THE DISTRIBUTIONAL IMPACT OF FISCAL MEASURES TO COMPENSATE FOR CONSUMER INFLATION IN GREECE IN 2022

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ABSTRACT

This paper analyses the distributional implications of consumer inflation in Greece and of the fiscal measures adopted to cushion its adverse impact on households in 2022. The analysis employs the tax-benefit microsimulation model for the European Union (EUROMOD) to study how inflation, income support measures, as well as measures aimed at containing prices affected households' purchasing power and welfare across the income distribution. The study confirms that the purchasing power of lower-income households was more severely affected by the 2022 inflation surge than that of higher-income households, resulting in the so-called inflation gap. The unequal impact of inflation was further magnified by the high shares of consumption in the income of the poorer, resulting in a welfare loss differential of 9.2 percentage points between the bottom and the top income decile. The adverse distributional impact of the inflationary shock was largely offset by government policies, with a welfare loss of only 2.9% remaining for the population as a whole. Fiscal measures were shown to close the inflation gap and mitigated the welfare loss differential between the poor and the rich to just 0.7 percentage points. Price measures were dominant vis-à-vis their income counterparts in compensating for welfare losses across the income distribution and, most interestingly, had a significant progressive impact largely driven by the electricity subsidy, as the support provided was inversely related to consumption. However, given that they were not as well-targeted to low-income households, they were relatively cost-inefficient when compared with income measures. Nonetheless, the efficiency advantage of income measures may be severely undermined in the presence of extensive tax evasion, which points not only to the need for a careful design of targeted measures, but also to complementarities with structural reforms fighting tax evasion.

Keywords: inflation; fiscal policy; distributional effect; welfare effect; EUROMOD

JEL classification: D12; D31; D60; E31; H20; I30

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Η ΑΝΑΔΙΑΝΕΜΗΤΙΚΗ ΕΠΙΔΡΑΣΗ ΤΩΝ ΔΗΜΟΣΙΟΝΟΜΙΚΩΝ ΜΕΤΡΩΝ ΓΙΑ ΤΗΝ ΑΝΤΙΜΕΤΩΠΙΣΗ ΤΟΥ ΠΛΗΘΩΡΙΣΜΟΥ ΣΤΗΝ ΕΛΛΑΔΑ ΤΟ 2022

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ΠΕΡΙΛΗΨΗ

Στην παρούσα μελέτη αναλύονται οι αναδιανεμητικές επιδράσεις του πληθωρισμού και των δημοσιονομικών μέτρων που υιοθετήθηκαν για την άμβλυνση των δυσμενών επιπτώσεών του στα νοικοκυριά στην Ελλάδα το 2022. Η ανάλυση χρησιμοποιεί το υπόδειγμα μικροπροσομοίωσης φόρων-παροχών της Ευρωπαϊκής Ένωσης (EUROMOD) για να μελετήσει πώς ο πληθωρισμός, τα μέτρα στήριξης του εισοδήματος των νοικοκυριών, καθώς και τα μέτρα που στόχευαν στη συγκράτηση των τιμών, επηρέασαν την αγοραστική δύναμη και την ευημερία των νοικοκυριών σε όλο το εύρος της κατανομής του εισοδήματος. Η μελέτη επιβεβαιώνει ότι η αγοραστική δύναμη των νοικοκυριών με χαμηλότερο εισόδημα επηρεάστηκε περισσότερο από την άνοδο του πληθωρισμού το 2022 σε σχέση με εκείνη των νοικοκυριών με υψηλότερο εισόδημα, γεγονός που οδήγησε στο λεγόμενο "χάσμα πληθωρισμού". Ο άνισος αντίκτυπος του πληθωρισμού ενισχύθηκε περαιτέρω από τα υψηλά μερίδια της κατανάλωσης στο εισόδημα των φτωχότερων, με αποτέλεσμα να προκύψει ένα χάσμα ως προς τις απώλειες κοινωνικής ευημερίας μεταξύ του κατώτατου και του ανώτατου εισοδηματικού δεκατημορίου της τάξεως των 9,2 ποσοστιαίων μονάδων. Η αρνητική αναδιανεμητική επίδραση της πληθωριστικής διαταραχής αντισταθμίστηκε σε μεγάλο βαθμό από τα μέτρα στήριξης που υιοθετήθηκαν, τα οποία περιόρισαν τις απώλειες σε όρους κοινωνικής ευημερίας σε μόλις 2,9% για τον πληθυσμό συνολικά. Επιπλέον, τα δημοσιονομικά μέτρα εξάλειψαν το χάσμα πληθωρισμού και μείωσαν το χάσμα απωλειών κοινωνικής ευημερίας μεταξύ φτωχών και πλουσίων σε μόλις 0,7 της ποσοστιαίας μονάδας. Τα μέτρα που στόχευαν στη συγκράτηση των τιμών κυριάρχησαν έναντι των μέτρων στήριξης του εισοδήματος των νοικοκυριών ως προς την αντιστάθμιση των απωλειών ευημερίας σε όλη την κατανομή του εισοδήματος. Είχαν δε προοδευτική αναδιανεμητική επίδραση, που οφείλεται κυρίως στην επιδότηση της κατανάλωσης ηλεκτρικής ενέργειας, καθώς η παρεχόμενη στήριξη ήταν αντιστρόφως ανάλογη της κατανάλωσης. Ωστόσο, επειδή δεν ήταν εξίσου στοχευμένα στα νοικοκυριά με χαμηλό εισόδημα, ήταν από οικονομικής απόψεως λιγότερο αποδοτικά σε σχέση με τα μέτρα στήριξης του εισοδήματος. Εντούτοις, το σχετικό πλεονέκτημα αποτελεσματικότητας των εισοδηματικών μέτρων μπορεί να υπονομευθεί σοβαρά υπό συνθήκες εκτεταμένης φοροδιαφυγής, γεγονός που αναδεικνύει την ανάγκη όχι μόνο για προσεκτικό σχεδιασμό των στοχευμένων μέτρων, αλλά και για συμπληρωματικότητά τους με διαρθρωτικές μεταρρυθμίσεις για την καταπολέμηση της φοροδιαφυγής.

THE DISTRIBUTIONAL IMPACT OF FISCAL MEASURES TO COMPENSATE FOR CONSUMER INFLATION IN GREECE IN 2022*

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1 INTRODUCTION

The inflation crisis, which started in 2021 due to the pandemic-related global supply bottlenecks, escalated in 2022 with Russia's invasion of Ukraine, as high worldwide energy dependency on Russia pushed further upwards the prices of fuels and, subsequently, of other products as well. Euro area inflation rose from 2.6% in 2021 to 8.4% in 2022, whereas in Greece the respective rates were 0.6% and 9.3%.

Rising inflation weighs on households' real income, eroding their purchasing power. Moreover, inflation has negative distributional effects, as it disproportionately affects lower-income households. On the one hand, the latter have a higher propensity to consume and, in some cases, even spend more than they earn. Furthermore, they are often credit constrained, so rising prices may ultimately contain their consumption.[1] On the other hand, food and energy products, which have experienced the largest price increases in recent years, have a larger share in the consumption basket of lower-income households.[2]

The above has put pressure on fiscal policy to contain the welfare losses associated with the inflationary shock and support the most vulnerable citizens, not only in order to stimulate consumption and growth, but also to maintain social cohesion by mitigating the adverse distributional effects of inflation.

This article aims to analyse the impact of inflation on household disposable income and assess how the latter was affected by the fiscal measures targeting households in Greece in 2022, focusing in particular on distributional effects. It is organised as follows: Section 2 offers a description, as well as a classification by type and target group, of the fiscal measures adopted in Greece in response to the energy crisis, along with the associated costs and financing sources. Section 3 introduces the data and methodology employed, which is centered around EUROMOD, the tax-benefit microsimulation model for EU countries. Section 4 presents the empirical results from two complementary points of view: the impact on real disposable income – or household purchasing power – and the impact on household consumption welfare. It also explores what drove the estimated changes in inequality by looking at the contributions of the inflationary shock, the associated fiscal support, as well as other factors. Finally, the efficiency of the different types of inflation compensation measures is assessed by weighing their inequality-reducing impact against their fiscal cost. Section 5 concludes.

In brief, we find that the purchasing power of lower-income households was more severely affected by the 2022 inflation surge in Greece than that of high-income households. Fiscal measures significantly contributed to closing the inflation gap and mitigating the resulting welfare differential. Whereas price measures were dominant compared to income measures in compensating for welfares losses across the income distribution, they were relatively cost-inefficient in containing the adverse inequality impact of inflation due to their less targeted nature. Nonetheless, the efficiency advantage of income measures needs to be addressed in the light of extensive tax evasion in Greece.

2 FISCAL MEASURES IN GREECE

In Greece, the fiscal interventions to address the energy crisis were sizeable compared to its

* This paper draws on the results for Greece included in the analysis of six euro area countries in Amores et al. (2023). The views expressed in this article are of the author and do not necessarily reflect those of the Bank of Greece. The author is responsible for any errors or omissions.

1 See Charalampakis et al. (2022).

2 See Villani and Vidal Lorda (2022).

euro area peers, amounting to 0.5%, 5.0% and 1.1% of GDP in 2021, 2022 and 2023, respectively, against euro area support amounting to 0.2%, 1.9% and 1.8% of GDP in the respective years. [3] It should be noted, however, that most of the interventions in response to the energy crisis were financed by revenues from the Energy Transition Fund (ETF)[4], reducing the budgetary cost of support measures in Greece to 0.1%, 2.2% and 0.0% of GDP in 2021, 2022 and 2023, respectively.

Inflation compensation measures (ICMs) were first introduced in 2021. They involved subsidies on electricity consumption (amounting to EUR 490 million), as well as extraordinary direct financial support to households. The latter involved one-off lump-sum transfers to low-paid pensioners, disabled people and the uninsured elderly, an increase in the heating allowance and the payment of double the amount of the minimum guaranteed income in December (totalling EUR 384 million).

With the escalation of the inflation crisis due to the Ukraine war in 2022, the fiscal support package was substantially expanded. Its composition strongly favoured price measures, such as subsidies, which accounted for 84% of measures (see Chart 1).

In particular, out of a total fiscal package of EUR 10.4 billion, subsidies on electricity and gas consumption amounted to EUR 7.7 billion, a significant part of which targeted enterprises. Table A2 in the Appendix contains an exhaustive list of the ICMs and associated costs in Greece in 2022 by type of measure (price, income and other).

Subsidies for household electricity consumption were effectively progressive, as they were inversely related to electricity consumption (see Table A3 in the Appendix). The subsidy rate varied throughout the year depending on the evolution of electricity prices. Households benefitting from the so-called social residential tariff received more generous support.

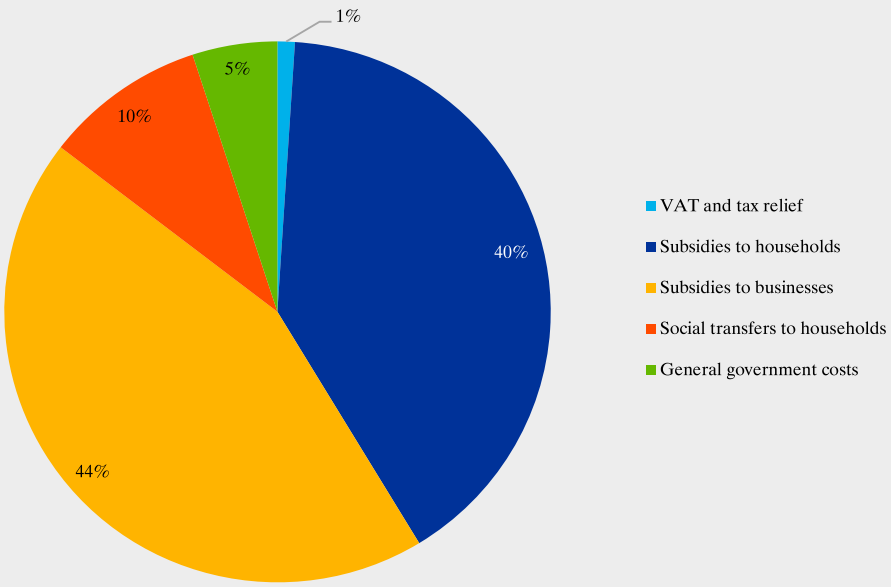
In contrast, for household natural gas consumption, a flat subsidy rate applied (EUR 20 per MWh from January to June 2022, except for April 2022, when it was EUR 40 per MWh). The Public Gas Corporation (DEPA) also provided a subsidy throughout the year. Lastly, flat-rate subsidies were provided for diesel (12 cents per litre) and for heating oil (20 cents per litre).

Other price measures concerned fiscal support to farmers, including a refund of excise duties on diesel and a reduction in the VAT rate on fertilisers and animal feed (from 13% to 6%). In addition, the "Power pass" programme involved a one-off 60% refund of the increase in electricity bills between December 2021 and May 2022 for households' primary residence, with eligibility based on a net family income in 2020 of up to EUR 45,000 and a maximum ceiling of EUR 600. Finally, the "Fuel pass" programme included two lump-sum payments in 2022, through either a bank payment or a dedicated digital debit card. In May 2022, eligibility criteria included a family taxable income of less than EUR 30,000; car owners received EUR 45 on a digital debit card or EUR 40 in a bank account. In August/September 2022, eligibility criteria included a family taxable income of less than EUR 30,000 (with expanded income criteria for each additional member, and up to a ceiling of EUR 45,000); car owners received EUR 80 on a digital debit card or EUR 65 in a bank account. Subsidy amounts were lower for motorcycle owners and higher for island residents.

Regarding income support to vulnerable households, there were two main fiscal support packages, which were disbursed in April and December 2022. As in 2021, they targeted low-paid pensioners, the uninsured elderly receiving OPEKA (Organisation of Welfare Benefits and Social Solidarity) benefits and recipients of dis-

3 See Checherita-Westphal and Dorrucci (2023).
4 The Energy Transition Fund (ETF) was established in 2021 (Law 4855/2021) to fund a variety of subsidies for electricity, natural gas, heating oil and transport fuels. A breakdown of its revenues is presented in Table A1 in the Appendix.

Chart 1 Estimated composition of inflation compensation measures in 2022



Source: Author's own calculations based on General Accounting Office estimates.

ability benefits. More specifically, the support provided included payments of EUR 200 in April 2022 and EUR 250 in December 2022 to (a) pensioners with a monthly income of up to EUR 600 and EUR 800, respectively, (b) the uninsured elderly receiving OPEKA benefits and (c) beneficiaries of disability benefits. Moreover, beneficiaries received double the amount of the minimum guaranteed income and one-and-a-half times the amount of the OPEKA child benefit in April 2022 and December 2022. The long-term unemployed received support of EUR 250 in December 2022. Finally, there was a further increase in the heating allowance. The total cost of these measures amounted to around EUR 1 billion and accounted for 9% of the total fiscal package.

Fiscal support for the energy crisis was largely withdrawn in 2023, totalling EUR 2.5 billion, all of which was budget neutral.

The present analysis focuses on income and price measures affecting households in 2022, i.e. it examines a subset of the overall fiscal support package. It covers 100% of the income measures and 98.5% of the price measures affecting households (see Table A2 in the Appendix for details and validations of our results against government cost estimates).

3 DATA AND METHODOLOGY

EUROMOD

The distributional effects were estimated using EUROMOD[5], a tax-benefit microsimulation model of the European Union, currently developed and maintained by the Joint Research Centre of the European Commission. EUROMOD enables the analysis, in a comparable manner, of the effects of taxes and benefits on household incomes for individual countries and the EU as a whole.

The distinguishing feature of microsimulation models is that they operate at the individual

5 Version I.4.113. For more information on the EUROMOD model, see https://euromod-web.jrc.ec.europa.eu/ as well as Sutherland and Figari (2013).

level, i.e. they take into account diverse circumstances and characteristics of the population of interest (Citro and Hanushek 1991) contained in micro datasets providing information on different sources of income (gross earnings, pensions and social transfers), household composition and individual socioeconomic characteristics. This allows the effects of public policy to be studied along the income distribution and across its various population segments.

EUROMOD is a static microsimulation model. Static microsimulation models typically impute income tax or other liabilities and the receipt of social security and other benefits by applying the rules for eligibility or liability to individuals and households (Harding 1996). In replicating current or hypothetical institutional frameworks, static models assume away behavioural responses on the part of micro agents. Their key purpose has, hence, traditionally been to show the "morning after" impact of a policy change.

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[6] 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.[7]

Data

EUROMOD by default uses the EU statistics on income and living conditions (EU-SILC[8]) survey as input data. EU-SILC 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.

The present analysis employs the EU SILC 2020 wave for the simulation of income support ICMs. For Greece, this is effectively a representative sample of the population containing information on 32,832 individuals in 15,086 households.

The EU-SILC 2020 wave reports income information for the year 2019. As such, the income reference year of the micro dataset does not correspond to the years relevant for the distributional analysis of inflation compensation measures in 2022. Therefore, adjustments, in the form of updating 2019 gross incomes, had to be implemented so that the latter reflect nominal levels in the base year 2021 and the analysed year 2022. This so-called uprating exercise is implemented by income source per simulated year within EUROMOD, based on information obtained from other data sources. The data are typically taken from Eurostat or provided by the statistical offices of the Member States, government authorities or national central banks.

Table A4 in the Appendix sets out the assumptions underlying the uprating mechanism from 2021 to 2022 in the case of Greece,[9] breaking down household disposable income in its basic sub-components. Two highlights from Table A4 include: (a) the differential wage growth applied to private and public sector employment, as civil servant wages had been frozen since 2012, while for private employees an annual wage growth of 1.8% was imputed on the basis of the 2023 Q3 national accounts data available at the time of analysis; and (b) the pension freeze applicable from 2016 (Law 4387/2016).

The 2021 and 2022 income distributions were, hence, artificially created in the basic EUROMOD functionality, enabling the simulation of inflation compensation measures targeting household incomes.

6 See Sologon et al. (2022).
7 See Barrios et al. (2019).
8 For more details on EU-SILC, see Eurostat's EU statistics on income and living conditions.
9 The Joint Research Centre of the European Commission 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).

For the simulation of price measures, an extended functionality of EUROMOD is used, namely the Indirect Tax Tool (ITT). The ITT relies on data from the Household Budget Survey (HBS), which contains information on household expenditure on goods and services. In particular, the ITT draws on the harmonised HBS, which is essentially a collection of the national HBSs carried out by Eurostat every five years. This is because HBSs, being national surveys designed with the main purpose of calculating weights for the consumer price index, leave leeway for each EU country to decide upon other objectives, methodology or even frequency of the survey. Although there have been continuous efforts to make the data comparable across countries and over time, differences remain. Microdata harmonised by Eurostat are available every five years, the latest coming from the 2010, 2015 and 2020 waves.

In the present analysis, the harmonised HBS is matched with the EU-SILC from the same year to obtain an internally consistent dataset with income and consumption data. At the time of drafting, consolidated EU-SILC and HBS microdata were only available for the 2010 wave of the HBS. The consolidation was implemented by means of a semi-parametric procedure developed by Akoğuz et al. (2020). This procedure combines the estimation of Engel curves used in earlier studies (such as Decoster et al. 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 the 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.

Given the above, we explored to what extent household consumption expenditure has changed since 2010. The HBS provides information on household consumption expenditure across twelve categories defined by consumption purpose, following the UN Statistical Commission's Classification of Individual Consumption According to Purpose (COICOP).

Chart 2 depicts the evolution, across the latest three HBS waves, of the expenditure share in Greece of the five COICOP categories making up the largest part of total consumption expenditure in 2010. The expenditure shares remained broadly stable across all three waves, with relative differences being most noticeable in "food and non-alcoholic beverages" and "housing, water, electricity, gas and other fuels", but still reaching up to 5% at most.

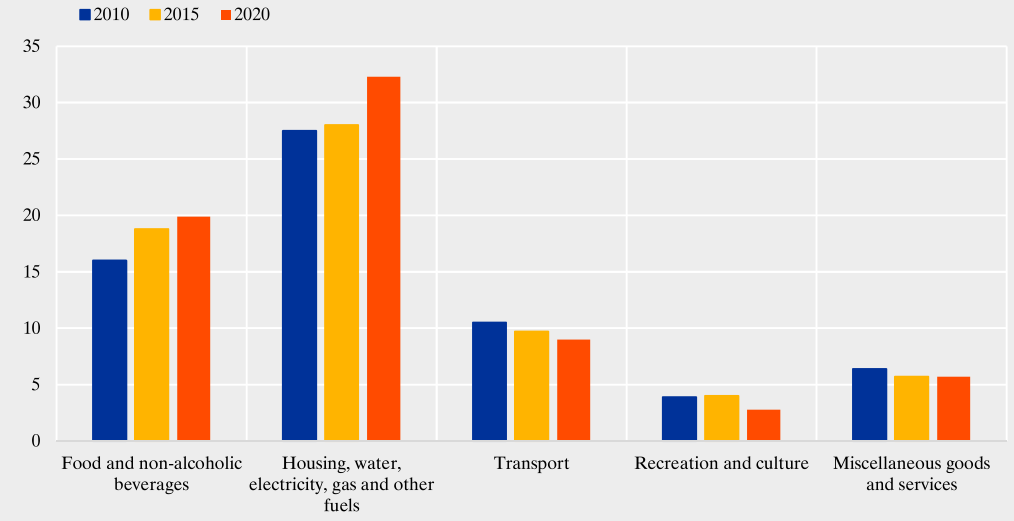
Moreover, as expenditure on energy goods is particularly relevant for our analysis, we explored the extent to which expenditure on electricity, gas and other fuels has changed by income quintile across the three more recent HBS waves.

Chart 3 shows that the share of expenditure on energy goods in Greece has increased for all income quintiles since 2010, the increase ranging from 1.7 percentage points (pps) for the top income quintile to 2.7 pps for the bottom. Across all waves, households with lower income spend a larger portion of their budget on energy compared to higher incomes.

Overall, there are changes in household expenditure patterns since 2010, but of relatively small magnitude. We may hence have some degree of confidence that the use of the 2010 HBS data to approximate current household

Chart 2 Share of top five COICOP categories in total consumption expenditure (2010-2020)

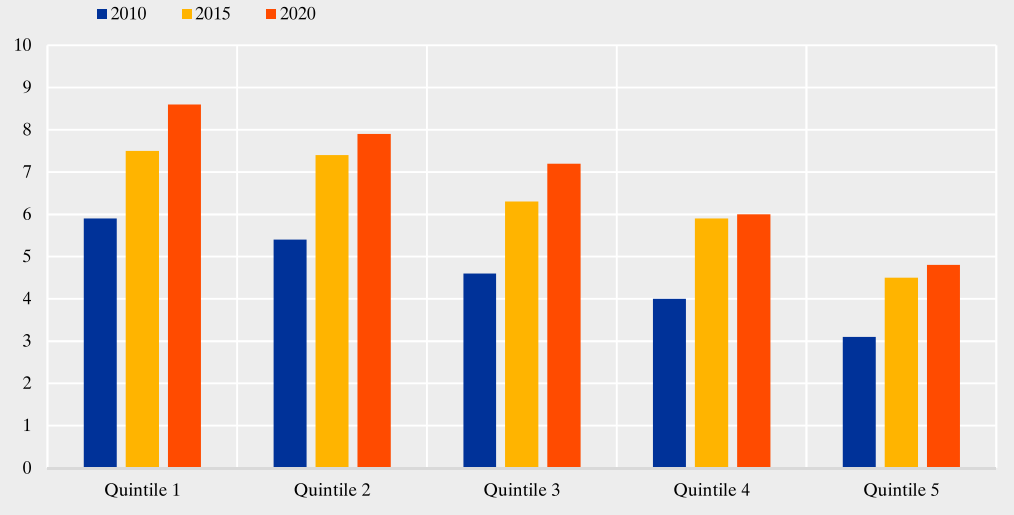
(%)



Source: Author's own calculations based on Eurostat's 2010, 2015 and 2020 HBS waves.

Chart 3 Share of expenditure on electricity, gas and other fuels in total consumption expenditure of each quintile (2010-2020)

(%)



Source: Author's own calculations based on Eurostat's 2010, 2015 and 2020 HBS waves.

consumption preferences and assess the impact of price measures in 2022 should not significantly bias results.

Counterfactual analysis

Inflation compensation measures (ICMs) on both the income and the price side are assessed

by means of counterfactual analysis, building on two extended functionalities of EUROMOD.

First, we employ the *Policy Effects Tool (PET)* in order to isolate the impact of income ICMs from other factors driving household disposable income changes in 2022.

The PET tool isolates policy effects from other changes in the income distribution by assessing household disposable incomes under the actual system and a counterfactual system, keeping household characteristics and market incomes constant. Furthermore, to adjust for changes in nominal income levels over time, the monetary parameters of the tax-benefit system are adjusted with a factor α, which reflects benchmark indexation. There are two predefined choices for benchmark indexation: $\alpha=1$ (custom), in which case the effect of policy changes is calculated simply in nominal terms; and $\alpha=$ CPI, in which case the effect of policy changes is calculated in real terms on the basis of Eurostat's Harmonised Index of Consumer Prices (HICP) along with other series of uprating indices.

Formally, let $d_t(p_t, y_t)$ denote the function calculating at time t household disposable income on the basis of household market income y and monetary parameters p reflecting the structure of the tax-benefit system (e.g. tax rates, benefit eligibility rules). Then, policy effects from $t=2021$ to $t=2022$, PE_{2022}, are calculated as follows:

$$PE_{2022} = \frac{1}{\alpha} * d_{2022}(p_{2022}, ay_{2021}) - d_{2021}(p_{2021}, y_{2021})$$

Technically, instead of scaling monetary policy parameters, the tool scales monetary input variables (market incomes, expenditure and assets) with the factor α and monetary output variables with the factor $1/\alpha$.

Using the PET tool, we employ a novel methodology in order to break down the total change in household disposable income from 2021 to 2022 into three components:

(a) the nominal adjustment of income, that is how disposable income grows on account of "market income" growth, i.e. due to wage growth and pension revaluation. This is effectively what explains the change in household disposable income once policy effects have been accounted for. Using the above notational convention, this is estimated in nominal terms ($\alpha=1$) as:

$$d_{2022}(p_{2022}, y_{2022}) - d_{2021}(p_{2021}, y_{2021}) - PE_{2022}$$

(b) gains arising from income support ICMs estimated as:

$$PE_{2022} - PE^{C}_{2022}$$

where PE^{C}_{2022} stands for policy effects in a counterfactual 2022 tax and benefit system, with no income ICMs.

(c) the impact of other income support measures, estimated as PE^{C}_{2022}.

Second, we used another extended functionality of EUROMOD, the *ITT extension*, to account for price measures such as price caps, price subsidies and discounts, and VAT reductions. Using the ITT extension, we simulate household spending under the 2021 and 2022 actual systems, i.e. the 2021 baseline, which considers household expenditure in 2021 (exp_{2021}) given the direct and indirect tax and benefit rules in place at that time, and the 2022 reform system, which considers household expenditure in 2022 (exp_{2022}) given the actual inflation increase and the discretionary price measures introduced by the government. Given our assumption of full pass-through, comparing household spending across these two systems gives us an estimate of the effective rates of inflation ($\pi = \frac{exp_{2022} - exp_{2021}}{exp_{2021}}$) experienced by households across the income distribution. In addition, we simulate a counterfactual 2022 scenario, where we assume that the discretionary price measures introduced by the government were not implemented. Comparing household spending under the counterfactual 2022 (exp^{c}_{2022}) and the baseline 2021

systems gives us the effective rates of inflation that households would have experienced if the price mitigation measures had not been in place $\pi^c = \frac{exp^c_{2022} - exp_{2021}}{exp_{2021}}$.

4 EMPIRICAL RESULTS

In the light of the above, empirical results are presented from two complementary points of view. First, we look at the impact of the inflationary shock and the associated policy response on real disposable income, or household purchasing power. Second, we focus on household expenditure to measure the impact on household consumption welfare.

We start by comparing changes in total nominal disposable income and consumer inflation by income decile (see Chart 4). This gives a general overview of the effects of the shock and policy interventions, since inflation erodes the real value of both consumption expenditure and savings.

Government price measures have significantly reduced consumer price inflation across the income spectrum, as estimated actual inflation was around 37% lower than in the counterfactual scenario. Moreover, price ICMs have effectively overcompensated for the inflation gap between poorer and richer households,[10] as in the counterfactual scenario inflation would have been higher (by around 2.4 pps) for the poorest than for the richest households, whereas it is estimated that following the policy response the top income decile in fact faces a marginally higher inflation rate than the bottom decile (by 0.3 pps).

This is because, while lower-income households are more strongly affected by energy and food inflation, they also profit to a larger extent from price measures in relative terms. Following the government price measures, the actual inflation rate across households is simulated to be widely equalised, even though price measures are not exclusively targeted at lower-income households, which nonetheless benefit marginally more than their richer counterparts.

Disposable income increased by 2% on average in 2022, only partly compensating for higher consumer prices.[11] Disposable income growth is inversely related to income, ranging from 1.4% for the ninth income decile to 4.8% for the bottom income decile. This pattern stems from the evolution of income growth as the combined result of income ICMs, nominal uprating and other government measures affecting household disposable income.

In particular, given that income support measures in response to the crisis predominantly targeted lower-income households that are more vulnerable to inflation, they are progressive in nature, increasing by 4.1% the income of households in the bottom decile, where they contributed almost the entirety (87%) of the overall growth in nominal disposable income. This contribution gradually drops as we move to higher income brackets, reaching about 0.03% for the top decile. Therefore, income ICMs appear to mitigate inflation-induced income inequality and the disproportionate impact on the purchasing power of lower-income households.

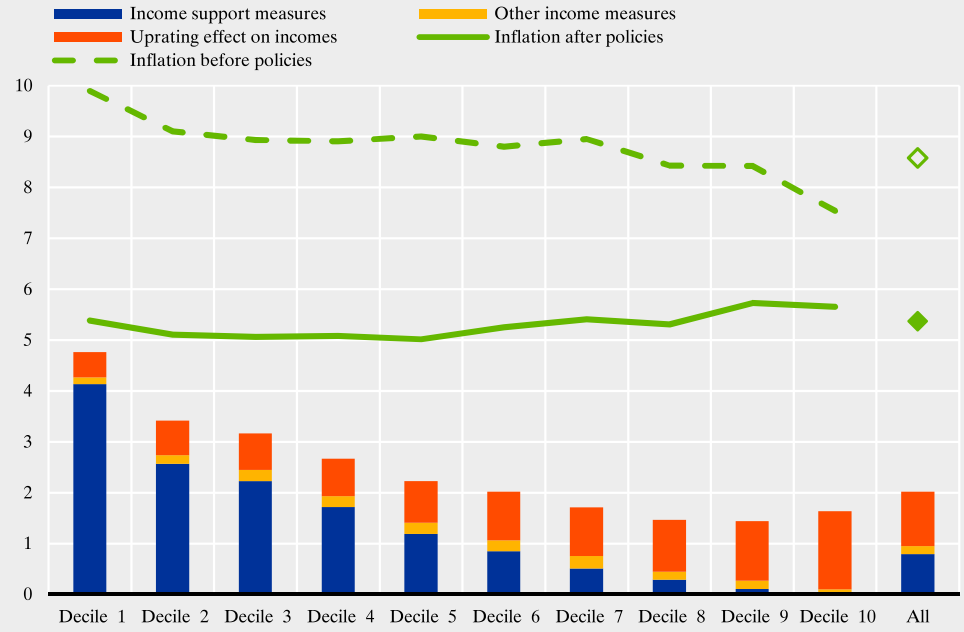
Income from employment often contributes less to the disposable income of poorer households than unemployment or other social benefits. This is what explains the increasing contribution, along the income distribution, of market income uprating to disposable income growth. Furthermore, increases in nominal earnings lead to the so-called "bracket creep", resulting in higher tax rates if tax brackets are

10 The so-called inflation gap refers to the higher inflation faced by poorer households relative to their richer peers. 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 et al. (2023) and Battistini et al. (2022).

11 See Bank of Greece (2023), *Annual Report 2022*, Chapter IV, section 5.1.

Chart 4 Distribution of disposable income growth and consumer inflation (2021-2022)

(percentage change in equivalised disposable household income and estimated inflation by decile)



Source: Author's own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
Notes: The bars in the chart show nominal disposable income growth by decile, with the bottom part of the bar, shaded dark blue, showing the contribution of government inflation-related income measures to income growth. The solid line shows the change in decile-specific household consumer expenditure $(exp_{2022}\text{-}exp_{2021})/exp_{2021}$, interpreted as consumer inflation. The dashed line shows the inflation rate in a counterfactual scenario without the government price measures, approximated by $(exp_{2022}{}^{C}\text{-}exp_{2021})/exp_{2021}$. Equivalised disposable income is computed by dividing the household's disposable income by the OECD 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.

not adjusted, especially so for lower income groups.[12]

At the same time, government income policies not explicitly linked to the inflation surge – predominantly reduced social security contributions and higher unemployment benefits as a result of the increase in the minimum wage – had a relatively small and equal impact across income groups.

Our second approach jointly evaluates 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 households would need at the inflated prices to afford the same basket of goods as in the baseline scenario.

Accordingly, our results are depicted in Chart 5, which combines the effects of inflation, income growth and government policies on households' welfare across income deciles. This chart may be interpreted as showing the changes in household welfare measured as "compensating variation", assuming a Leontief utility function (i.e. how much money a household would need to spend so as to maintain a given level of utility).

The green negative bars in Chart 5 show the impact of the inflationary shock on the decile-specific consumption basket, had there been no

12 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 a phasing out of transfers.

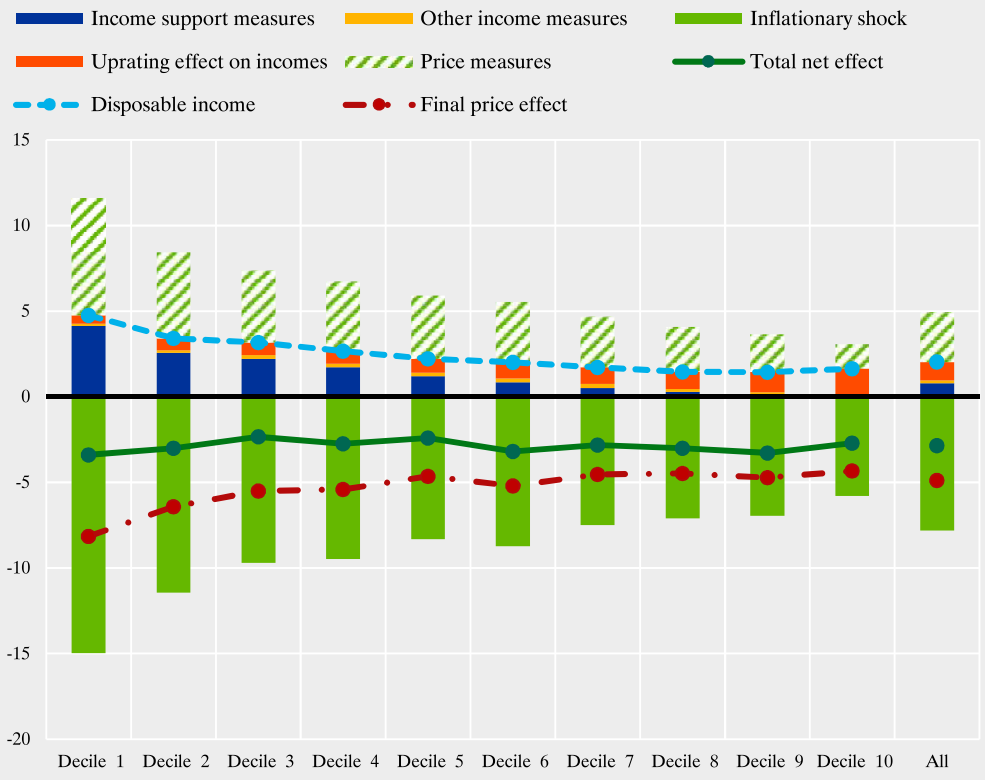
price ICMs, approximated by the increase in household expenditure as a share of household disposable income ($\frac{exp^{c}_{2022} - exp_{2021}}{d_{2021}}$). Since disposable income and expenditure are generally not equal, the impact of a consumer price shock on disposable income does not necessarily coincide with the inflation rate ($\frac{exp^{c}_{2022} - exp_{2021}}{exp_{2021}}$). In particular, since households in the lower income deciles spend more than they earn (implying negative savings), the impact of the increase in expenditure relative to disposable income in the bottom four deciles is larger than the estimated inflation rate.

Positive bars show the positive impact on household purchasing power of (i) market income growth (red bars), (ii) government measures unrelated to the inflationary shock (yellow bars), (iii) income ICMs (blue bars), and (iv) ICMs on the price side (striped green bars). The total net effect (dark green line) is obtained by deducting the final price effect (red dashed line) from the total positive impact of market income growth and government measures (blue dashed line).

As can be seen from Chart 5, ICMs compensated for welfare losses across the income distribution. At the same time, they narrowed down the welfare gap between the poor and the rich: the negative impact of the inflationary shock as a percentage of 2021 household disposable

Chart 5 Price and income effects based on household welfare

(% change as a portion of 2021 equivalised household disposable income, by decile)



Source: Author's own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.
Note: Equivalised disposable income is computed by dividing the household's disposable income by the OECD 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.

income, ranged from -3.4% in the bottom decile to -2.7% in the top decile, implying a welfare gap of 0.7 pps. Inflation, if left unaddressed, would disproportionately burden the poor, raising expenditure by as much as 15% for the bottom decile against only 5.8% for the top decile.

As already mentioned, income ICMs increase households' disposable income in a progressive manner, their positive contribution falling with income. Overall, their positive contribution is 0.8% but as high as 4.1% for the lowest income decile.

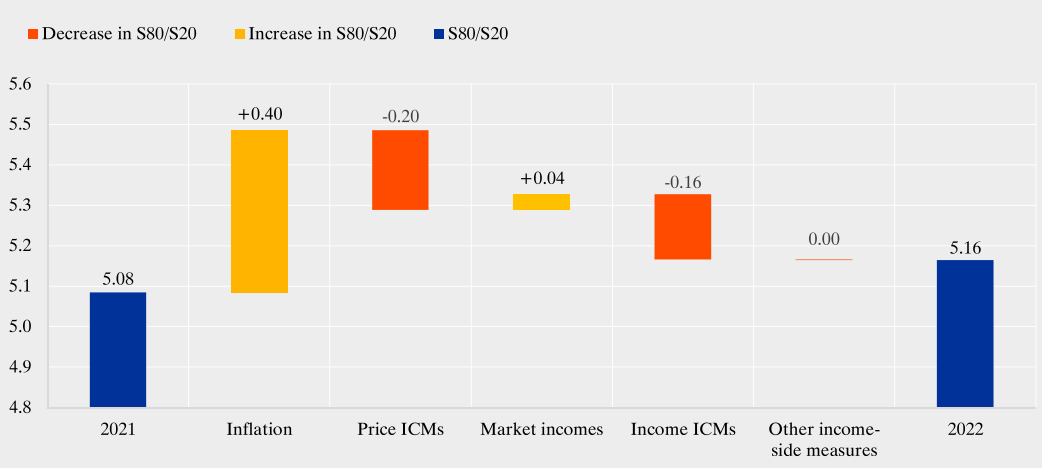
Price ICMs had a dominant effect vis-à-vis income ICMs across all income deciles. Moreover, as already mentioned, they have a progressive character, in that they benefit lower-income households more than their richer counterparts. In fact, it is worth noting that price measures compensated for about half the purchasing power loss in the first income decile, while income measures played a much smaller role. The progressive footprint of price ICMs in Greece is largely due to the design of the electricity subsidy (see Table A3 in the Appendix).

Overall, we may conclude that the adverse distributional impact of the inflationary shock in 2022 was largely offset by government policies, with a welfare loss of only 2.9% remaining for the population as a whole.

The above findings are also reflected in the breakdown of the change in the S80/S20 inequality index (see Chart 6), where we can see that ICMs have made a significant contribution to limiting the inequality-increasing pressures created by the 2022 inflationary shock in Greece. Chart 6 breaks down changes in the quintile share ratio (S80-S20), namely the real disposable income of the top 20% of the income distribution as a share of that of the bottom 20%, calculated on the basis of the welfare measure introduced earlier. In total, our measure of inequality is estimated to have increased by 1.6%. Inflation increased inequality by around 7.9%. Market income growth also had an adverse, yet much milder, inequality impact, increasing the S80/S20 index by 0.8%. Government ICMs on the income and the price side have jointly reduced the S80-S20 ratio by around 7.0%, almost offsetting the inequality footprint of the inflationary shock. Other income side measures, such as reduced social security contributions and higher unemployment benefits, were relatively neutral in reducing inequality.

Chart 6 Breakdown of changes in inequality in Greece (2021-2022)

(changes in the S80/S20 ratio)



Source: Author's own calculations based on EUROMOD and ITT extension simulations, using EU-SILC and HBS data.

Overall, Greece is estimated to have achieved one of the highest inequality reductions amongst its European peers[13] thanks to its rather progressive ICM profile, arising not only from the targeted income measures, but also from the progressive nature of the electricity subsidy paid to households.

The finding that income and price ICMs have both reduced inequality does not mean that they were equally efficient. Given that income measures are typically more targeted at lower-income households, they are generally more efficient at reducing inequality than price measures. Price measures are predominantly untargeted, in that they dampen price increases for all consumers, thus incurring higher fiscal costs compared with their income counterparts.

In particular with regard to Greek ICMs in 2022, it was estimated that an extra 1% of GDP spent on income ICMs increased the adjusted disposable income of the bottom income quintile by four times as much as the same amount spent on price ICMs. This pattern was in fact representative of the euro area.

Additionally, it is not fully clear whether price ICMs achieve their intended objective of containing prices, since the majority are dependent on firms deciding to perfectly pass through the government support to consumer prices. They are, for this reason as well, a relatively inefficient instrument to support the most vulnerable.

Nonetheless, the efficiency of targeted income measures may be undermined in the presence of extensive tax evasion, in which case households underreport their income to the tax authorities so as to be eligible for income support. This caveat is particularly relevant for Greece, yet we need to acknowledge the recent legislative initiatives aiming to contain tax evasion including, among other things, an imputed floor for the taxation of self-employment income and the payment of benefits via a prepaid card. With regard to the latter, beneficiaries should use at least 50% of their allowance in electronic payments and purchases, while the remaining amount may be withdrawn in cash. Incentives are also provided for anyone who chooses not to withdraw the balance, but instead use it in electronic transactions, along the lines of the tax lotteries currently being carried out by the Ministry of Finance.

5 CONCLUDING REMARKS

In 2022, Greece implemented substantial fiscal interventions (amounting to 5.0% of GDP, with a budgetary impact of 2.2% of GDP) to cushion the adverse effects of inflation on the economy and mitigate its adverse distributional impact.

Our analysis makes use of the EUROMOD microsimulation model and its extended functionalities, namely the ITT and PET tools, to assess how inflation and a subset of the above fiscal measures, in particular those targeting households, affected households' purchasing power and welfare across the income distribution.

EUROMOD is a static model, hence it does not account for households' reactions to changes in prices and assumes full pass-through by firms of any increase in production cost or government subsidy. Its scope is limited to government measures directly targeting households. As such, any indirect impact on households arising from government support directed to firms is not assessed.

Given the above, our results confirm earlier empirical findings showing that the purchasing power of lower-income households was more severely affected by the 2022 inflation surge than that of high-income households. The so-called "inflation gap" between the bottom and top income deciles is estimated at 2.4 pps and is mainly attributed to the high share of food

13 See Amores et al (2023).

and energy goods in the consumption basket of low-income households.

The unequal impact of inflation was further magnified by the high shares of consumption in the income of the poorer. Welfare losses, measured as the increase in expenditure as a share of the income required to afford the 2021 basket of goods and services, were as large as 15% for the bottom income decile compared with 5.8% for the top income decile.

Fiscal measures significantly contributed to closing the inflation gap and mitigating the welfare differential.

Price measures (totalling around 3.5 EUR billion) were dominant vis-à-vis their income counterparts in compensating for welfares losses across the income distribution but, perhaps most interestingly, they had a significant progressive impact. Price measures have not only lowered inflation by 37%, but also they have effectively overcompensated for the inflation gap between poorer and richer households, the top income decile facing a higher (by 0.3 pps) inflation rate than the bottom decile. Moreover, they effectively compensated for about half of the welfare loss implied by inflation for the bottom decile, lowering the welfare gap between the bottom and top income deciles to 3.8 pps. These results are largely driven by the progressive character of the electricity subsidy, as the support provided was inversely related to consumption.

Income support measures, totalling around EUR 1 billion, included one-off transfers to vulnerable population groups, increases in the heating allowance and supplements to means-tested benefits. They accounted for 39% of the estimated 2% increase in household disposable income in 2022, which still fell short of the estimated inflation rate. As they targeted low-income groups by design, they were progressive in nature. The income support package effectively mitigated the inflation-induced income inequality, increasing by 4.1% the income of households in the bottom decile, where it contributed almost the entirety (87%) of the overall growth in nominal disposable income. Its contribution gradually dropped towards higher income brackets, reaching about 0.03% for the top decile.

The inequality-reducing impact of price and income ICMs is also reflected in our breakdown of changes in the S80/S20 inequality index in 2021-22. In total, the S80/S20 index is estimated to have increased by 1.6% in 2022. Government ICMs on the income and price sides have reduced the S80/S20 ratio by 3.2% and 3.9%, respectively, largely offsetting the inequality footprint of the inflation and market income growth.

Our analysis reveals a multifaceted picture when looking at the cost efficiency of different types of measures. Fiscal interventions involving price measures, which are not as well-targeted to low-income households as income support measures, imply a high fiscal burden. In particular, it was estimated that given the same amount of expenditure, income measures achieved a quadruple increase in the household disposable income of the bottom decile compared to price measures.

Nonetheless, the relative efficiency of income measures may be severely undermined in the presence of extensive tax evasion, which points not only to the need for a careful design of targeted measures, but also to complementarities with structural reforms fighting tax evasion.

Overall, the policy mix in the fiscal support package should address both efficiency and effectiveness concerns. In parallel, despite its estimated progressive distributional impact, energy-related income support should remain targeted and temporary, should be financed by using the available fiscal space and should be accompanied by energy-saving actions and incentives to reduce energy consumption.

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APPENDIX

Table A1 Breakdown of revenues of the Energy Transition Fund

(EUR millions)

	2021	2022	2023	2024
Total revenues	749	5,782	2,592	1,205
Revenues from windfall profits mechanism (Law 4951/2022, Article 122) – Renewables	0	1,783	555	0
Revenues from renewables (RES special account surplus until June 2022)	0	1,100	0	0
Revenues from CO_2 Emissions Trading System	749	1,026	1,115	1,142
Revenues from public utility services	0	400	60	0
Revenues from levy on producers for the period Oct. 2021-June 2022 (windfall profits)	0	367	-30	0
Revenues from windfall profits mechanism (Law 4951/2022, Article 122) – Lignite, Hydro & Natural Gas	0	1,106	133	0
Revenues from 10-euro levy on natural gas used for electricity production	0	0	128	63
Revenues from solidarity contribution on refineries (in 8 installments, July 2023-February 2024)	0	0	630	0

Table A2 Inflation Compensation Measures (ICMs) in Greece in 2022

(*EUR millions*)

	Official	Simulated
A. Price Measures	**8,867**	
Refund of Special Diesel Consumption Tax to farmers	76	65
Reduction of VAT on animal feed from 13% to 6%	15	12
Reduction of VAT on agricultural fertilisers from 13% to 6%	15	33
Subsidy for household electricity consumption (funded by ETF revenues)	3,187	3,441
Refund of 60% of the increase in electricity costs for the primary residence of households with an income of up to EUR 45,000 (Power pass)	296	
Subsidy to businesses for electricity consumption (funded by ETF revenues)*	4,171	
Subsidy to households for natural gas consumption (not including DEPA subsidies; funded by ETF revenues)	94	55
Subsidy to businesses for natural gas consumption (funded by ETF revenues)*	246	
Subsidy amounting to 80% of the increase in the cost of agricultural electricity for the period Aug.-Dec. 2021 (funded by ETF revenues)*	33	
Subsidy to farmers for the increased cost of animal feed	50	
Inclusion of animal feed transport in Crete in the Transport Equivalent scheme	8	
Increase in the subsidy for the transport of animal feed to small Aegean islands	4	
Prepaid card for the purchase of motor fuel by households (Fuel Pass)	300	447
Diesel subsidy (12 cents per litre)	217	251
Subsidy to taxi drivers amounting to EUR 200 in April due to increased fuel prices	5	
Farmers' subsidy for the increased cost of fertilisers	60	
Heating oil subsidy (20 cents per litre)	90	93
B. Income Measures	**991**	
Increase in the heating allowance and incentives for replacing natural gas with other forms of fuel	189	3
Support of EUR 200 in April 2022 and EUR 250 in December 2022 to pensioners with a monthly income of up to EUR 600 and EUR 800, respectively	367	280
Support of EUR 200 in April 2022 and EUR 250 in December 2022 to 35,000 uninsured senior citizens receiving OPEKA benefits	15	40
Support of EUR 200 in April 2022 and EUR 250 in December 2022 to 172,000 beneficiaries of disability benefits	65	
Double amount of the minimum guaranteed income paid to 225,000 beneficiaries in April 2022 and December 2022	94	14
OPEKA child benefit payments to 800,000 beneficiaries increased by one and a half in April 2022 and December 2022	243	222
Support of EUR 250 in December 2022 to 100,000 long-term unemployed	18	52
C. Other Measures		
Additional cost of general government operators for electricity and fuel	523	
D. Total ICMs	**10,378**	
with a budgetary impact	4,596	
affecting households	5,405	
simulated	5,341	5,008

* Measures targeting enterprises.

Table A3 Subsidy to households for electricity consumption in 2022

Month	Consumption	Subsidy (in EUR) per MWh
January	0-150 KWh	160
	151-300 KWh	120
February-March	0-150 KWh	150
	151-300 KWh	110
April	0-150 KWh	270
	151-300 KWh	210
May	0-150 KWh	205
	151-300 KWh	160
	300 KWh +	100
June	0-150 KWh	185
	151-300 KWh	140
	300 KWh +	100
July	0+ KWh	200
August	0+ KWh	337
September	0+ KWh	639
October	0-500 KWh	436
	501-1000 KWh	386/436*
	1000 KWh +	336/386*
November	0-500 KWh	238
	501-1000 KWh	188/238*
	1000 KWh +	98/148*
December	0-500 KWh	221
	501-1000 KWh	171/221*
	1000 KWh +	81/131*

* An increased rate applies if electricity consumption is down by at least 15% relative to the previous year.

Table A4 Income uprating 2021-22

(1)+(2)-(3)-(4)	Disposable income	Uprating
(1)	**Original income**	
+	Earnings	
	Employment: civil servants	Wages and salaries per employee; national accounts data
	Employment: public enterprises	Wages and salaries per employee; national accounts data
	Employment: private sector	Wages and salaries per employee; national accounts data
	Self-employment	Wages and salaries per person employed and gross value added by sector; national accounts data
+	Income of children under 16	Wages and salaries per employee; national accounts data
+	Income from rent	0.75 * CPI
+	Private pension	CPI
+	Investment income	Based on housing costs
+	Private transfers received	Wages and salaries per employee; national accounts data
–	Alimony payments	GDP deflator
–	Other maintenance payments	GDP deflator
(2)	**Benefits**	
(2a)	**Pensions**	
+	Main old age pension	Frozen up to 2022
+	Supplementary old age pension	Frozen up to 2022
+	Minor old age pensions	Frozen up to 2022
+	Orphan's pensions	Frozen up to 2022
+	Survivors' pensions	Frozen up to 2022
+	Disability pensions	Frozen up to 2022
(2b)	**Means-tested benefits**	
+	Heating allowance	As announced by government
+	Minor social assistance benefits	Frozen
+	Housing benefits	Based on Social Housing Organisation (OEK) subsidy rates
+	Child benefit, long-term unemployment benefit, birth grant, lump-sum benefit for low-paid pensioners, guaranteed minimum income, housing allowance	Simulated
(2c)	**Non-means-tested benefits**	
+	Non-contributory disability benefits	Based on the severe disability benefit
+	Education allowances for students	Based on the scholarships provided by the State Scholarship Foundation (IKY)
+	Minor family benefits	Frozen
+	Sickness benefits	Wages and salaries per employee; national accounts data
+	Minor unemployment benefits	On the basis of unemployment assistance to the long-term unemployed
+	Maternity benefits	Wages and salaries per employee; national accounts data
+	Unemployment insurance benefit, maternity benefit, parental benefit, lump sum support to vulnerable population groups	Simulated
(3)	**Taxes**	Simulated
(4)	**Social insurance contributions**	Simulated