old-age pensions	1,000	1,016
Support for lower-income families	Income	Other social benefits other than in kind	367	362
One-off supplement for non-pensioners	Income	Other social benefits other than in kind	730	599
One-off supplement for children	Income	Other social benefit	134	96
Reduced VAT rate on first 100kw of energy consumption	Price	VAT	23	22
Discounted tax (ISP) on oil products	Price	Excise	829	599
10 cents/litre refund on oil products: "autovoucher" (€100/1,000 litres)	Price	Discount/subsidy	133	79

SOURCES: Working Group on Public Finance of the European System of Central Banks (ESCB) and own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

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