The distributional implications of the euro area crisis: Evidence from macroeconomic adjustment in Greece and Portugal

This paper explores the distributional effects of economic crises and the resulting economic adjustments on household income in Greece and Portugal.

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Abstract

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Keywords: Sovereign debt crises, economic adjustment, fiscal policy, inequality
JEL codes: D31, E62, F32, F34

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Non-technical summary:

The paper explores distributional effects of economic crises and the resulting economic adjustments on household income. It uses the euro area (EA) sovereign debt crisis as a case study to analyse changes in the income distribution during the periods of economic adjustment triggered by economic crises. It draws lessons from the experiences of both Greece and Portugal.

Detailed data from the European Union Statistics on Income and Living Conditions (EU-SILC), help us look beyond conventional aggregate inequality measures. The fine-grained microdata allow us to examine how different income sources for various social groups evolved during the crisis. Thanks to this high-quality dataset, we can differentiate between groups based on age, gender, education, and income level. With multiple empirical methods, we examine the distributional impact of the crisis and the economic adjustments and provide a nuanced understanding of these effects.

The paper also investigates the roles of social spending and redistribution. In both Portugal and Greece, we document a temporary decline in disposable household income due to the crisis and the adjustment programs. The observed decline is larger in magnitude in Greece than in Portugal. After an initial drop in the early adjustment period, income gaps compared to similar countries stabilise. This points to distinctive trajectories in the early adjustment period and in subsequent years. Notably, the gap starts to diminish in 2016 in Greece and in 2015 in Portugal, indicating a gradual convergence and a potential shift in income dynamics in later stages of the crisis.

Our analysis confirms that different income groups depend on different income types and that such variation results in different vulnerabilities in times of crisis. For the most vulnerable groups, our analysis documents the crucial role played by pensions and transfer systems during the economic adjustments in the Eurozone crisis. It points to the need to put in place effective and sustainable safety nets in stable times, as ad hoc tweaks during economic crises can negatively impact the well-being of the lowest income groups. We also confirm that targeted reforms can alleviate pressures on the poor.

Introduction

How do episodes of macroeconomic adjustment during financial crises affect societies? How are the burdens of crisis adjustment distributed across households? What roles do social spending and redistribution play? These are crucial questions for both economists and policymakers, but they are notoriously hard to answer (Lane & Milesi-Ferretti 2012, Ramey 2016, Summers 2000, Walter 2013). Their empirical assessment requires fine-grained micro-level data that are comparable across countries. Most household surveys, however, are nationally organised and thus barely allow cross-country comparisons. In addition, the countries for which comparable high-quality household surveys exist are mostly advanced economies where adjustment episodes are exceptional.

We approach these questions in the context of the euro area (EA) sovereign debt crisis, which offers an excellent laboratory to study shifts in distributional dynamics during the crisis and the periods of macroeconomic adjustment. First, the EA crisis hit several years after the European Union (EU) had launched its *Statistics on Income and Living Conditions (EU-SILC)*, an annual survey instrument producing granular and multidimensional microdata on the distribution of household incomes. These data are exceptional in that they offer harmonised microdata across all EU Member States and thus allow tracing and comparing household incomes across EA countries before, during and after the sovereign debt crisis. Second, during this crisis, several euro area countries with current account deficits lost investor confidence and underwent macroeconomic adjustment backed by external financial assistance. While other EA countries with current account deficits did not face the same loss of investor confidence and did not undergo such adjustment, they faced similar macroeconomic constraints stemming from their joint membership in the common currency area. They thus lend themselves to comparisons with statistical methods.

More specifically, the EA sovereign debt crisis hit Europe after the 2008 global financial crisis had exposed imbalances accumulated since the onset of the single currency. In the run-up to the crisis, the excess capital from countries with a strong savings position flowed through the euro area banking system and fueled housing-bubbles, debt-financed growth and current account deficits in other euro area economies. The financial turmoil then led to a reassessment of financial risks. As a consequence, the indebted borrowers with current account deficits were no longer able to access cheap funding and service their mounting debt. Concerns about debt sustainability triggered fears that some countries might have difficulty sustaining their euro area membership and countries had to embark on alternative policy trajectories.

When the crisis intensified and some countries effectively lost market access, EA members, together with the EC and the IMF, reacted by setting up new financial assistance institutions to organise loan programmes conditional on policy reforms. The financial assistance was coordinated jointly by the International Monetary Fund (IMF) and the European Commission (EC) with co-financing from the newly established European Stability Mechanism (ESM, and its predecessor EFSF). Official financial assistance replaced market financing and provided countries leeway to reshuffle economic structures and implement alternative policies. The European strategy is thus reminiscent of IMF-led loan programmes, where loan-financed macroeconomic and structural adjustments were applied to help countries regain market access and gradually improve competitiveness, growth and employment.

We study changes in the distribution of household incomes around the EA sovereign debt crisis and the associated macroeconomic adjustment. An inspection of the programme policy conditions leads us to focus on the adjustments in Greece and Portugal, where conditionality related to social and distributional issues was significantly more far-reaching than in Cyprus and Ireland. We aim to assess how the macroeconomic adjustment in the context of the crisis affected the most vulnerable countries:

their social fabric, their transfer policies and the extent to which their most vulnerable social groups were protected.

The main contribution of this paper is to look beyond aggregate measures and to identify how various income sources of different social groups evolved during the crisis. By using highly fine-grained microdata, we differentiate between social groups in terms of age, gender, education and income level. We also distinguish between short and long run effects and determine the extent to which the shifts were driven by changes in market incomes versus changes in different types of social transfers and pensions. The disaggregation provides a nuanced understanding of changes in distributional outcomes during the adjustment period and more general lessons on the role of social policy for inequality in times of macroeconomic crises.

In terms of empirical methods, we adopt multiple approaches to examine the distributional impact of the crisis and the macroeconomic adjustment. We begin with descriptive analyses to document trends in distributional outcomes in crisis countries by disaggregating household incomes by source and by distinguishing between different socioeconomic groups. We then apply difference-in-differences (DID) techniques to compare incomes in EA countries with loan programmes to incomes in similar EA countries without loan programmes. While fully isolating the causal effects of the macroeconomic adjustment programmes from the impact of the crisis is virtually impossible, this approach allows us to study how trends in various income sources of different income groups differed between countries with and without financial assistance programmes that are comparable in terms of pre-crisis trajectories and macroeconomic fundamentals. Recognising the importance of further addressing potential confounding factors that vary over time and across groups, we employ a triple DID specification at the country-group-year level. This approach allows absorbing all time-varying macroeconomic developments that vary across countries by means of country-times-year fixed effects. This brings us closer to disentangling the effects of the crisis from the effects of the financial assistance programmes.

Overall, our results point to pronounced heterogeneity in income developments amid the ongoing crisis and the macroeconomic adjustment. The onset of the crisis and adjustment period interrupted the relatively steep growth of household income in countries that required external financial assistance. While incomes for most social groups followed a similar downward trend during the adjustment, the size of the income losses differed across groups in terms of gender, age, and income level. Transfers mitigated increases in inequality, but early adjustment policies placed a larger burden on poorer income groups than on richer ones. Conversely, reforms of transfer policies in later stages of the crisis tended to reduce inequality by supporting poorer households, especially in the case of Greece. The intricate links between crisis effects and country-specific policy responses prevent us from directly linking income developments to specific policy measures.

More specifically, we reach three sets of substantive conclusions. First, we document a decline in mean incomes in Greece and Portugal relative to countries with similar pre-crisis trajectories and macroeconomic fundamentals. The combined effect of the crisis and the adjustment programmes had a negative impact on disposable household income in both countries, relative to similar euro area countries without an adjustment programme. The observed decline is larger in magnitude in Greece than in Portugal. After an initial drop in the early adjustment period, income gaps compared to similar countries stabilise. This points to distinctive trajectories in the early adjustment period and in subsequent years. Notably, the gap starts to diminish in 2016 in Greece and in 2015 in Portugal, indicating a gradual convergence and a potential shift in income dynamics in later stages of the adjustment period.

Second, the distributional analysis shows that the crisis period implied income losses for all income groups in Greece and Portugal, but the size of the losses differed across groups. While the Gini index of disposable household income does not point to significant changes of overall inequality, the more disaggregated analysis reveals different income dynamics across various social groups. In Greece, during the early years of the crisis and adjustment period, the poorest 10 percent experienced a larger decline in their income than other income groups. From 2016 onwards however, there is a faster catching-up process for this group. The relative losses of the poorest compared to the richest were recovered by 2018. In Portugal, the dynamics are similar. Initially, there is a stronger negative effect for the bottom 10 percent in 2014 and 2015, but thereafter, the relative losses of the poorest diminish over time and undergo a recovery phase. In both countries, we document greater vulnerability for households headed by women, who experience a larger income decline.

Third, various income sources have contributed to these distributional changes in different ways. In both Portugal and Greece, losses in market income – i.e. before taking into account state intervention with public transfers – are larger for richer households, reflecting the larger dependency on market incomes of this group. For poorer households, transfers and pensions play a more important role in supporting household income during the adjustment period. Cuts to pensions reduced disposable income of low-income households in both countries, and these cuts were stronger than for households with higher incomes. In Greece, we record a substantial drop in pensions and transfers for the poorest 10 percent between 2012 and 2016. This negative trend reverses in 2017 and the relative losses for this group vanish towards the end of the observation period. Reforms to social transfers at this time, such as the introduction of the Social Solidarity Income scheme, seem to have benefited the poorest and contributed to this development. The findings emphasise the importance of considering various income sources for a comprehensive understanding of the distributional effects of economic adjustments.

Our study contributes to two strands of literature. First, research on the distributional effects of loan programmes from international lenders – like the IMF – that set policy conditionality in exchange for financial assistance. Several studies conclude that IMF programmes, on average, increase income inequality (Vreeland 2002, Oberdabernig 2013, Lang 2021). Loan conditions, particularly those that demand social-spending cuts and labor-market reforms, have been identified as channels (Forster et al. 2019, Lang 2021, Stubbs et al. 2022). Such evidence is so far almost exclusively based on aggregate country-level data for developing countries. We add to this literature by providing evidence in the context of more advanced economies, differentiating between effects for different social groups, and tracing the distributional effects back to different income types.

Second, we contribute to the literature studying the social implications of the European sovereign debt crisis. Studies in this strand of the literature often pinpoint the lack of social considerations in the programme design, especially when it comes to the conditionality attached to loan disbursements (Kentikelenis et al., 2016). Studies focusing on the sovereign debt crisis either describe the effects of the crisis on poverty and income inequality (Andriopoulou et al. 2019, Kaplanoglou, Rapanos, 2018) or use static Euromod microsimulation models to bridge gaps in data availability when estimating the impact of the crisis on the income distribution (Leventi and Matsaganis, 2016). Official Eurozone programme evaluations (IMF IEO 2017, ESM 2020) suggest that conditions applied across countries varied significantly and highlight the importance of programmes' social sustainability. We contribute to this literature by analysing and comparing how the two selected euro area financial assistance programmes fared in terms of social and distributional aspects with an empirical approach that is substantially more fine-grained than what has been considered so far.

The remainder of the paper is structured as follows. Chapter 1 describes the empirical setting and explains the conditions under which the adjustment during the Eurozone crisis took place. Chapter 2 describes the data we use. Chapter 3 provides a descriptive analysis of these data. Chapter 4 compares aggregate income levels and inequality of countries under adjustment to macroeconomically similar countries and provides micro-level evidence from difference-in-difference and triple-difference designs. Chapter 5 differentiates between income types and takes a closer look at the role of pensions and social safety nets. We conclude with lessons learnt for the design of financial assistance programmes that aim to avoid adverse distributional effects.

1. Empirical setting

In 2008, the euro area (EA) was hit by the global financial crisis (GFC) and the ensuing turmoil in financial markets. To re-establish investor confidence and regain market access, five EA countries went through financial assistance programmes that were conditional on the implementation of economic reforms agreed by the governments and a partnership of European and international institutions: The European Commission (EC) led the policy design, the International Monetary Fund (IMF) provided its expertise and limited funding. At first, the newly established European Stability Mechanism (ESM) and its predecessor (EFSF) channeled the funding. Over time, the ESM became more involved in financial sector measures and monitoring.

The financial assistance was coupled with policy conditionality introducing structural reforms intended to enhance competitiveness and reduce imbalances accumulated in the run-up to the financial crisis. The strategy of making official financial support conditional on the implementation of adjustment policies is reminiscent of IMF-led loan programmes in the context of debt and balance-of-payment crises in developing and emerging markets. Macroeconomic adjustment is often characterised by extensive fiscal, financial, or structural reforms aimed at stabilising economies facing crises or challenges.

Within the euro area, countries participating in financial assistance programmes, such as Cyprus, Ireland, Greece, and Portugal, experienced distinct circumstances. The reforms implemented reflected underlying economic problems. For instance, Cyprus and Ireland primarily focused on financial sector policies, while Greece and Portugal concentrated more on fiscal measures (see Appendix A. Figure 3 and also Clancy et al. 2022). This diversity in the programme focus suggests that the implications for inequality and the mechanisms through which these programmes influence it can vary significantly, adding complexity to the assessment of their social impact.

To address this difficulty, we initially evaluate the database of conditionalities published by the ESM. The data include conditionality clauses from around 60 different official reviews across all programmes (Moshammer and Siskind, 2020). This allows us to select the countries whose adjustment process we study and compare in greater detail. The ESM conditionality is summarised in the online Programme Database, which offers an overview of all conditions discussed by the European institutions and former ESM programme countries (Moshammer and Siskind, 2020). The number of conditions gives an indication of the reform intensity. For a more nuanced understanding of the respective focus of the adjustment programmes, we assigned the conditions to three categories: social policy, health policy, and education policy (Appendix A. Table 1). This coding reflects the COFOG spending classification. As a country with only financial sector conditionality, Spain is excluded from our analysis.

Appendix A. Figure 2 and Appendix A. Figure 4 show the number of conditions across time, policy areas and shares across the overall programmes.[1] They identify Greece and Portugal as the countries with a substantially larger share with social policy conditionality when compared to Cyprus and Ireland, suggesting that the Greek and the Portuguese adjustment programmes are systematically different from the other two smaller-scale programmes. Besides, the two countries also faced the largest number of conditions targeting social spending, the policy area that is the most relevant for our analysis.[2] Our empirical analysis therefore focuses on Greece and Portugal. According to our classification, Greece had the largest number of conditions in the most relevant sectors when compared to Portugal, suggesting that the potential implications of the adjustment process are likely to be more significant in Greece (see Appendix A. Figure 1).

To illustrate the role of conditionality, we construct a timeline of policy measures adopted in the two key countries that could impact household income (Appendix G). The overview shows that conditions implemented in Portugal were more consistent across time and less extensive than in Greece. We also use this timeline when studying the mechanisms driving our results. Obviously, the intertwined conditions and complex economic circumstances of economic crisis make it impossible to draw causal inferences about the distributional effects of specific conditions. Nevertheless, the conditionality data and the timeline show that many conditions and reforms coincide with subsequent distributional changes where causal connections are plausible, even if one cannot empirically discern whether observed effects result from the conditions themselves or are consequences of the broader economic context.

2. Data

We rely on multiple data sources for different aspects of our research objectives. As our main data source, we obtained restricted-use microdata from Eurostat: the scientific use files of the EU's Statistics on Income and Living Conditions (EU-SILC). For our purpose, these data constitute an ideal and unique source. In other parts of the world, household-level income surveys are country-specific. Different approaches across national surveys render cross-country comparisons with household-level data notoriously difficult. EU-SILC, in contrast, provides income surveys that apply the same approach in each EU Member State at an annual frequency for the 2004-2023 period.

EU-SILC provides fine-grained information on income sources for each surveyed household and individual. The data differentiates between labour income, capital income, pensions, different types of social transfers and benefits, and different types of taxes. The dataset allows us to identify how the types of incomes and transfers changed during the period of the macroeconomic adjustment. Decomposition of disposable income sources across different deciles helps better understand changes in income distribution.

[1] Given that the database covers only conditionality included in the European institutions' documents, we do not analyse conditions applied by other international institutions.

[2] In terms of duration, Greece exhibited the longest persistence of conditionality per year, as illustrated by Appendix A. Figure 2. Note that we do not take into consideration compliance with conditions. An analysis of compliance can be found in Clancy et al, 2023. In Appendix F, we show how government spending changed in Portugal and Greece during the adjustment period versus the rest of the euro area countries. It shows that in both countries, government spending was substantially reduced relative to other euro area countries. We acknowledge as a caveat that the usefulness of conditionality as a measure of the intensity of the adjustment programme is somewhat limited by the possibility that a larger number of conditions may also reflect the lack of effectiveness of earlier conditions. We abstract from the analysis of compliance with the conditionality.

A key innovation compared to the existing literature in this field relates to our usage of the restricted-access EU-SILC data at both the household level and the individual level. For our analysis, we combine each survey wave for each EA country to a large individual-level dataset. We also match the individual-level data to household-level data, by nesting individuals in households. Our final dataset consists of about one million observations. Details as well as caveats to be considered when using these data are discussed in Appendix I.

In addition, we use aggregate data on social outcomes, public spending, and macroeconomic indicators from Eurostat and the World Bank (for details see Appendix I) and the ESM conditionality database discussed in chapter 2.

3. Descriptive evidence

This chapter provides descriptive evidence on the trends of household incomes in both Greece and Portugal before, during, and after the financial assistance programmes. After initially showing how mean household income and Gini indices of inequality evolved during the macroeconomic adjustment process, we use EA-wide microdata to go beyond these conventional measures of income levels and inequality. This analysis sheds light not only on income levels across different social groups and their main income sources but also allows for identifying and tracking the most vulnerable groups.

Mean disposable household income and income inequality

To measure economic well-being, our analysis relies mainly on equalised disposable household income, which reflects the amount of money available to households after taxes, transfers and other compulsory deductions. It sums up the gross personal income components of all individual household members and adds gross income components at the household level. Regular taxes on income, wealth, regular inter-household cash transfers paid and social insurance contributions are subtracted. An equivalisation accounts for the household size according to the modified OECD equivalence scale.[3] The overall level of equivalised disposable household income determines the ability of household members to meet their needs and enjoy a certain quality of life.

Figure 1, panel (a) plots mean equivalised disposable household incomes in Portugal, Greece and the remainder of the euro area.[4] While Greek income recorded steep growth before the onset of the Eurozone crisis, there was a sharp drop at the beginning of 2010. The drop in incomes takes place at the same time as the start of the adjustment programme indicated by a dot. Around 2013, household income stabilised at a lower level and recorded only marginal growth rates. Portuguese income growth was less strong before the crisis and the decline during the crisis is substantially less pronounced than in Greece. The post-crisis recovery is also faster in Portugal than in Greece. Mean incomes in the remainder of the euro area were growing relatively fast before the crisis, continued their growth at lower rates during the crisis and returned to pre-crisis growth rates toward the end of the 2010s.

We turn to inequality in panels (b) and (c) of Figure 1. In both Greece and Portugal, pre-crisis trends in inequality in income *before* social transfers were relatively flat and similar to the EA average.[5] Coincident with the onset of the crisis and the financial assistance programmes, inequality in market

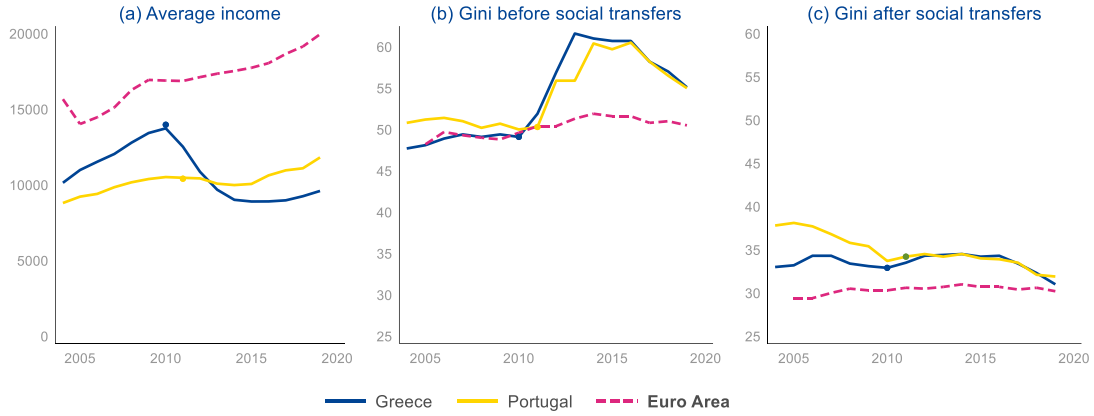
[3] The equivalisation divides total disposable household income by the number of "equivalent adults" in the household. It gives a weight of 1.0 to the first adult, 0.5 to the second adult and each person aged 14 and older, and 0.3 to each younger child.

[4] In Appendix B. Figure 1 we report equivalized income reported in Figure 1 Panel (a) adjusted for inflation.

[5] Note that private pension plans are included in the Eurostat's definition of the Gini coefficient of income without transfers.

incomes increased in both countries, while the EA average remained stable. This increase continued until 2015/2016. Afterwards inequality declined. Trends in net income inequality i.e. after social transfers are remarkably different. Both Greece and Portugal saw declining levels of net inequality before the crisis, while the decline was substantially stronger in Portugal. At the onset of the crisis, net inequality mildly increased in Greece and remained stable in Portugal. Starting in 2016, net inequality decreased in both countries. The Gini coefficient of income after social transfers remained more stable as social systems played their role and mitigated the propagation of the shock.

Figure 1
Income and inequality



Note: This figure reports the means of equivalised disposable household income for Greece, Portugal and the remainder of the euro area (excluding Cyprus and Ireland) in panel (a). Panel (b) shows the Gini coefficient of equivalised disposable income before social transfers (pensions included in social transfers). Panel (c) shows the Gini coefficient of equivalised disposable income after all social transfers. Dots indicate the start of the adjustment programme in the two countries. See also Appendix B. Figure 1, which adjusts for inflation and shows very similar trends.
Source: EU-SILC and Eurostat.

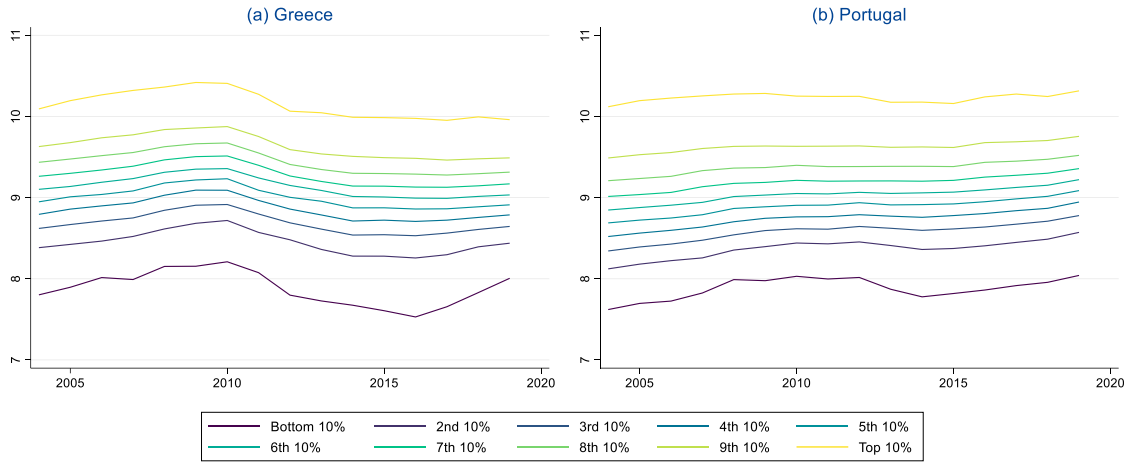
The descriptive analysis highlights three main lessons. First, the crisis and adjustment episodes coincided with breaks in the income and inequality trends in both countries, suggesting that the distributional implications of the adjustment episodes deserve a more detailed analysis. Second, trends in Greece and Portugal are different, suggesting that there is merit in analysing both countries separately. Third, the tax-and-transfer systems did not fully absorb the economic shock and translated into different trajectories of the market and net income. Without taxes and transfers, inequality in both countries would have increased much more during this period. At the same time, taxes and transfers did not fully absorb distributional consequences either. A more detailed analysis of the role of taxes and transfers during the adjustment process therefore promises important insights.

Income by decile group

Analysing inequality solely on the basis of Gini coefficients leaves important blind spots. First, countries with different income distributions can have the same Gini coefficient (Elison 2002). Second, the measure is more sensitive to changes in inequalities in the middle of the income spectrum than to changes at the bottom and the top of the income distribution. Complementing the Gini coefficient with a more detailed breakdown of income according to income groups derived from microdata provides a more nuanced understanding of the income distribution. This is why, in the following, we look at decile groups. For such an analysis, we assign each observed household to one of ten decile groups depending on the household's relative position in the distribution of equivalised disposable household income in

each country and in each year. This way we can trace how income levels and income sources of each decile group varied over time in each country.[6]

Figure 2
Income by decile group



Note: This figure reports the disposable income of households in Greece and Portugal by decile. The equivalised disposable income is the total income of a household, after tax and other deductions (transfers to other households), that is available for spending or saving, the indicator reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary in-kind social benefits. See also Appendix B Figure 2 , which adjusts for inflation and shows very similar trends.
Source: EU-SILC, own calculations.

Figure 2 shows the evolution of disposable income by decile group for Greece and Portugal. In Greece, the income drop starting in 2010 is visible for all income groups. The bottom 10% are affected to a somewhat stronger extent than the top 90%. They recover from a period with markedly reduced disposable household incomes around the year 2017. Overall, trends in Portugal are similar, although the drop in income is substantially less pronounced. Between 2012 and 2015, declining incomes are observed for the top 10% and the bottom 20%, while other income groups see stagnant incomes. After 2015, all income groups see a substantial increase in disposable household income as the crisis recedes.

These results highlight that income losses during the crisis and adjustment processes affected large segments of the society. At the same time, they indicate that the poorest groups experienced stronger income losses than other groups and that income trends for the richest households also deviate from those of middle-income groups. A more detailed analysis at the decile-group level with a particular focus on the top and the bottom thus seems worthwhile.

Income by type

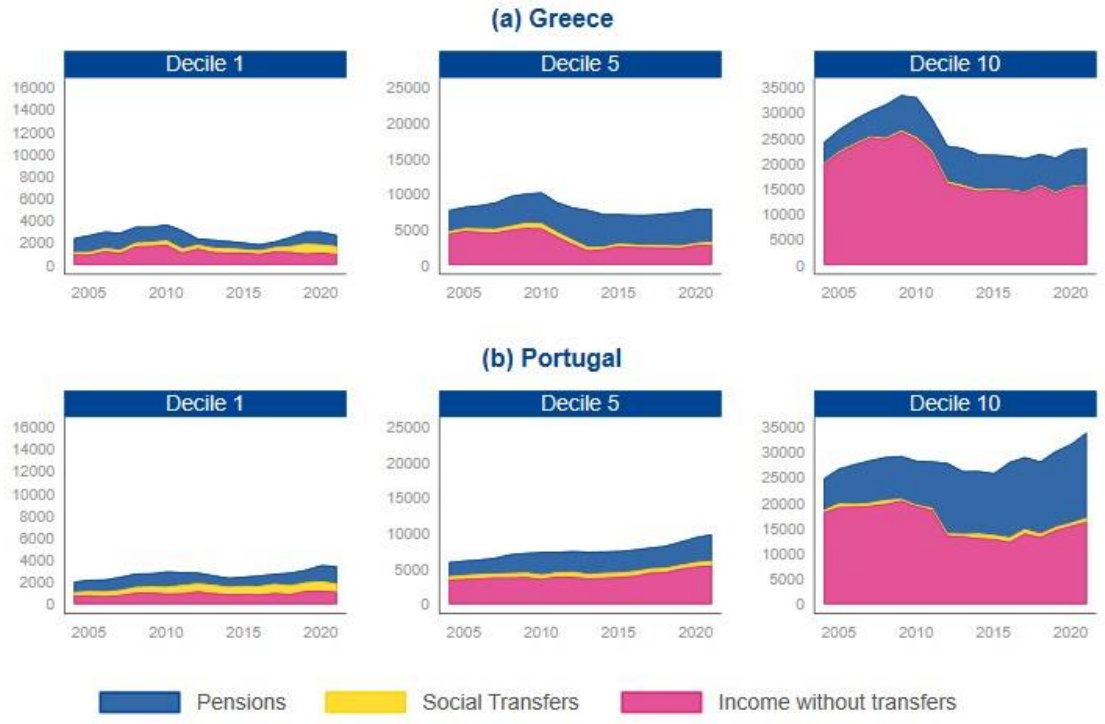
As a next step, we disaggregate between different types of income. In the euro area, income from employment and self-employment is the most important income source. Most European economies, however, also entertain a large tax-and-transfer system. In the countries we consider, by far the largest amount of transfer income results from pensions and other old-age benefits. Social transfers are an order of magnitude smaller than pensions but are an important income source for some segments of society. Other income sources that are of smaller magnitude for society as a whole, while constituting an important income source for clearly defined groups include family benefits and capital income (see Appendix D. Figure 2 and Appendix D. Figure 3).

[6] Note that this exercise is based on repeated cross-sectional data (rather than panel data) such that assignment to an income group of a given household is not fixed over time. Instead, decile groups have the same size in each year such that the values indicate for each year the average income of the bottom 10 percent, the second 10 percent, etc., up until the top 10 percent.

Figure 3 disaggregates incomes by type for selected income groups in Greece and Portugal (see Appendix D. Figure 1 for all income groups as a *share* of total household income[7]). The graphs show that various income types are of different significance for each income group and each country. They also show that various income types evolved differently across income groups during the crisis. For the Greek bottom 10 percent, pensions constitute an important income source and a reduction in pension payments is an important driver behind the drop in disposable household incomes for this group. Rising social transfers in the second half of the 2010s contribute to rising incomes for this decile group. For decile group 5 and 10, the drop in income from employment contributes most to the observed drop in household incomes in the early 2010s, while income from pensions did not substantially change for these groups.

Overall patterns in Portugal are similar. Social transfers, however, constitute a more important and more stable income source for poorer decile groups than in Greece.[8] The drop in employment income is much less pronounced in Portugal than in Greece but it is clearly visible for richer households. A concurrent increase in pensions for these decile groups suggests an increase in early retirement during the crisis, partially compensating losses of employment income for the rich.

Figure 3
Income by type and decile group
(EUR)



Note: This figure reports the main income components of households' income by decile group and over time. In the first row are depicted the results for Greece and in the bottom row for Portugal. Based on Eurostat definition of HY020 the income without transfers includes: gross employee cash or near cash employee income, company car, gross cash benefits or losses from self-employment (including royalties), pensions received from individual private plans, rental of a property or land, regular inter-household cash transfers received, interests, dividends, profit from capital investments in unincorporated business, income received by people aged under 16 MINUS regular taxes on wealth, regular inter-household cash transfer paid, tax on income and social insurance contributions. See also Appendix B for summary statistics. Source: EU-SILC, own calculations.

[7] In Appendix D we replicate the figure as a share of total gross household income and in Appendix D. Figure 4 and Appendix D. Figure 5 we replicate the figure split by educational attainment. Appendix D. Figure 2 highlights relative stability of the capital income compared to employment income.

[8] This is consistent with Arnold and Rodrigues (2015) who estimate that non-pension benefits in Portugal provide considerable support to the low-income households, constituting up to 20% of disposable income for bottom quintile.

The main lesson to be learned from the descriptive analysis is that for different income groups, different income types are important, leading to different kinds of vulnerabilities. For a holistic understanding of how the crisis and subsequent adjustment episode affected households across the income distribution, a disaggregation by income group and income type is thus necessary. In our main analysis, we will thus present results for different types of incomes by income group. Analysing the components of disposable household income provides insights into the role of social support structures and helps identify how market incomes and tax and transfer systems interacted to produce changing distributional outcomes.

4. Distributional effects across social groups: Evidence from DID

So far, we have studied the data in a descriptive way, providing insights into income dynamics during the crisis in the two countries under consideration. Yet, to what extent did the experiences in Greece and Portugal differ from EA countries that faced a comparable external economic environment in the monetary union but did not lose market access and did not engage in financial assistance programmes? We draw such comparisons in the following chapter.

Dynamic difference-in-difference design

EU-SILC has a cross-sectional data feature, where a random sample of households is surveyed in each year in each country. Exploiting this feature, we pool euro area microdata across survey waves between 2004 and 2019 to employ a difference-in-difference (DID) design by estimating the following specification:

$$y_{ict} = \sum_{t \neq base\ year}^{T} \beta_t (D_c \times \tau_t) + \delta_c + \tau_t + \boldsymbol{X'_{ct}}\lambda + \boldsymbol{Z'_{it}}\alpha + \varepsilon_{ict} \qquad (1)$$

The outcome variable, y_{ict}, denotes various income types of household *i* surveyed in country *c* in year *t.* We initially focus on total disposable household income but subsequently also use other components of income. The variable *D* indicates one of the two "treated" countries (Greece and Portugal) in separate regressions. Applying "event-study" specifications, *D* is interacted with year fixed effects, τ_t, to allow estimating how differences between treated and control countries vary over time. In all regressions, we include full sets of year fixed effects, τ_t, to absorb all time-specific shocks that hit all countries in the sample in the same way and country fixed effects, δ_c, to absorb all time-invariant country-specific differences. $\boldsymbol{Z'_{it}}$ controls for micro-level household characteristics such as the age, gender, education, marital status of the household head, the number of children under 18 in the household and a categorical variable for the type of household (couple with one or 2 children, couple with 3 children or more, mono-parental households, young single or couple without children, and older single or couple without children). $\boldsymbol{X'_{ct}}$ represents the control vector of country-year-level variables. Throughout the treatment bias" or "collider bias", the baseline specification only includes the country's age structure. In alternative specifications reported in Appendix C, we include additional time-varying macroeconomic variables (such as exports and imports, the current account balance, and the government's interest payments to account for differences in market pressure) to minimise differences between control countries and treated countries. The results from specifications with and without control variables are similar. In all the specifications, we use robust standard errors clustered at the country level.

The DID design requires us to determine an appropriate control group. A key difficulty lies in the non-random selection of countries that undergo an adjustment programme. Our selection of the control group is informed by both theoretical reasoning and an auxiliary application of the synthetic control method as a data-driven approach. As regards to theoretical reasoning, we follow the broad consensus in the literature that the EA crisis was a balance-of-payments crisis that had fundamentally different implications for countries with current account deficits than for countries with current account surpluses (for details see Baldwin et al. 2015, Frieden and Walter 2017). Most deficit countries encountered financial and economic troubles during the crisis, while most surplus countries fared substantially better.

In Table 1 we follow Frieden and Walter (2017) in ranking EA countries by their pre-crisis current account balance. As is visible in Table 1, all countries that were under any form of adjustment programme had current account deficits before the crisis. Greece and Portugal were the countries with the largest current account deficits in the pre-crisis period. The table also shows that other countries that participated in adjustment programs (Cyprus, Ireland), received limited financial sector assistance (Spain), or saw sharp spikes in borrowing costs and multiple credit rating downgrades (France, Italy, Malta, Slovakia, Slovenia) were countries with current account deficits (Baum et al. 2016). We exclude Lithuania, Latvia, and Estonia as they adopted the euro after the start of the financial assistance programmes in some countries. Moreover, Latvia underwent a financial assistance programme before joining the euro area.

Table 1
Definition of DID control group, current account balance

Euro area countries 2009	Current Account Balance (% GDP) 2004-2009
Greece	-10.50
Portugal	-9.93
Cyprus	-7.53
Spain	-7.34
Slovakia	-6.40
Malta	-4.57
Ireland	-3.91
Slovenia	-2.80
Italy	-1.47
France	-0.28
Belgium	1.57
Austria	3.21
Finland	3.55
Germany	5.58
Netherlands	6.05
Luxembourg	6.51

Note: EA countries ranked by their pre-crisis current account balance. ESM programme countries in blue. Countries that are used for the control group of the DID design in orange. Spain is excluded from the control group because it had a small-scale financial-sector programme.
Source: Eurostat. See also Frieden and Walter (2017).

Therefore, we propose as the control group those EA countries that had a current account deficit in the pre-crisis period. Following this approach, the control group consists of Slovakia, Slovenia, Italy, Malta,

and France.[9] This amounts to excluding the group of surplus countries that fared relatively well during the EA crisis (Luxembourg, Netherlands, Germany, Finland, Austria, Belgium).

To combine this theory-driven selection of the control group with a data-driven approach, we apply the synthetic control method in Appendix E. As a donor pool of potential control countries, we use the entire euro area excluding only the countries that received some sort of financial assistance programme. We then let the synthetic control method select a linear combination of countries to match the pre-crisis trend of disposable household income as well as of a large number of macroeconomic and demographic country-year specific fundamentals (see Appendix E for details). For the data-driven construction of the counterfactuals for both Greece and Portugal, the synthetic control algorithm selects only countries with a negative current account balance in the pre-crisis period (Italy, Slovakia, and Malta). This result suggests that countries with a current account deficit during this period are an appropriate control group for both theoretical and empirical reasons.

Bearing in mind the challenges related to the identification of the control group, we conduct an additional robustness check. Following Zigraiova and Erce (2024), we define an alternative control group based on a comparative dimension that prioritises the risk of losing market access.[10] In this exercise, we compare Greece and Portugal to this alternative control group consisting of Slovenia, Slovakia and Italy. These countries are selected based on their high probability of market access loss prior to the sovereign debt crisis. This approach leverages countries with similar market signals and thus provides an alternative basis for our comparative analysis.

With this approach, the DID design estimates how income levels of households in Greece and Portugal, conditional on covariates, differ from households in macroeconomically similar countries before, during and after the crisis. If the pool of control countries constitutes an appropriate control group, there should not be any significant differences in outcomes in the pre-adjustment period. This can be tested by estimating β_t for all $t < -1$ and as the results below show, we do not find such statistically significant β_ts in the pre-adjustment period.

The β_t for all $t \geq 0$, the adjustment and post-adjustment period, indicate the dynamic differences between households in the two countries under consideration (Greece and Portugal) and the control group, conditional on time-invariant country characteristics, EA-wide time trends and observable household and country characteristics. This DID specification assesses the aggregate effects of the crisis and the adjustment policies. The results should be interpreted as the combined effects of the crisis and the adjustment period. The estimates in this chapter provide an understanding of how, during the crisis and the following adjustment, household income trends in programme countries diverged from observably comparable households in similar countries without adjustment programmes. In subsequent analyses in chapter 6, we make use of a triple DID design, which can under certain assumptions disentangle distributional effects of changing national policies from the crisis repercussions.

Results for average income

We begin by studying the mean of disposable household income. The results for the estimated coefficients of interest, β_t, and the corresponding 95% confidence intervals are plotted in Figure 4. The plot shows no indication of pretends as the estimates are close to zero, statistically insignificant, and do not show any systematic temporal pattern. Before the start of the economic downturn and the

[9] As France's current account deficit is close to zero, we exclude it from the control group in robustness tests (see Appendix C). The results are barely affected.

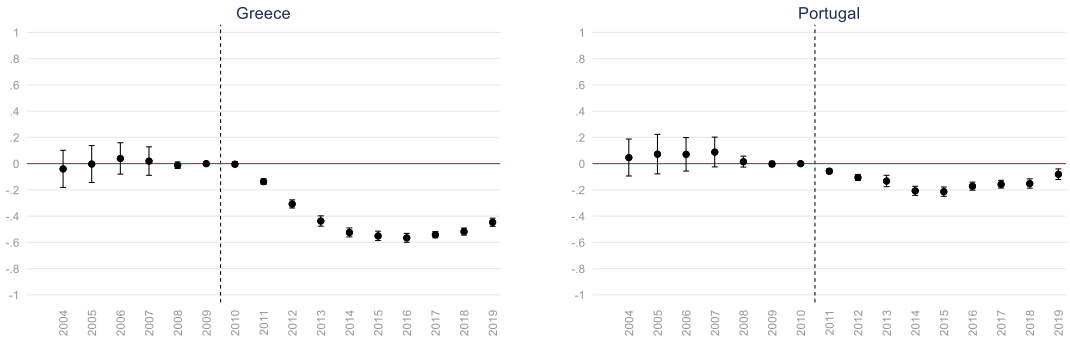
[10] Due to data limitations, their study excludes several countries e.g. Malta.

adjustment programme, the disposable income evolved similarly for households in the treatment countries and in the control group countries, conditional on the controls. This further supports the view that the selected countries provide a valid control group.

Once the crisis has propagated into the real economy and with the start of the adjustment, the disposable income of households in Greece declined to a greater extent than in the control group countries. The largest difference is recorded in 2016 with 0.57 log points (statistically significant at the 99% level). After 2016, the gap between Greece and treatment group countries starts shrinking, indicating a reversal. The overall pattern is similar for Portugal, but its magnitude is smaller. The largest difference is observed in 2015, when it reaches 0.2 log points, and by 2019 the gap declines to 0.1 log points. The pattern indicates that the divide between the control and treatment groups in terms of disposable income is on a path of reversion to the pre-crisis period.

These results are robust to specifications with various sets of control variables. In Appendix C. Figure 1, we show regressions without controls and with additional macroeconomic country-year level controls. We also show that results remain unchanged, when adjusting income for inflation and purchasing power parity (Appendix C. Figure 2) or when we rely on a different control group of countries following Zigraiova and Erce (2024) as explained in the previous chapter (Appendix C. Figure 2, Panel C). We report the full regression output in Appendix C. Table 1.

Figure 4
Disposable income over time



Note: The figure shows the regression results from a pooled OLS regression following specification (1). It includes country and year fixed effects and robust standard errors clustered at country level. A set of household level controls are included (age, gender, education, marital status of the household head, the number of children under 18 in the households and a categorical variable for the type of household (couple with one or 2 children, couple with 3 children or more, mono-parental households, young single or couple without children, and older single or couple without children)) and a country level control (the share of population older than 65 years old). The outcome variable in each of the panels is the total disposable household income and has a natural logarithmic transformation. In all panels the control group countries are defined as described in Table 2 and are the following: Italy, France, Slovenia, Malta and Slovakia. The dots represent the point estimate, while the lines represent the 95% confidence intervals. The vertical line is positioned one year prior to the start of the programme, which serves as the base year. The Y axis depicts the regression coefficients β_t which capture differences between treated and control countries in household income in log terms for each year. Regression results are weighted using the cross-sectional weighting for household data.
Source: EU-Silc, based on own calculations.

These results corroborate the findings from the descriptive evidence. They indicate marked differences in the two programme countries. In Greece, we observe a strong negative effect followed by a positive reversal in the income trend starting from 2016 onwards. In Portugal, we observe a milder negative effect followed by a positive reversal in the average income trend as of 2015.[11]

[11] Note that these results are also in line with the auxiliary SC method shown in Appendix E. The fact that pre-trends are insignificant and that the results from SC and DID regressions yield very similar results shows that the DID design constructs a similar counterfactual as the SC method. As a result, subsequent results on distributional effects can be interpreted is the same way as results from an SC design.

Obviously, these results only indicate an aggregate estimate and do not inform about which groups of the population experienced a larger drop in income. This is the focus of the subsequent chapters.

Heterogeneity by household characteristics

As a next step, we differentiate between different types of households to see which social groups faced the most significant drops in income. We initially focus on the gender of the household heads, their age, and their education. For these analyses, we estimate the same regressions as before but split the sample according to these household characteristics and report separate regression results for the sub-samples. Separating the microdata according to these characteristics allows us to get a deeper understanding of how the crisis and economic adjustments propagated across society.

We observe differences across gender of the household head (Figure 5. Panel A). Both household types recorded significant income drops. However, households with female heads were impacted somewhat more strongly in both countries. This might be driven by the sectoral employment of women in lower paying jobs and an intensifying gender pay gap in times of crisis.

In terms of age differences (Panel B), individuals older than 65, mostly pensioners, at the mean do not appear to have suffered as much as other groups. The finding is in line with Andriopoulou et al. (2019) and Arnold and Rodrigues (2015), who report relatively favorable income positions of pensioner-headed households. The economic adjustment period affected market income more than pensions. In addition, older groups have a higher probability of benefiting from alternative income sources. Nevertheless, income losses for the elderly during the crisis, which went up to 0.4 log points in the mid-2010s, are not trivial and result mostly from substantial pension cuts. We study pensions in more detail in the following chapter.

Differences according to education of the household head are small. Households headed by high-skilled individuals fared somewhat worse during the adjustment period. This might be caused by a higher level of informality for low-skilled workers in the Greek economy during the adjustment (Hassan, Schneider, 2017; Dellas et al. 2022). But also, by the income squeeze at the top of the income distribution and a decrease in the education premium documented in the case of Portugal (Oliveira et al. 2023, Rodrigues et al., 2012). In sum, women and the working-age population experienced a relatively larger decrease in income during the adjustment in both Portugal and Greece.

Figure 5

Heterogeneity by household head characteristics

Note: The figure shows the regression results from a pooled OLS regression from Specification (1) and split into two different samples according to: i) gender, ii) age, iii) education. It includes country and year fixed effects and robust standard errors clustered at country level. A set of household level controls are included (age, gender, education, marital status of the household head, the number of children under 18 in the households and a categorical variable for the type of household (couple with one or 2 children, couple with 3 children or more, mono-parental households, young single or couple without children, and older single or couple without children)) and a country level control (the share of population older than 65 years old). In each of the cases, the control that is used to spit the sample is removed. The outcome variable in each of the panels is the total disposable household income. The outcome variable in the regression has a logarithmic transformation. In all panels the control group countries are defined as described in Table 2 and are the following: Italy, France, Slovenia, Malta, and Slovakia. The dots represent the point estimate, while the lines represent the 95% confidence intervals. The vertical line is positioned one year prior to the start of the programme. Regression results are weighted using the cross-sectional weighting for household data.

5. Distributional Effects across Income Groups: Evidence from Triple-DID

To study the distributional implications of the adjustment periods in Greece and Portugal in greater detail, we differentiate by income decile groups. As anticipated in chapter 4, we assign each household to its decile group according to equivalised disposable household income. This allows us to identify income groups that saw the most significant changes to their income over time. Such a distinction deepens our understanding of changes in the overall inequality as well as in various trends across groups.

To estimate these effects, we initially estimate the DID regressions at the decile-group level. They are specified as follows and estimated separately for each decile group g:

$$\ln y_{g,c,t} = \mu_c + \tau_t + \sum_{t=2004}^{2021} \beta_{g,t}(P_c \times \tau_t) \quad + X_{ct}\Gamma + \varepsilon_{g,c,t} \ , \forall\, g \in G \qquad (2)$$

These regressions compare a given decile group in the respective treated country to the same decile group in the countries of the control group while absorbing country and year fixed effects, as well as the same country-year-specific macroeconomic control vector specified above.

While these results show the changes in incomes for the different income groups relative to the same income groups in similar countries, they do not allow us to infer whether the distributional consequences of the adjustment period differed significantly by income group. Moreover, these regressions do not allow us to disentangle the effects of the country-specific crisis shock from the effects of the adjustment policies. To address these two limitations, we also run "triple difference-in-difference" (triple-DID, Olden & Moen 2022) regressions by estimating the following specification:

$$\ln\, y_{d,c,t} = \sum_{t\neq 2009}^{T} \beta_t \left(D_c \times \tau_t \times \gamma_g\right) + \delta_c + \tau_t + \gamma_g + (D_c \times \gamma_g) + (\tau_t \times \gamma_g) + (D_c \times \tau_t) + \varepsilon_{g,c,t} \qquad (3)$$

These are our most conservative specifications. Importantly, they absorb all country-year-specific aggregate shocks by including country-times-year fixed effects, $\tau_t \times \gamma_g$.[12] This means that the aggregate income shock of the crisis effect in a given country-year is fully controlled for. What remains is only variation across decile groups within a given country-year. This helps disentangle crisis effects from adjustment effects. Nevertheless, this specification estimates the isolated distributional effects of the adjustment policies implemented by the two countries only under the strong assumption that the crisis had a homogenous aggregate effect across income groups within a given year.

Disposable Household Income

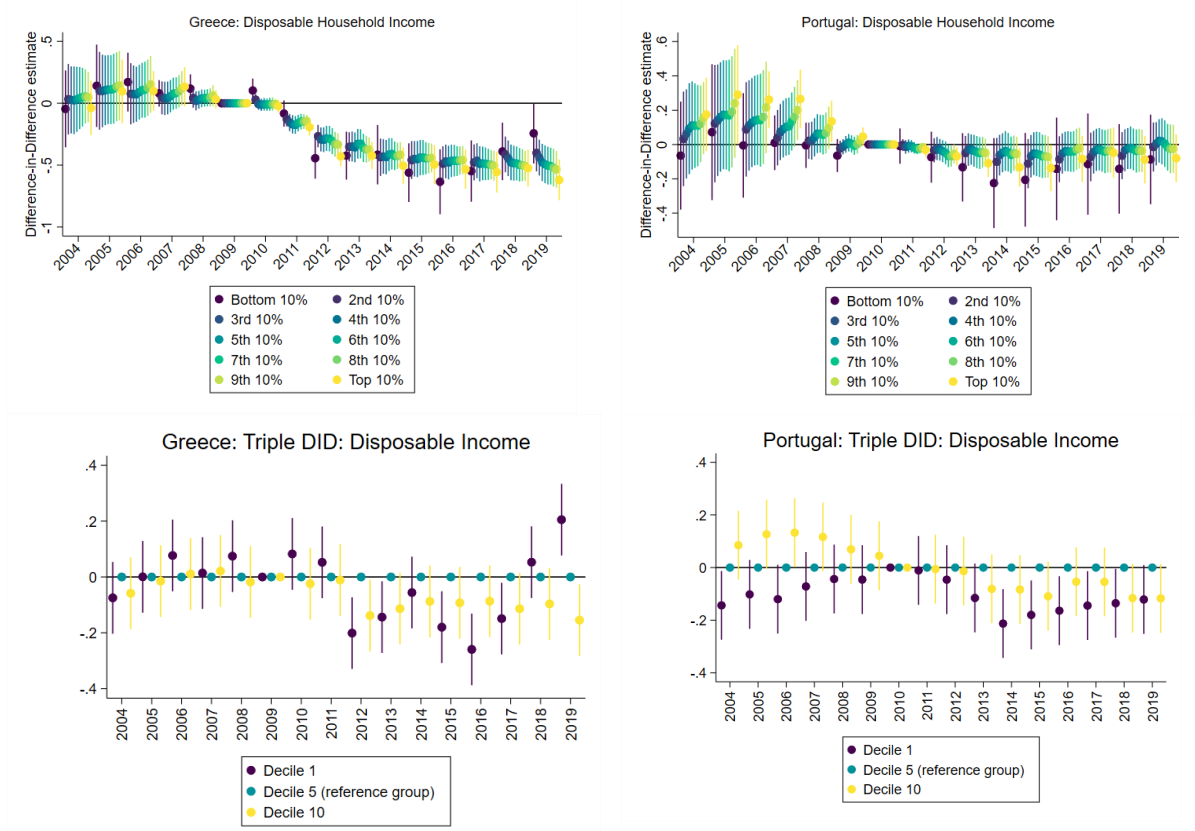
We plot results in Figure 6. The upper panel shows the results of the DID regressions. It depicts the DID estimates for all ten income groups. In Greece, the drop in disposable household income is significant for all income groups and remains so until the end of the observation period. The drop in the early adjustment period is strongest for the poorest 10 percent. The triple DID regressions in the lower panel show that these differences in the early adjustment period are statistically significant, suggesting that incomes of the bottom 10 percent were indeed more negatively affected than incomes in the middle

[12] Since country-times-year fixed effects are absorbed, we argue that we do not need to restrict the control group here and use the full sample of EA countries for the triple DID regressions to increase statistical power.

of the income distribution.[13] Thanks to the catching-up process starting in 2017, the relative losses compared to the reference groups were recovered by 2018.

Figure 6

DID design: disposable household income – results for specification 2 panel a) panel b) shows the triple diff in difference



Note: The two graphs in the top panel show the results of DID regressions with the outcome variable disposable household income before transfers by decile group in Greece (left) and Portugal (right) (Specification 2). The two graphs in the bottom panel show the results of triple-DID regressions of the same variables (Specification 3).

The overall pattern in Portugal shows some similarities but the magnitude of the economic shock is milder. At the decile-group level, individual coefficients for the early adjustment period are all negative but not statistically significant at conventional levels. The triple DID results show, however, that the bottom 10 percent are also more negatively affected than the income groups in the middle. Over time, DID coefficients increase for all decile groups pointing to an overall economic catch-up in Portugal relative to comparable countries. The relative losses for the bottom 10 percent also diminish over time, pointing to a catch-up at the bottom of the Portuguese income distribution.

Income from social safety nets

To shed more light on the income developments across income deciles, we disaggregate overall disposable household income into various income sources. First, we examine the combined transfer income from all social safety nets (including all types of social transfers and pensions) and exclude all market income (from employment, self-employment or capital investments).[14] Given that many conditions of the adjustment programmes in Greece and Portugal focused on the reform of the pension

[13] Note that the regressions include all decile groups but we only plot the bottom top income groups to reduce clutter. A graph with all coefficients is shown in the Appendix. Decile group 5 is the left-out reference group in all regressions.

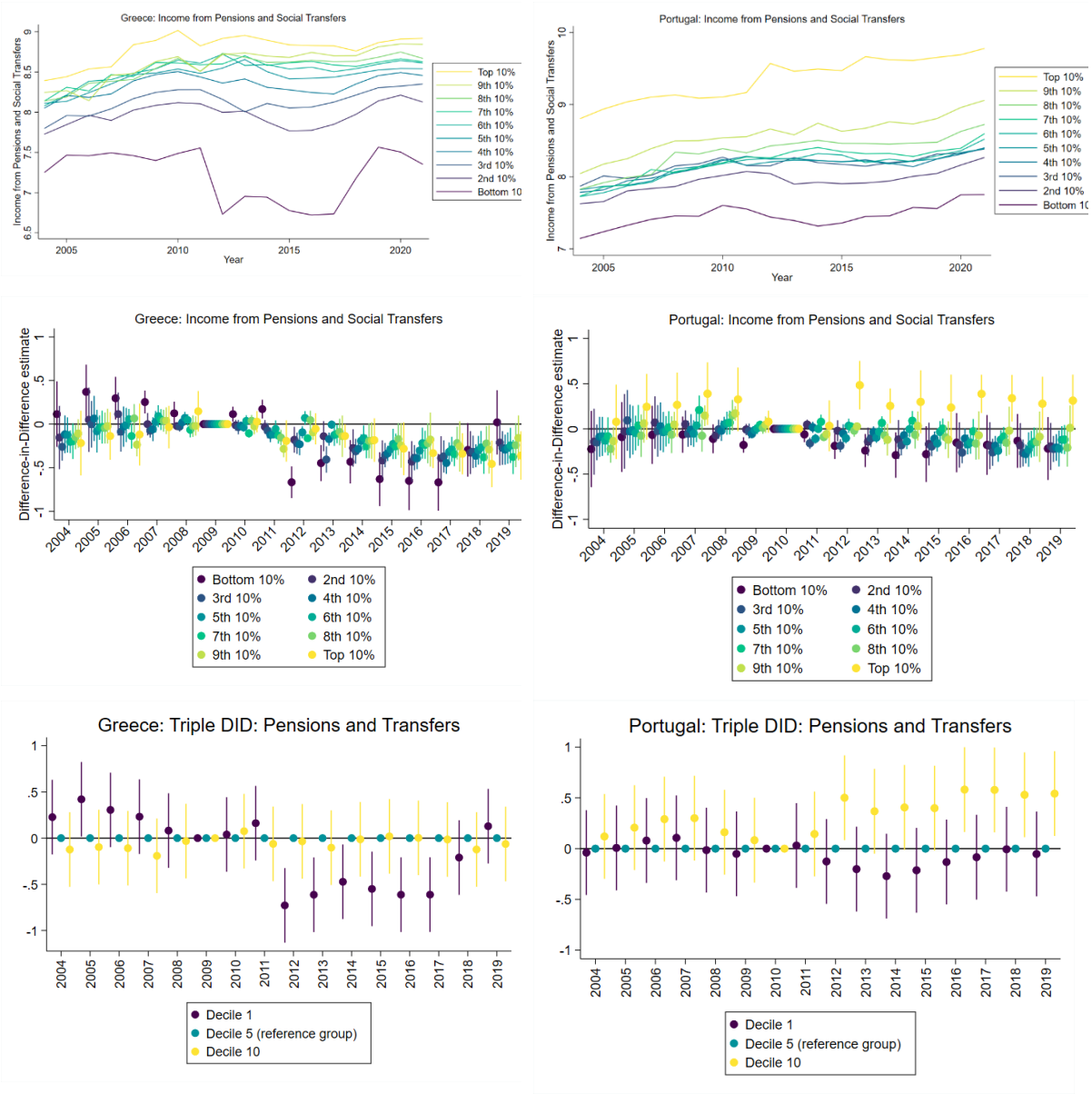
[14] In Appendix H, we also show results for market income and further differentiate between pensions and transfers.

and transfer system (see chapter 2, Appendix A and Appendix G), we expect the most direct effects of the policies on these sources of household income. In subsequent analyses, we then disaggregate between income from different types of social safety nets.

The top panel of Figure 7 shows descriptive evidence over time and suggests that richer households received higher income from social safety nets. This is mostly due to pension payments, which account for the largest share of this income type and are larger for richer households as they reflect previous earnings. In terms of changes over time, the most notable development is a substantial drop in pension and transfer payments to the poorest 10 percent in Greece between 2012 and 2017.[15] In Portugal, there also is a drop during the adjustment period for poorer households but it is smaller than in Greece. At the same time, we observe an increase in pension payments to the Portuguese richest ten percent in 2012.

[15] Leventi and Picos (2019) link a drop in income of households headed by pensioners to the 2011 personal income tax reform which resulted in a considerable rise in pensioners' solidarity contributions; on average, half of this category of households located in deciles 5-10 experienced income losses of 5% or more.

Figure 7
Descriprive, DID, and triple-DID: Income from Social Safety Nets (Pensions and Transfers)



Note: The two graphs in the top panel show the evolution of income from pensions and transfers by decile group in Greece (left) and Portugal (right). The two graphs in the bottom panel show the results of DID regressions of the same variables.

The results from DID regressions reported in the middle panel compare these developments to similar EA countries. They are generally in line with the descriptive findings: in the early crisis phase, there is a substantial drop in income from pensions and transfers combined for the poorest 10 percent in Greece. This drop is mostly driven by a drop in income from pensions (see Appendix H, which differentiates between pensions and transfers). The negative trend for the poorest 10 percent in Greece, however, starts to reverse in 2017 and the relative losses vanish towards the end of the observation period. This trend reversal is driven mostly by transfers, which increase for the poorest 10 percent in later stages of the adjustment period (see Appendix H and below).

These results are confirmed by the triple DID regressions in the bottom panel. They show that the temporary differences between the bottom 10 percent and the middle of the income distribution are statistically significant for the 2012-2017 period and vanish thereafter. To the extent that the crisis in

Greece had a homogenous impact on income from public transfers across income groups, these estimates indicate the distributional effects of the adjustment policies. The results show that adjustment policies temporarily reduced income from social safety nets for the poor. Distinguishing between pensions and social transfers suggests that this reduction is driven by pensions (Appendix H). Social transfers for the poor increased in later stages of the adjustment programme and contributed to the catching-up for the bottom 10 percent.

For Portugal, the relative loss in pension and transfer incomes for the bottom 10 percent is not statistically significantly different from the middle of the income distribution. However, the relative increase in this income stream for the top ten percent is statistically significant until the end of the observation period. This suggests that, also in Portugal, changes in distributional patterns of income from pensions and transfers contributed to inequality during the adjustment period.

Disaggregating social safety nets

This section delves into a more detailed analysis of different types of social transfers to understand how the social safety net has affected distributional outcomes during the crisis. We use the most granular type of EU SILC data at the individual (household-member) level, which differentiates between many types of social transfers. The public transfers that were considered thus far included different types of public redistribution schemes related to poverty, education, families, sickness, disability, unemployment, housing, etc. This analysis now differentiates between the various types. It thereby excludes all kinds of pensions (i.e., old-age and survivors' benefits), since their aggregate volume is an order of magnitude larger and masks the nuances in levels of other targeted social transfers. As these different types of social transfers vary strongly across countries and are thus difficult to compare in a regression-based framework, we study this highly granular disaggregation in a descriptive way.

Before turning to these microeconomic data on social transfers, we illustrate the macroeconomic evolution of social protection spending in Greece and Portugal before, during, and after the crisis. Appendix F depicts government spending on social protection in the analysed countries. It shows dynamic growth in government spending on social protection per capita in the run-up to the financial assistance programme in both Greece and Portugal. With the start of the adjustment, the social protection expenditures drop in Greece, while they continue to rise in Portugal. The Greek social protection spending continuously dropped each year between 2009-2013. In 2013/4 social protection spending stabilised at a lower level until the end of the observation period. In Portugal, the adjustment process only slowed the pace of expenditure increases (see Appendix F).

In line with the modest change to aggregate social protection spending levels during the crisis in Portugal, we observe only limited over-time fluctuations in income from social benefits across income groups. There are three notable observations. First, the most substantial break in the time series is observable for the top 10 percent, for whom we record a large jump in income from unemployment benefits in 2012/3. This reflects the ability of unemployment benefits in Portugal to act as automatic stabilisers when the crisis hit the job market. More generally, the expenditure data show that unemployment benefits make up a large share of social protection spending in Portugal. They increase after the start of the adjustment process and start decreasing around 2013. The reform timeline in Appendix G provides details on the policy changes in the Portuguese unemployment benefits and shows both changes in disbursed amounts and extensions of coverage. A second notable observation is the progressive role played by family allowances, which are large for low-income households, decrease with household income and are relatively small for high-income households. A final notable observation from Portugal is that income support to address social exclusion is highly targeted. This

type of social spending mainly reaches households in the bottom 10 percent and only few households in richer decile groups benefit from it.

For Greece, social exclusion benefits were initially much less targeted. In the pre-crisis and early adjustment period, households from virtually all decile groups received similar amounts of income from social-exclusion spending. Unemployment, disability benefits and family allowances are also similar across income groups in this time period. The most notable observation for the early adjustment in Greece is the substantial decline in income from social spending for all income groups. The largest drops are observed for households in decile groups 2-8. This shows that the cuts to social spending in the early adjustment period affected both rich and poor segments of the Greek society. As social transfers constitute a relatively more important income source for poorer households (Appendix D), this had more severe implications for those households. In the later adjustment period, we identify a marked shift. The data show a strong increase in social exclusion income support for the bottom ten percent and a mild increase for the second decile group. This uptick coincides with the implementation of the Guaranteed Minimum Income (GMI) / Social Solidarity Income (SSI) in 2016/2017. In the same period, we also observe a substantial increase in income from family allowances for low-income families. Richer families simultaneously lose income from family allowances, reflecting cuts to family allowances implemented in 2011/12 (see the timeline in Appendix G). Overall, the evidence shows that social transfers in Greece become significantly more targeted toward low-income households in the later stages of the adjustment.

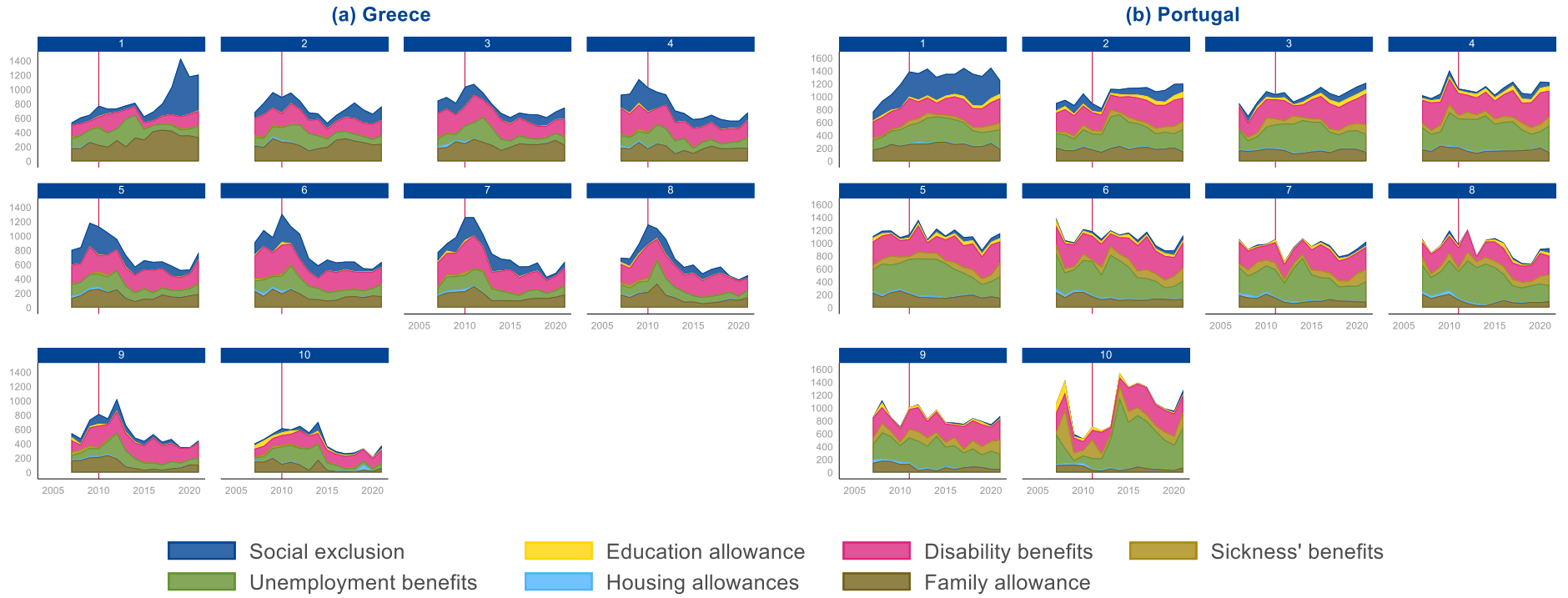
A key difference between Portugal and Greece is that unemployment benefits played more of a social safety role in Portugal than in Greece. As an example, consider the values from 2014. According to our calculations, the average income from unemployment benefit for households in the 5th decile was €120 in Greece, while in Portugal it reached €578 .[16] In Greece, the household income from unemployment benefits decreased early after the start of the economic adjustment. The short coverage and the low amounts translate into substantially lower per capita government spending on unemployment benefits. Conversely in Portugal, unemployment government spending per capita continued rising until 2013 and only diminished towards the end of the adjustment (see Appendix F. Figure 3).

[16] The OECD (2013) highlighted that for 2014 only 17% of the people declared as unemployed received the unemployment benefits in Greece in 2009, compared to 26% in Portugal and 53% in France.

Figure 8

Social benefits excluding old-age and survivors' benefits.

(EUR)



Note: This figure reports breakdown of social benefits excluding the old-age and survivors benefits. The reference period is only starting in 2007.

Conclusion

Our research delves into the distributional implications of the Eurozone crisis and macroeconomic adjustment. In particular, we focus on changes in income levels across various social groups, on how these changes unfold over time and on the types of incomes that drive these. By employing detailed microdata, our study moves beyond aggregate measures to unveil the nuanced evolution of living conditions among various social groups during this period of macroeconomic adjustment. Drawing on descriptive analyses, as well as on DID and triple-DID regressions, we reach conclusions on the evolution of aggregate household income, on distributional changes across social groups, and on the mechanisms behind those.

First, average household incomes declined during the crisis in both Greece and Portugal, while the decrease in incomes was more pronounced in Greece than in Portugal. The aggregate income drop in both countries was larger than in a group of countries with similar pre-crisis trajectories and macroeconomic fundamentals. The initial drop was followed by a reversal from 2016 onwards in Greece and from 2015 onwards in Portugal.

Second, these income losses during the crisis were not equally distributed across social groups. When differentiating between households by the gender of the household heads, their education and their age, we find that women and younger people saw more substantial income losses during the adjustment in both Portugal and Greece. When examining the income developments at the decile-group level, we find that both in Greece and Portugal, the bottom 10 percent were initially more negatively affected than the middle-income groups. These groups were also worse off compared to their counterparts in other countries with similarly weak pre-crisis economic characteristics.

Third, studying the mechanisms that drive these changes in disposable income, we find that various types of household income (market income, pensions, social transfers) reacted differently for different income groups. In Greece, we find a significant drop in income from pensions for the poorest 10 percent between 2012 and 2017. From 2018 onwards, however, the relative loss of income for the poorest ten percent ends, mainly due to a gradual boost in social transfers. This shift is associated with the gradual roll-out of a general minimum income scheme.

Overall, trends are similar in Portugal, but with a smaller magnitude. Here, we also observe temporary income losses for the poorest ten percent that are associated with decreasing incomes from pensions. At the same time, we observe a relative increase in pension payments to the richest 10 percent between 2012 and the end of the observation period. In Portugal, unemployment benefits played a major role in shielding many income groups from more substantial income losses. In both countries, changing distributions of income from pensions and transfers played a key role for inequality during the adjustment period.

In sum, our analysis confirms that different income groups depend on different income types and that such variation results in different vulnerabilities in times of crisis. For the most vulnerable groups, our analysis documents the crucial role played by pensions and transfer systems during the economic adjustments in the Eurozone crisis. It points to the need to put in place effective and sustainable safety nets in stable times, as ad hoc tweaks during the economic adjustment can negatively impact the economic well-being of the lowest income groups. We also find that well-designed and targeted reforms can alleviate pressures on the lowest income groups.

More generally, the heterogeneous findings for different phases of the adjustment periods suggest that distributional outcomes are sensitive to the exact policy design. While cuts to transfers and pensions in the early adjustment period in Greece placed a substantial burden on low-income

households, the same households benefitted from reforms that led to more targeted social policies in the later stages of the programme. This was achieved without substantial increases in the overall volume of spending and thus points to the need for well-targeted social policies in times of crisis.

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Appendix

Appendix A

Appendix A. Table 1
Coding of Conditionality

ESM database sector	ESM database subsector	COFOG classification
Financial sector policies		Omitted for the analysis
Fiscal measures[17]	Expenditure measures	Categorised based on their description
	Revenue and expenditure measures	Categorised based on their description
	Revenue measures	Categorised based on their description
Fiscal-structural[18]	Education	Categorised under COFOG 09-Education
	Healthcare reform	COFOG classification 07-Health
	Pension system	COFOG classification "10-Social Protection
	Welfare system	COFOG classification "10-Social Protection
	Social security	COFOG classification "10-Social Protection
	Other	Categorised based on their description
Other policies	Social policies	COFOG "10-Social Protection"
	Other	Categorised based on their description
	Monitoring and Technical assistance	Categorised based on their description
Structural labour market policies	Active Labour Market Policies	Categorised based on their description
	Collective bargaining	Categorised based on their description
	Other	Categorised based on their description
	Education system	09-Education
	Employment protection legislation	10-Social Protection
Structural product market policies	Pension system	COFOG "10-Social Protection"
	Employment protection legislation	COFOG "10-Social Protection"
	Health care reform	COFOG "07-Health"
	Education system	COFOG "09-Education"
	Remaining subsectors	Categorised based on their description

Note: Own classification.
Source: ESM Conditionality Database

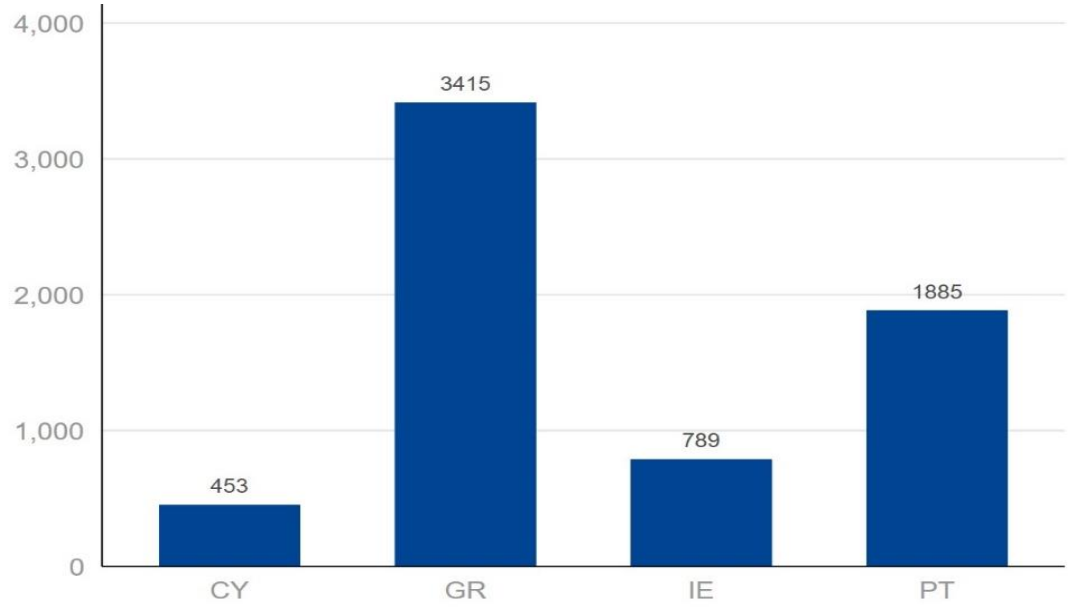
Box 1. Conditionallity assessment

The inspection of the data we coded for the four former beneficiary countries suggests that conditionality implemented in the social policy areas mainly touched upon health care and social protection. The intensity varied across countries and across time. Portugal and Greece score highest when comparing numbers of conditionalities targeting social spending. According to our classification, Greece had the highest number of conditionalities related to social protection, amounting to 281 conditions, while Portugal had a notably lower count of only 87. Additionally, in terms of duration, Greece exhibited the longest persistence of conditionality per year, as illustrated in Appendix A Figure 2 . This is why our empirical analysis focuses on Greece and Portugal. We do not take into consideration compliance with conditions and their effects. For a more detailed assessment of compliance assessment see Clancy et al, 2023.

[17] Impact government revenues and expenditures and in turn deficit.

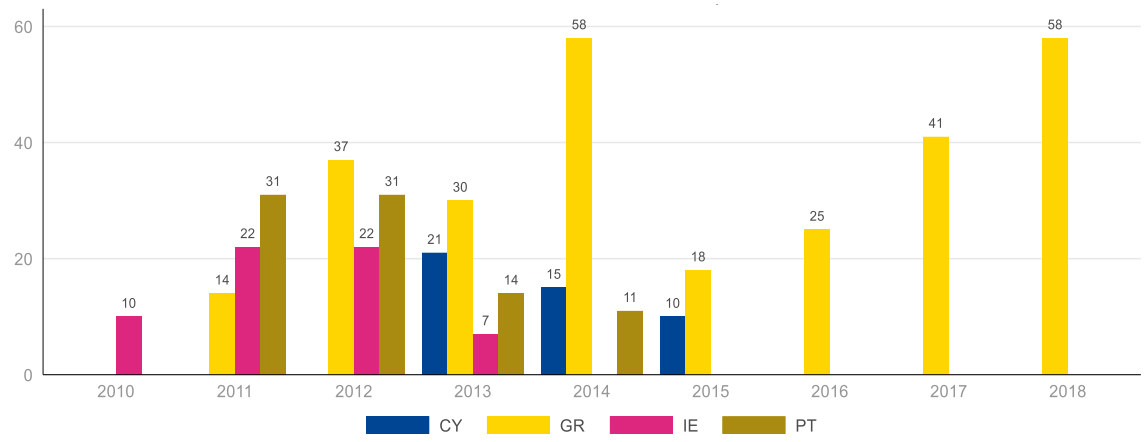
[18] Improve expenditure and revenue efficiency.

Appendix A. Figure 1
Total number of conditions



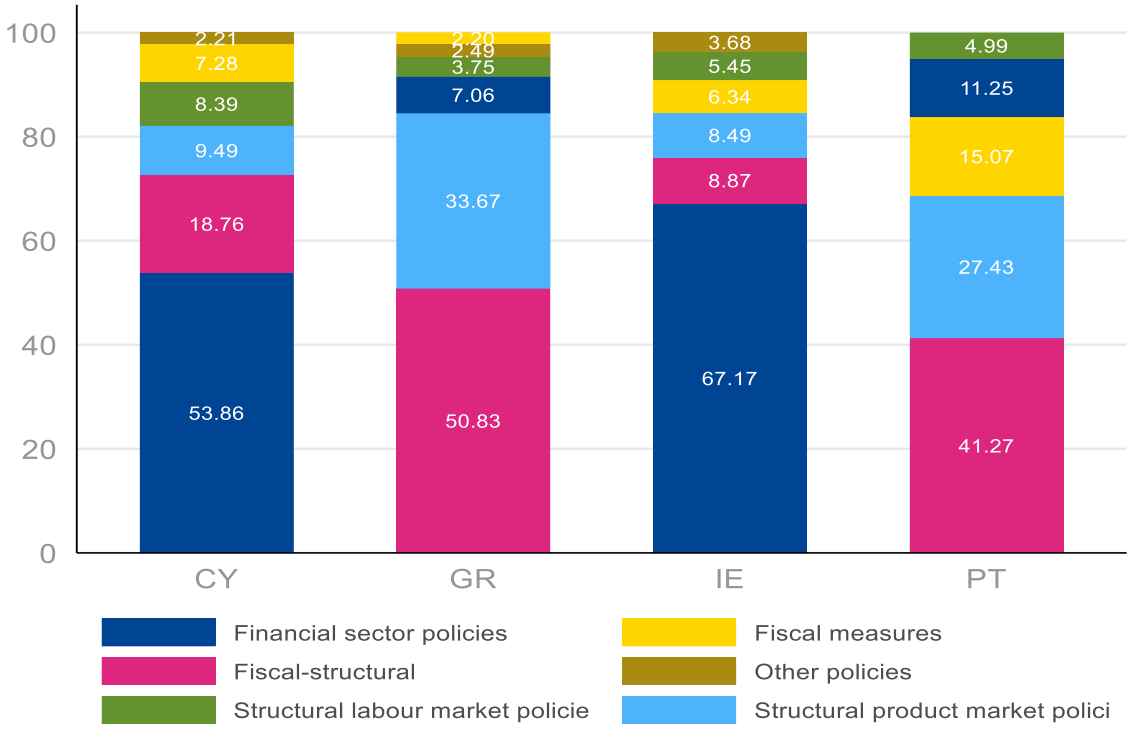
Note: This figure reports the total number of conditions for Cyprus, Greece, Ireland, and Portugal based on the ESM conditionality database.
Source: ESM Conditionality Database.

Appendix A. Figure 2
Social protection related conditionalities over time
(number)



Note: This figure reports conditionalities for Cyprus, Greece, Ireland, and Portugal based on the ESM conditionality database related to COFOG category social protection. It reports for each year the number of conditions for each country.
Source: ESM Conditionality Database, Eurostat and own calculations.

Appendix A. Figure 3
Focus of financial assistance programs
(percent)

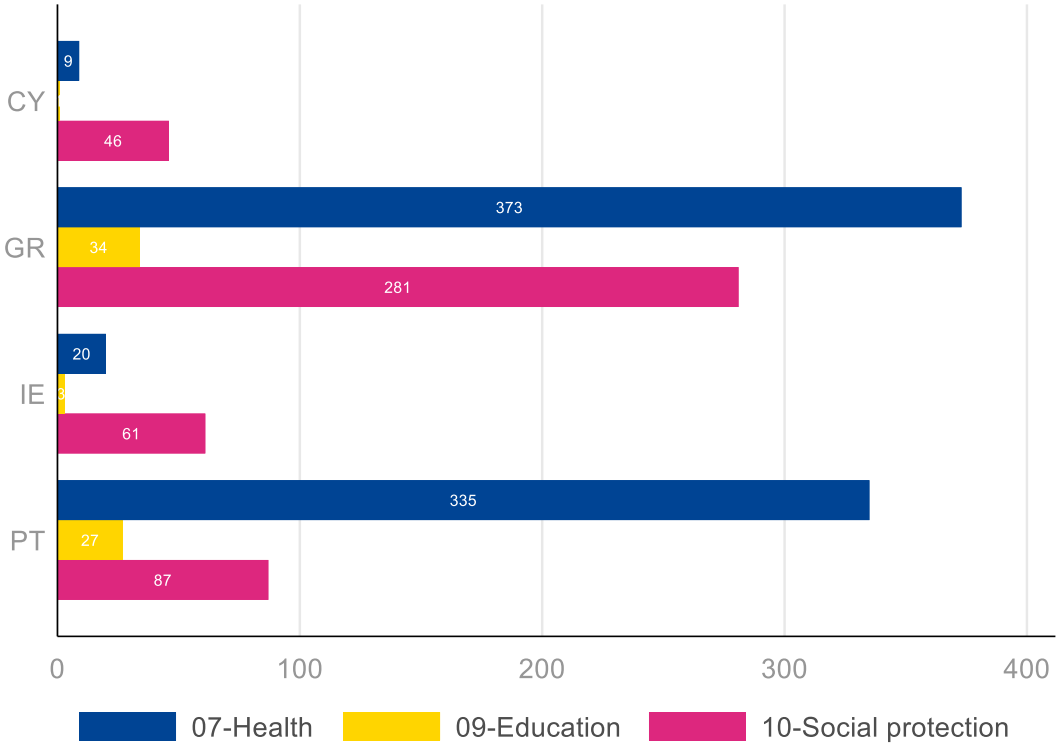


Note: This figure depicts the main classification of conditionalities for Cyprus, Greece, Ireland, and Portugal.
Source: Own coding based on ESM conditionality database.

Appendix A. Figure 4

Conditions across countries and sectors

(number of conditionalities)



Note: This figure classifies the conditionalities for Cyprus, Greece, Ireland, and Portugal. It matches data from the ESM conditionality database against three main COFOG categories related to social spending. We refer to social spending as spending on i) health, ii) education and ii) social protection. The horizontal axis shows the number of conditions, and the bars report the actual number for each category. Source: Own coding based on ESM conditionality database.

Source: Own coding based on ESM conditionality database.

Appendix B

Summary Statistics

The tables in this section report the mean of each variable: i) market income (income from employment, self-employment, interest, property), ii) gross household income (which includes taxes), iii) disposable household income, iv) social transfers, v) taxes. The average for each income type is reported for each decile. Each table reports the average for selected period.

Descriptive statistics - mean by (decile) before 2010 - Greece

	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	2996.442	7975.05	5195.545	515.794	2417.345
2	4971.128	11465.216	8927.593	714.983	2095.313
3	7225.795	14218.814	11236.444	710.685	2325.925
4	9515.299	16920.058	13186.044	818.323	3007.61
5	12368.88	19919.287	15458.378	732.111	3762.662
6	16004.323	23996.625	18319.692	817.408	4646.688
7	20803.19	29168.698	21712.952	758.172	6188.292
8	28464.456	35632.782	25781.875	669.231	8651.989
9	38770.532	45483.464	31764.782	401.12	12196.072
10	55616.925	81708.21	52798.640	453.318	26389.7

Descriptive statistics - mean by (decile) between 2010 and 2016 - Greece

	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	5373.031	6756.224	4431.691	706.358	2324.534
2	7398.491	10557.467	7768.826	747.455	2788.641
3	9901.025	13512.869	10070.397	815.091	3442.472
4	10722.247	15452.938	11581.212	760.713	3871.726
5	12505.06	17850.96	13386.836	774.288	4464.124
6	14829.635	20405.397	15243.690	806.384	5161.707
7	19530.809	24649.27	18229.725	844.097	6419.545
8	26057.117	29847.77	21692.128	732.633	8155.642
9	34382.914	36927.174	26297.475	588.896	10629.699
10	61532.981	64480.443	43077.394	445.939	21403.049

Descriptive statistics - mean by(decile) between 2017 and 2019 - Greece

	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	5632.093	7572.651	4690.590	1234.821	2882.061
2	7713.243	11188.891	7464.122	886.314	3724.769
3	9706.093	14019.379	9388.159	756.806	4631.22
4	11032.68	15959.271	10698.117	669.58	5261.154
5	12389.487	18000.954	12174.492	673.849	5826.462
6	14918.335	20554.048	13895.888	658.679	6658.16
7	18180.238	23834.543	15929.404	577.59	7905.14
8	23045.474	28005.141	18554.947	517.275	9450.193
9	28799.32	33422.323	22129.519	395.842	11292.804
10	53034.196	56306.539	35682.218	288.055	20624.321

Descriptive statistics - mean by(decile) before 2011 - Portugal

	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	2532.297	5318.721	4206.828	974.127	797.682
2	4472.659	8085.568	6872.952	1052.284	894.067
3	5199.926	9415.359	8113.907	984.612	899.432
4	8450.587	12205.962	10396.544	1149.458	1465.132
5	11129.938	14660.873	12370.582	1201.322	1854.319
6	14651.921	17806.508	14705.563	1305.937	2651.363
7	18855.383	21251.715	17325.335	1074.024	3552.126
8	22802.041	26378.853	20826.533	1087.356	4889.613
9	31990.814	35778.217	27164.146	1019.034	7980.105
10	56449.28	69112.132	49693.660	926.172	19531.376

Descriptive statistics - mean by(decile) between 2011 and 2014 - Portugal

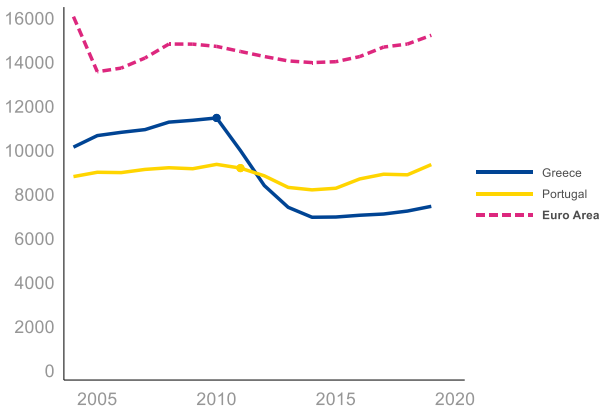
	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	3897.295	5521.026	4780.545	1440.806	740.481
2	5575.874	8165.178	7292.193	1057.429	872.985
3	6898.459	10095.691	8977.842	1123.8	1117.849
4	9465.883	12402.592	10966.500	1200.449	1436.093
5	13050.891	15222.195	13172.486	1316.555	2049.709
6	15642.044	17769.02	15072.899	1254.959	2696.121
7	19665.559	21232.969	17565.993	979.872	3666.976
8	25280.03	26474.622	21037.754	1105.455	5436.868
9	33872.357	35115.778	26389.940	990.532	8725.838
10	59625.216	65843.92	44948.591	955.067	20895.329

Descriptive statistics - mean by(decile) between 2015 and 2019 - Portugal

	Market income	Gross income	Disposable Inc	Social transfers	Total taxes
1	3515.11	5249.843	4580.050	1276.015	669.793
2	5950.825	8561.457	7653.569	1108.73	907.887
3	7171.209	10716.106	9575.765	1005.166	1140.341
4	10368.592	13136.24	11521.894	1020.886	1614.346
5	13594.656	15950.262	13696.780	1044.717	2253.483
6	17515.058	19412.334	16163.219	1001.204	3249.115
7	22077.422	23411.769	18756.164	855.237	4655.605
8	27939.317	28938.793	22177.489	836.761	6761.304
9	37368.187	38567.368	27538.886	797.343	11028.482
10	59250.682	69717.635	45316.888	1371.318	24400.748

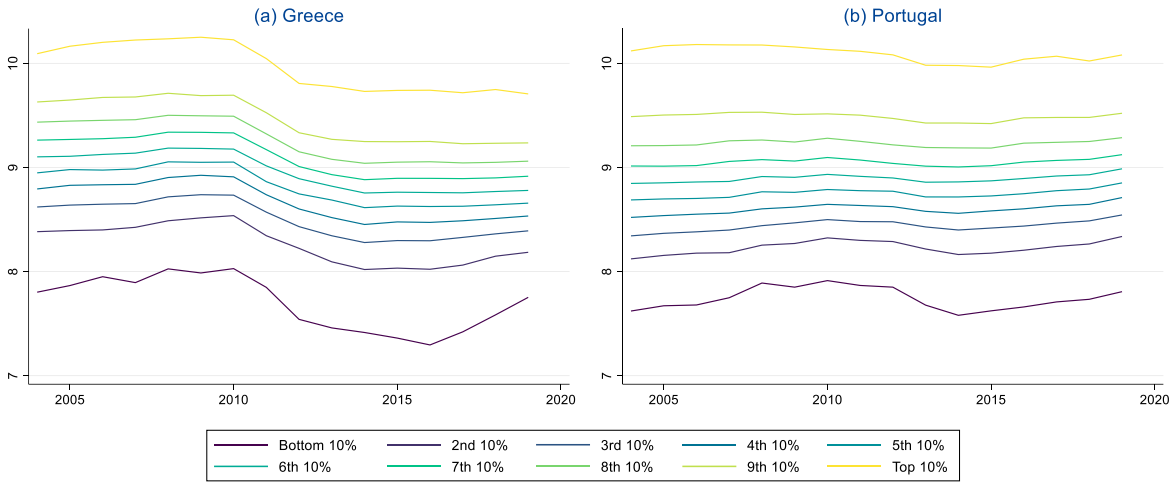
Appendix B. Figure 1

Equivalised disposable household income adjusted for inflation



Note: This figure reports the mean of equivalised disposable household income for Greece, Portugal and the remainder of the euro area (excluding Cyprus and Ireland) ajdusted for inflation.
Source: EU-SILC and Eurostat.

Appendix B. Figure 2
Income by decile group



Note: This figure reports the disposable income of households in Greece and Portugal by decile adjusted for inflation. The equivalised disposable income is the total income of a household, after tax and other deductions (transfers to other households), that is available for spending or saving, the indicator reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary in-kind social benefits.
Source: EU-SILC, own calculations.

Appendix C

Appendix C. Table 1

Regression results

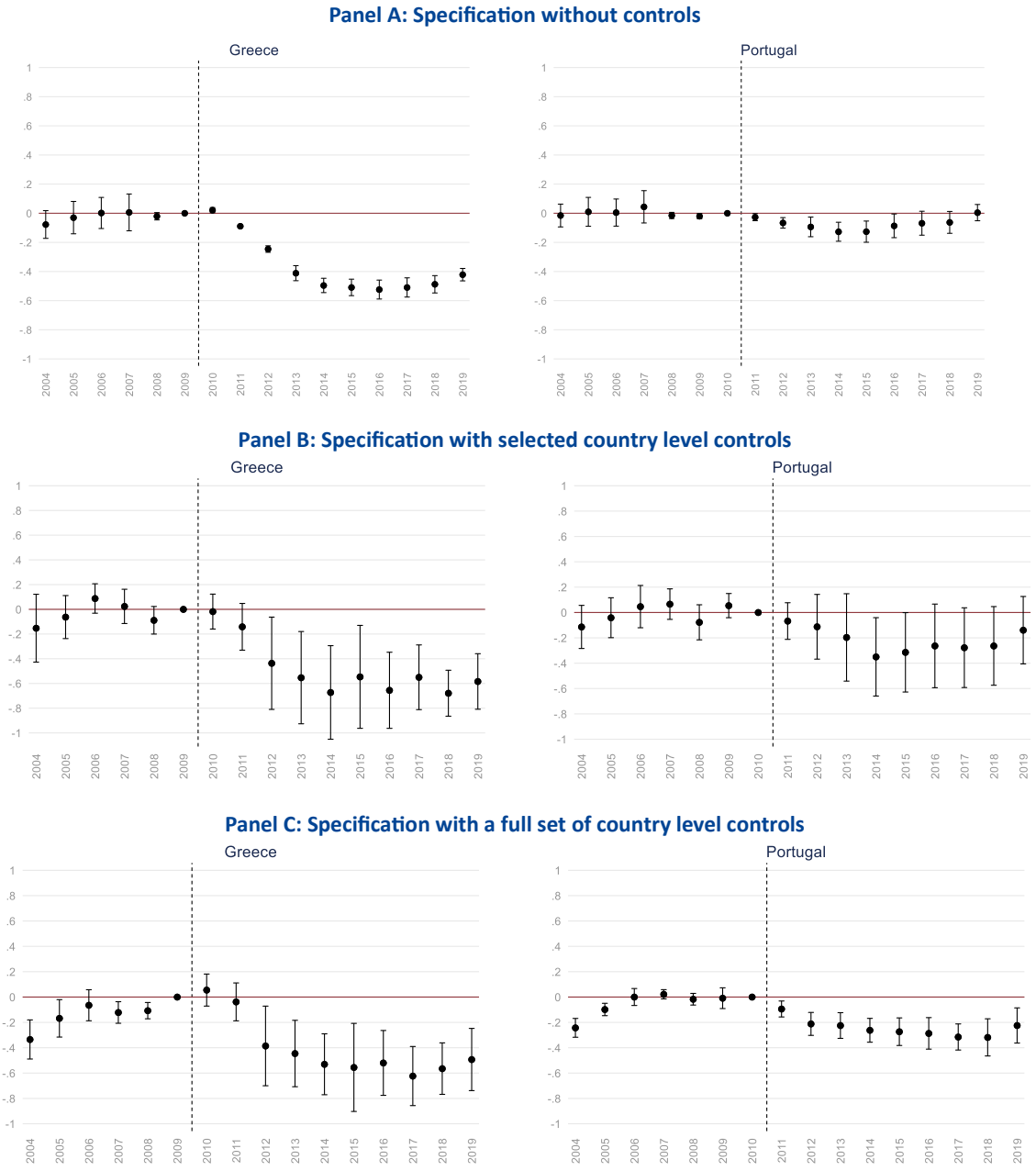
	Greece		Portugal	
	(1) No controls	(2) With Controls	(3) No controls	(4) With Controls
Treatment # 2004.year	-0.0784	-0.0400	-0.0165	0.0463
	(0.0486)	(0.0724)	(0.0399)	(0.0718)
Treatment # 2005.year	-0.0301	-0.0029	0.0097	0.0724
	(0.0567)	(0.0718)	(0.0505)	(0.0768)
Treatment # 2006.year	0.0018	0.0396	0.0045	0.0710
	(0.0545)	(0.0609)	(0.0474)	(0.0651)
Treatment # 2007.year	0.0059	0.0194	0.0404	0.0885
	(0.0645)	(0.0552)	(0.0566)	(0.0578)
Treatment # 2008.year	-0.0207	-0.0125	-0.0153	0.0153
	(0.0129)	(0.0127)	(0.0109)	(0.0213)
Treatment # 2009.year			-0.0201*	-0.0023
			(0.0091)	(0.0106)
Treatment # 2010.year	0.0214*	-0.0040		
	(0.0091)	(0.0093)		
Treatment # 2011.year	-0.0889***	-0.1368***	-0.0271*	-0.0572***
	(0.0051)	(0.0110)	(0.0123)	(0.0096)
Treatment # 2012.year	-0.2458***	-0.3071***	-0.0661**	-0.1054***
	(0.0114)	(0.0159)	(0.0184)	(0.0118)
Treatment # 2013.year	-0.4114***	-0.4371***	-0.0936**	-0.1322***
	(0.0264)	(0.0200)	(0.0344)	(0.0221)
Treatment # 2014.year	-0.4957***	-0.5242***	-0.1271**	-0.2072***
	(0.0251)	(0.0174)	(0.0333)	(0.0177)
Treatment # 2015.year	-0.5090***	-0.5505***	-0.1264**	-0.2132***
	(0.0289)	(0.0183)	(0.0371)	(0.0180)
Treatment # 2016.year	-0.5237***	-0.5653***	-0.0864*	-0.1717***
	(0.0332)	(0.0173)	(0.0415)	(0.0158)
Treatment # 2017.year	-0.5093***	-0.5412***	-0.0684	-0.1569***
	(0.0336)	(0.0122)	(0.0419)	(0.0151)
Treatment # 2018.year	-0.4875***	-0.5174***	-0.0626	-0.1514***
	(0.0304)	(0.0138)	(0.0383)	(0.0180)
Treatment # 2019.year	-0.4215***	-0.4467***	0.0042	-0.0808**
	(0.0218)	(0.0158)	(0.0285)	(0.0206)
N	1,048,472	927,287	993,107	870,566
adj. R^2	0.1171	0.3119	0.1175	0.3072
Within R^2	0.0058	0.2233	0.0005	0.2173
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

Note: The table reports the regression results from specification (1) where the outcome variable is the household disposable income. Controls include household level characteristics and the age structure. The table reports robust standard errors clustered at country level in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001.

Source: EU-Silc based on own calculations.

Appendix C. Figure 1

Robustness checks with alternative controls

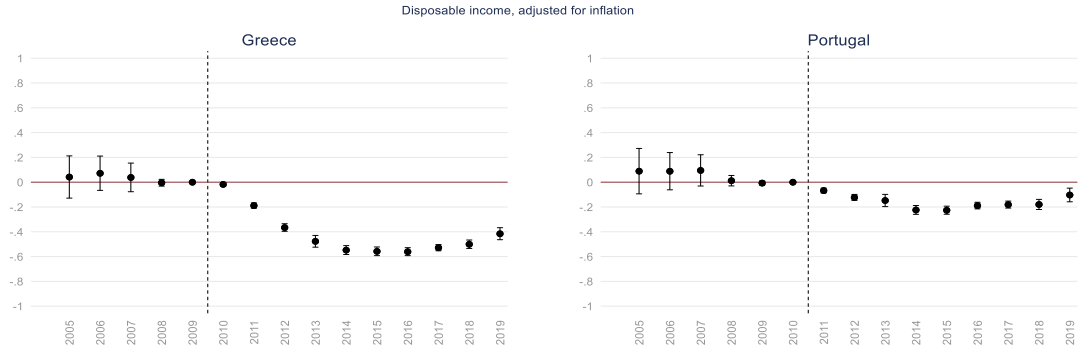


Note: The figure shows the regression results from a pooled OLS regression from Specification (1). It includes country and year fixed effects and robust standard errors clustered at country level. In all panels the control group countries are defined as described in Table 2 and are the following: Italy, France, Slovenia, Malta and Slovakia. The dots represent the point estimate, while the lines represent the 95% confidence intervals. The vertical line is positioned one year prior to the start of the programme. In panel A, there are no control variables. In panel B, we augment the controls with household level variables and selected number of country controls such as: percent of population older than 65, imports, exports, current account deficit and the real labour productivity per person. In panel C, we add in addition to the controls in Panel B: Gini index, real GDP growth, investment as share of GDP, volatility of stock market index, political stability index (World Bank) and government interest expenditure as % of GDP. Regression results are weighted using the cross-sectional weighting for household data

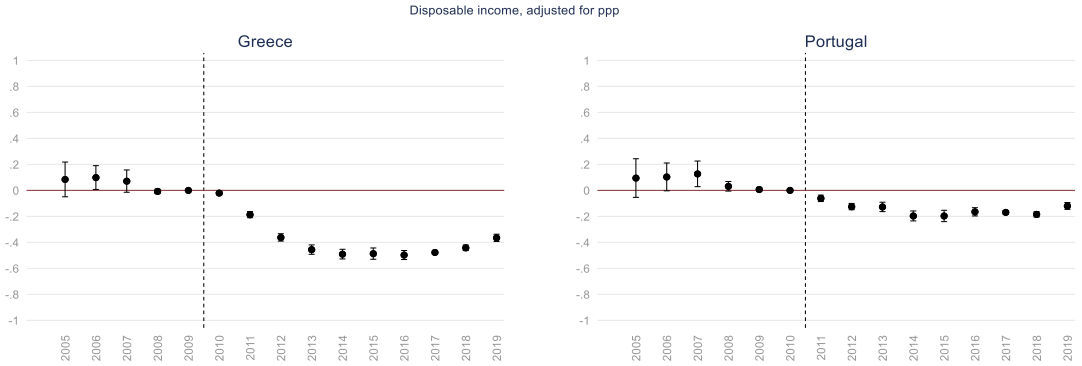
Appendix C. Figure 2

Robustness checks adjusting for inflation and purchasing power parity

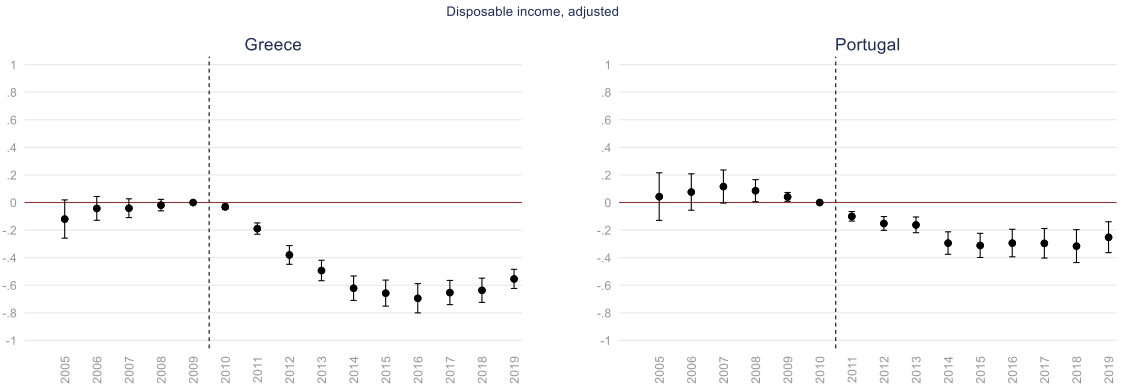
Panel A: Specification with disposable income adjusted for inflation



Panel B: Specification with disposable income adjusted for purchasing power parity



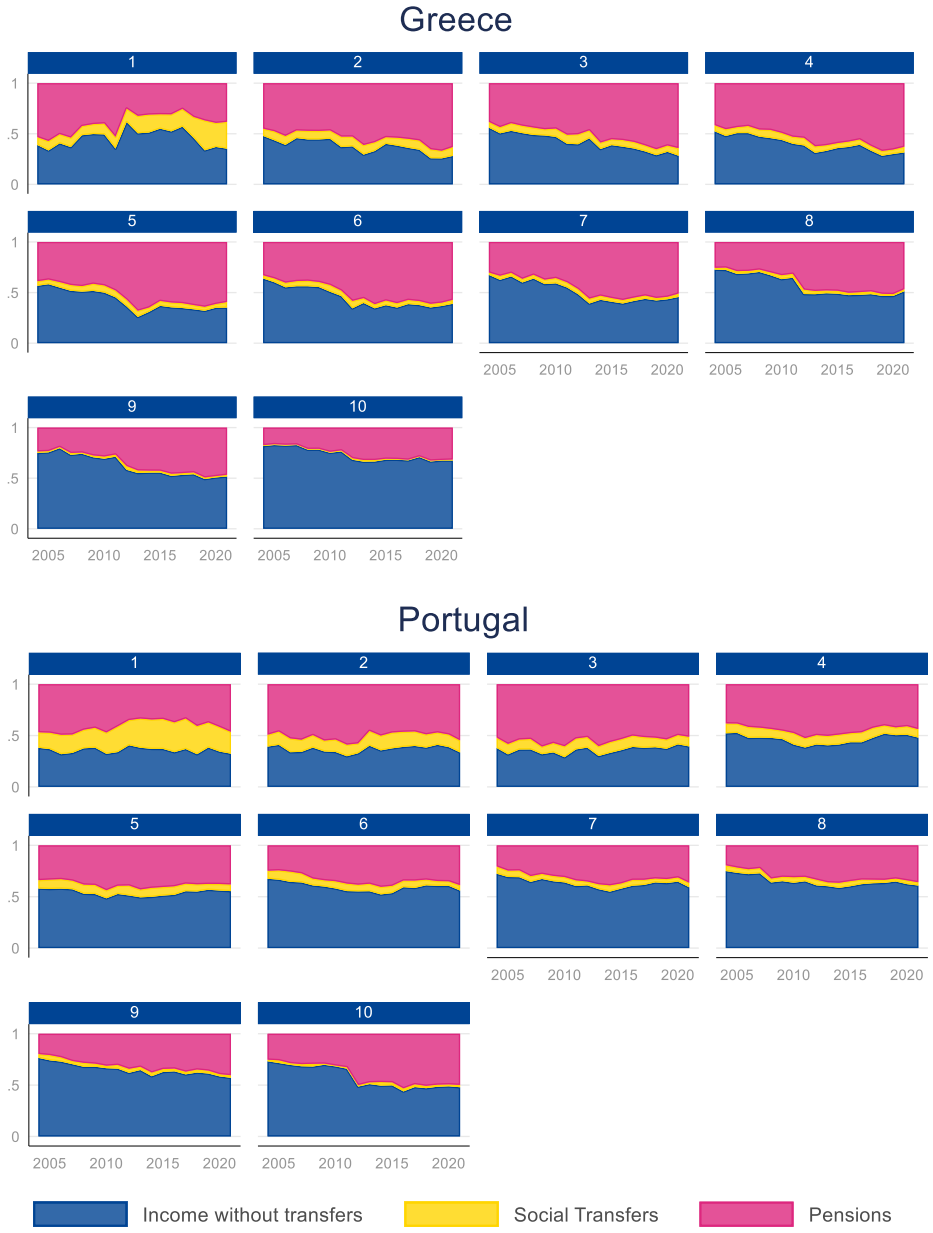
Panel C: Specification with different control group



Note: The figure shows the regression results from a pooled OLS regression from Specification (1). It includes country and year fixed effects and robust standard errors clustered at country level. The outcome variable in each of the panels is the total disposable household income. The outcome variable in the regression has a natural logarithmic transformation. In panel A and B the control group countries are defined as described in Table 2 and are the following: Italy, France, Slovenia, Slovakia and Malta. In panel C we include as control group countries: Slovenia, Slovakia and Italy forllowing Zigraiova and Erce (2024). Due to lower number of observations in 2024 because we reduced the number of countries the starting period is 2005. The dots represent the point estimate, while the lines represent the 95% confidence intervals. The vertical line is positioned one year prior to the start of the programme. Regression results are weighted using the cross-sectional weighting for household data.

Appendix D

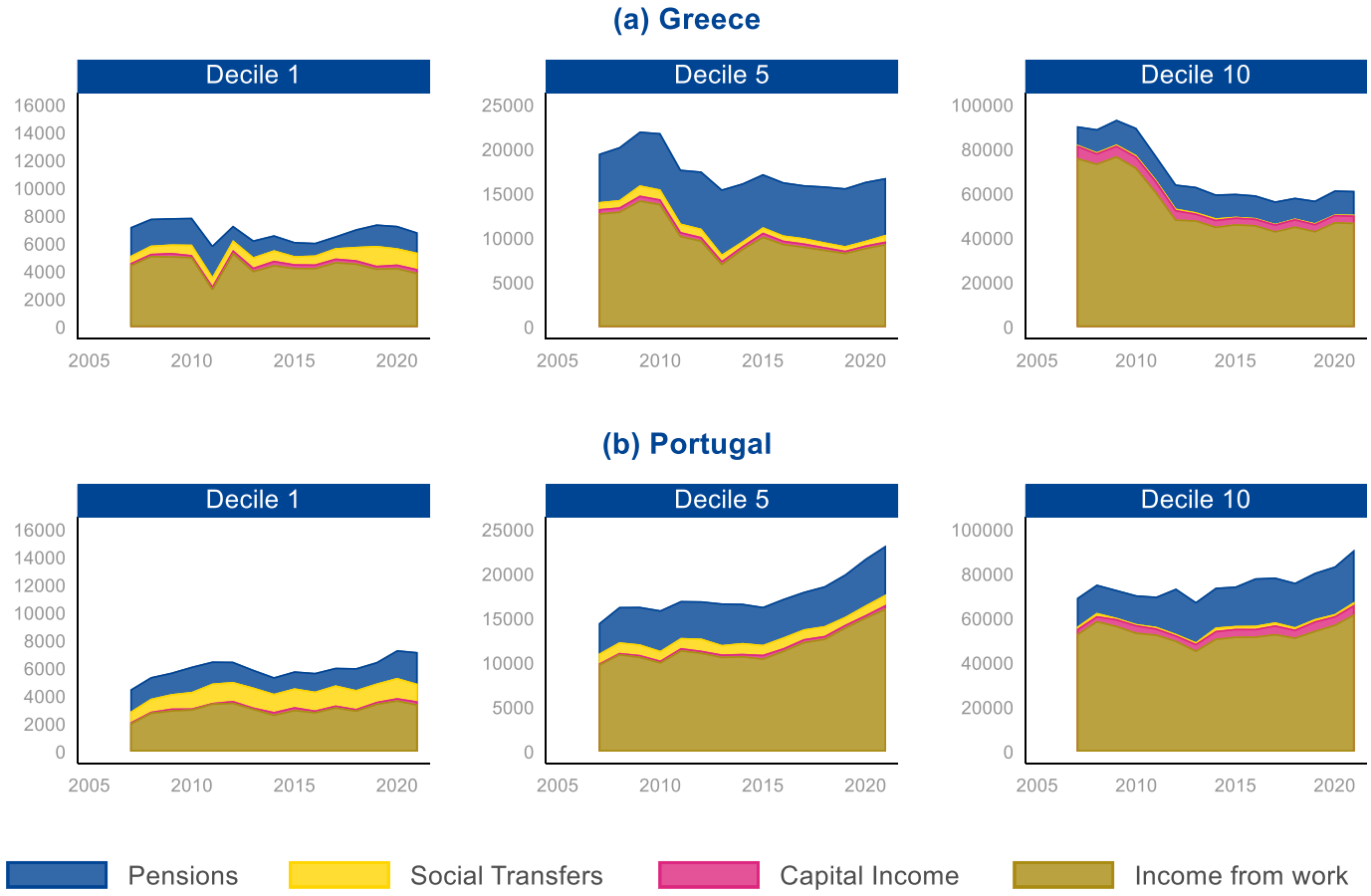
Appendix D. Figure 1
Income sources as percent of gross income



Note: The figure reports the main income components of households' income by decile group and over time as a percent of total gross income, for Greece and Portugal.

Appendix D. Figure 2

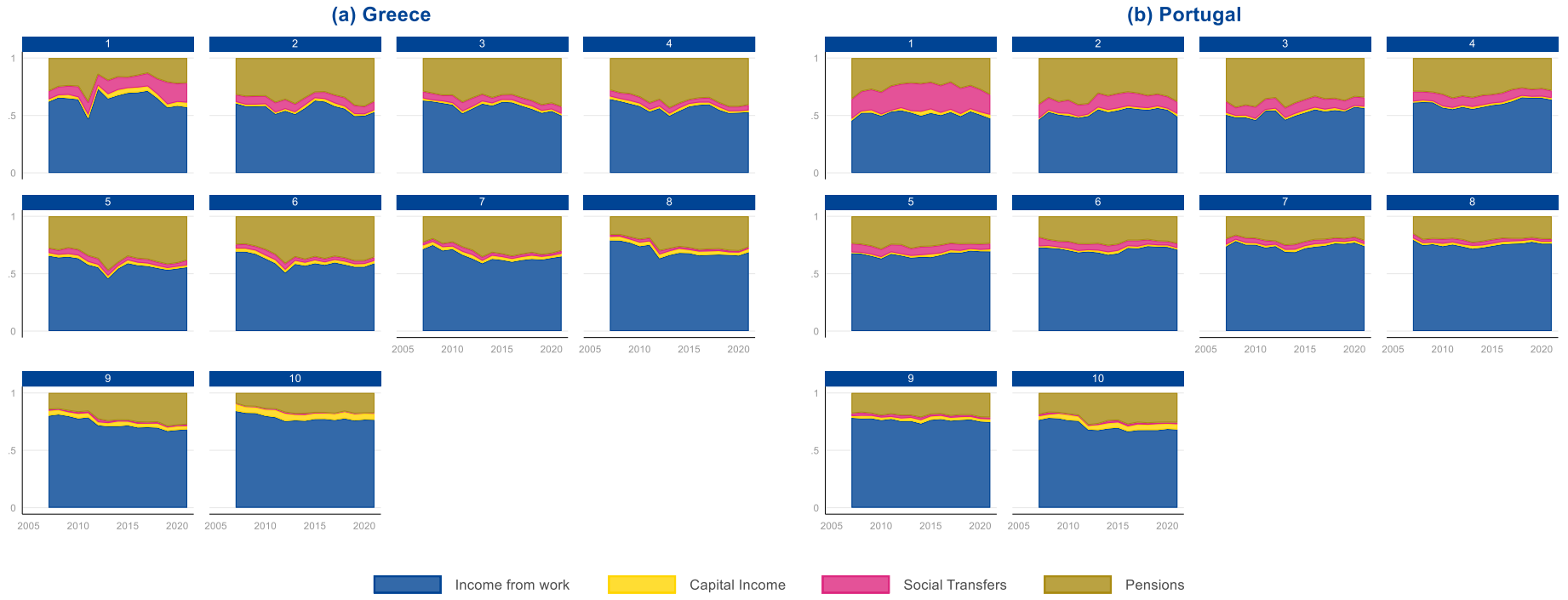
Income sources, including capital income



Note: The figure reports the main income sources, including capital income, over time for decile 1, 5, and 10.

Appendix D. Figure 3

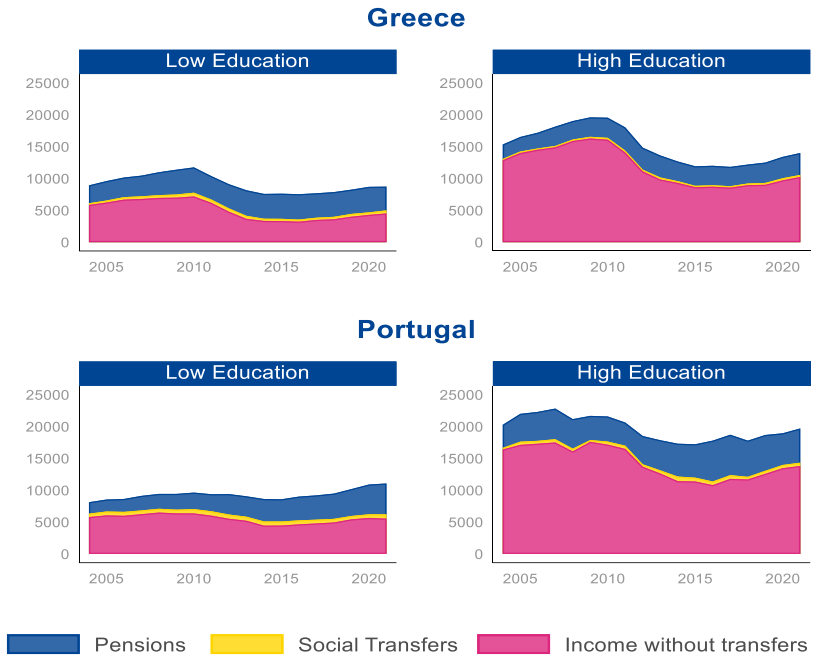
Income sources, including capital income, as percent of total



Note: This figure reports the main income sources, including capital income, over time for decile 1, 5, and 10. The income components are reported as a share of total gross household income.

Appendix D. Figure 4

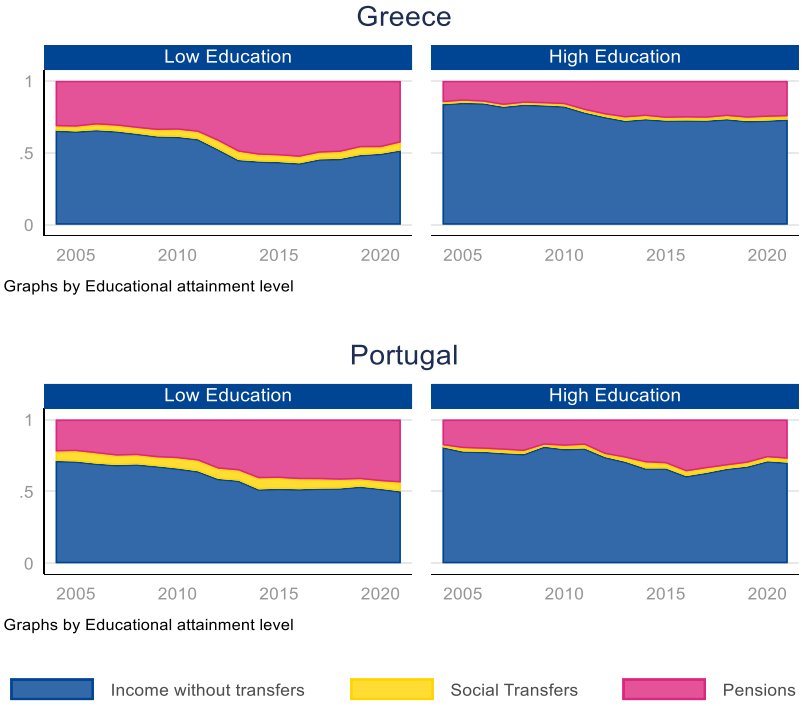
Income sources by education group, in levels



Note: This figure reports the main income components in Greece and Portugal over time for two groups: household that have a head with high educational attainment and those whose head has a lower educational attainment.

Appendix D. Figure 5

Income sources by education group, in percent



Note: This figure reports the main income components in Greece and Portugal over time for two groups: household that have a head with high educational attainment and those whose head has a lower educational attainment. Income components are reported as percent of total gross household income.

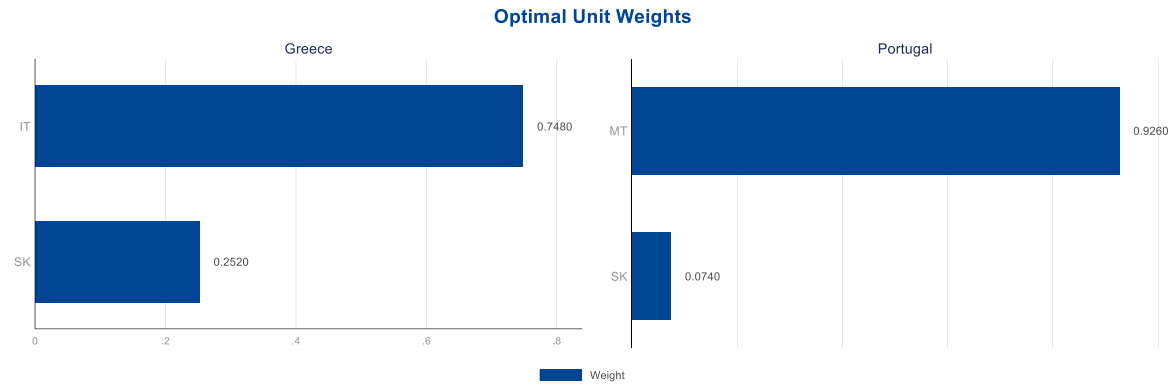
Appendix E

Synthetic Control

As discussed in the main text, we study the aggregate shock on household incomes during the adjustment episodes in Greece and Portugal with the synthetic control (SC) method. The intuition behind the SC approach is to construct a counterfactual for the "treated" country by constructing a synthetic combination of control countries that matches, as closely as possible, the characteristics of this country in the pre-treatment period. This synthetic combination is a weighted average of untreated countries. The calculated weights are then used to project the synthetic control into the post-treatment period. Because they allow different weights for each control unit, SCs often provide more appropriate counterfactuals for individual treated units (Abadie, 2020). In the related literature, SC methods have been used to study the introduction of the euro (Puzzello and Gomis-Porqueras, 2018), the effects of Brexit (Born et al. 2019), the integration of new EU members (Campos, Coricelli, and Moretti 2019) and the adjustment programme in Greece (Revuelta, 2021).

For our application of the SC approach, we use all member countries of the euro area as the "donor pool" of countries from which the SCs can be constructed. We match both Greece and Portugal on pre-treatment values of the outcome variable, mean equivalised disposable household income, and the following set of basic macroeconomic variables: real GDP growth, government deficit, current account balance, real labour productivity per hour worked, government expenditures on social protection as % of GDP, exports as % of GDP, imports as % of GDP, the proportion of population less than 14 years old and more than 65 years old. Appendix E. Figure 1 reports the set of optimal weights that enables the synthetic country to closely replicate each individual treatment country's characteristics in the period leading up to the start of the euro crisis. The data driven algorithm of the SC method selects Italy (75%) and Slovakia (25%) for Greece, and Malta (93%), and Slovakia (7%) for Portugal.

Appendix E. Figure 1
Donor Units for Synthetic Greece and Portugal



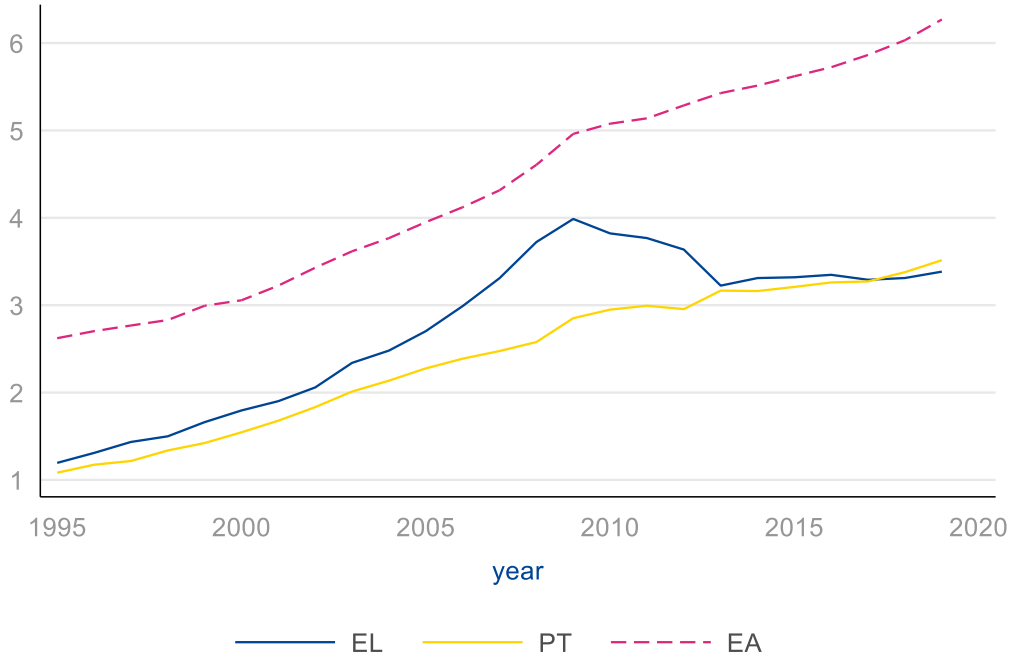
Note: This figure reports the donor units weighted according to importance for the synthetic Greece and Portugal that best match the disposable income during the pre-crisis period.

Appendix F

Government Spending

Appendix F. Figure 1

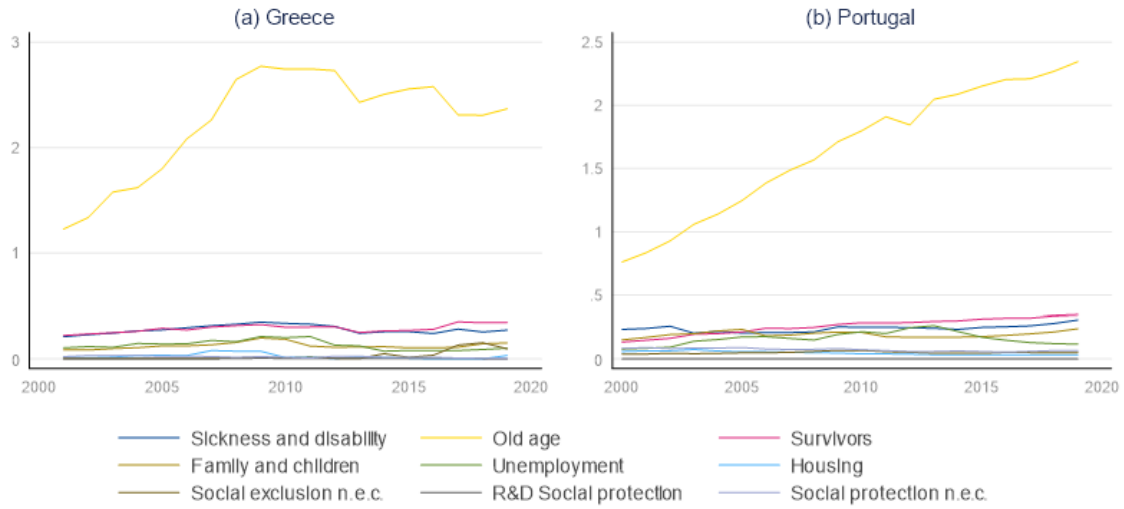
Government Expenditures on Social Protection



Note: This figure reports descriptively total government expenditures on social protection per capita for the treatment countries, Greece or Portugal versus the average for the euro area (the pink dashed line).

Appendix F. Figure 2

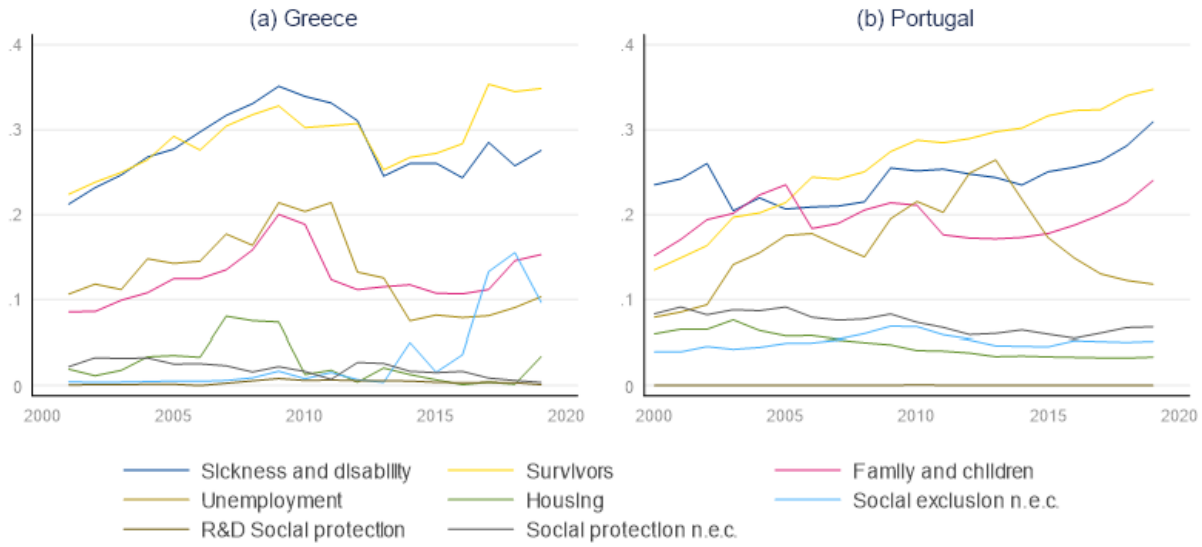
Government Expenditures on Social Protection by function and per capita



Note: This figure reports government expenditures, measured per capita, by COFOG function descriptively over time for Greece and Portugal.

Appendix F. Figure 3

Government Expenditures on Social Protection by function per capita, old age category not included



Note: This figure reports government expenditures, measured per capita, by COFOG function descriptively over time for Greece and Portugal.

Appendix G

Policy measures timeline: Greece[19]

Expenditure side and structural measures	
2011	National register of beneficiaries of social and welfare benefits
2011	Pension reform: Pensioners' Social Solidarity Allowance/Benefit (EKAS) - a new set of stricter eligibility criteria was introduced
2011+2012	Five family benefits were abolished: a) lump sum allowance for the third child, b) the third child benefit, c) the large family allowance, d) the third family benefit, e) lifelong pension to mothers with more than three children
Feb-12	Retrenchment of contributory unemployment for wage earners
2012	Broadening of access to means-tested unemployment assistance for long-term unemployed
late 2013	Introduction of the means tested unified family benefit: extension of family benefit to cover all children no matter the family size
2013	Unemployment insurance extended to formerly self-employed workers
2014	Family support is made of two means tested programs: Large Family Benefit (reserved for families with 3 or more children, it has a generous income threshold and confers a disproportionately more generous benefit to these families, 34 % of families in the top quintile received the benefit, 49 % of families in the poorest quintile receive this benefit); Unified family benefit: is also a means tested benefit that provides all poor families with children an equitable benefit, the amount of the benefit is €40 per child for those in the lowest bracket and several other programs result in fragmented landscape. Despite being mean-tested the two main benefits cover even the 8th decile. The families in the poorest 40% of the population receive insufficient transfers - 71% are couples with 1-2 children. Such couples make up 32% of the population.
Nov-14	Guaranteed minimum income program piloted in 13 municipalities until June 2015
Aug-15	World Bank requested to conduct a social welfare review. The review was conducted between October 2015 and August 2017.
2015-2016	Introduction of the humanitarian crisis package: three means-tested schemes: a) electricity allowance for poor families (some of them had electricity disconnected due to unpaid bills), b) rent subsidy (paid directly to the landlords on behalf of their tenants), c) food subsidy in the form of pre-paid debit card accepted at supermarkets and other groceries.
Jul-16	A phased roll out of the GMI renamed SSI began mid-July 2016. Guaranteed minimum income program entitled Social Solidarity Income was implemented in Greece in 30 municipalities in Greece from July to December 2016. The total number of accepted beneficiaries represented 7.4% of overall population in the 30 municipalities. The average household size of accepted applications is 2.51, with over 50 percent of accepted applications including 2 or fewer household members, and about one third had 3 or 4 members.
Feb-17	Social Solidarity Income (SSI or GMI) scheme, implemented
May-17	Government legislated measures that should improve fiscal room to provide support to the poorest and most vulnerable
Mid 2017	Establishment and operation of community centers in most municipalities as one-stop-shop for all social programs
May-17	Abolishment of small family/child allowances
Jan-18	Consolidation of the two main family benefits into a single benefit, classification of disability assessment system
Jan-18	Modification of disability assessment system, establishment of the single public payment authority for all welfare benefits (OPEKA) and IT reforms
Jan-19	Introduction of new means-tested housing benefits

[19] Source: Matsaganis (2020), World Bank (2017a, 2017b), Leventi, Picos (2019), The Tax Structure of an Economy in Crisis: Greece 2009-2017, OECD (2013).

Revenue side I											
Year/area of the measure implemented	**Personal income tax bands**	**Maximum tax rate**	**Zero tax bracket**	**Increase in zero tax bracte due to children**	**Increase in zero tax bracket due to disability**	**Tax allowances (TAs)/tax credits (TCs)**	**Solidarity contributions**	**Self-employed & liberal professions' contribution**	**Pensioners' solidarity contributions**	**Solidarity contribution**	**Emergency tax on large incomes**
2009	5	40% for annual incomes over €75,000	€12,000 for employees and pensioners; €10,500 for all others	1st child: €1,000; 2nd child: €2,000; 3rd child: €10,000	€ 2,400	Spending on private insurance, installation of eco-friendly energy systems: eligible for TA; Social Insurance contributions (SIC): fully deducted from taxable income	n/a	n/a	n/a	n/a	n/a
April 2010 reform affected incomes earned in 2010	9	45% (for annual incomes over €100,000)	€12,000 for all	1nd child: €1,500; 2nd child: €3,000; 3rd child: €11,500	no change	Spending on private insurance, installation of eco friendly energy systems: eligible for TCs; SIC no change	Paid by individuals with annual taxable income above €12,000; applied to incomes above €12,000 as a levy between 1%-4%; the top rate applicable to the annual incomes exceeding €100,000; the tax rate applies to the whole income amount.	€300 per year	Main pensions exceeding €1,400 per month taxed from 3% to 14%	An emergency tax was introduced, paid by individuals with income exceeding €12,000 per year with contribution rates rising from 1% for incomes between €12,000 - 20,000 per year to 4%. The tax rates apply to the entire amount not only the excess over the threshold.	Personal incomes over €100,000 earned in 2009 were made subject to a one-off emergency tax at 1%.
October 2011: affects earnings in 2011 and 2012	8	no change	€9,000 for persons aged below 30/above 65; €5000 for all others	1st child: €2,000; 2nd child: €4,000; 3rd child: €7,000	no change	TCs: 50% reduced; TAs: abolished; SIC for self-employed: provided as a 10% TC	no change	€500 per year (in 2011), €650 per year (in 2012)	Reformed and also applied to supplementary pensions	n/a	n/a

Revenue side II													
Year/area of the measure implemented	**Personal income tax bands**	**Maximum tax rate**	**Zero tax bracket**	**Increase in zero tax bracket due to children**	**Increase in zero tax bracket due to disability**	**Tax allowances (TAs)/tax credits (TCs)**	**Solidarity contributions**	**Self-employed & liberal professions' contribution**	**Pensioners' solidarity contributions**	**Solidarity contribution**	**Interest Income tax**	**Property income tax**	**Farming income**
2013 reform: December 2012 reform affecting incomes in 2013 - 2015	different for various income sources	*Different for various income sources;* Maximum tax rate set to 42% for annual incomes over €42,000. Self-employment income from independent services through liberal profession, or a personal commercial enterprise, taxed by a separate tax schedule with two tax brackets, maximum tax rate of 33% for annual incomes over €50,000.	abolished	abolished	turned into a tax credit	most TCs abolished; introduction of employment & pensions income TC; SIC fully deducted from taxable income	no change	no change	no change	2015: schedule revised	Rate increased from 10% to 15% in 2013	Property income was taxed at 10% (33%) for incomes below (above) €12,000 per year	Separate tax schedules for rental and farming income were also introduced. 2013: taxed according to the employment and pension tax schedule; 2014 and 2015: taxed at 13%
April 2016 reform: Affecting incomes from 2016 onwards	4	45% for annual incomes over €40,000	n/a	n/a	no change	changes in employment and pensions' income TC; SIC: no change	The schedule was revised in 2015 and 2016. From 2016 onwards the schedule consists of seven brackets and the maximum rate of 10% for annual incomes above €220,000, the rates apply to the amounts exceeding the thresholds as of 2016.	no change	no change	Seven brackets and maximum rate of 10% for annual incomes above €220,000; 2016 tax rates apply marginally to the income part exceeding the bracket threshold.	n/a	Property income was also taxed separately, using a different tax schedule with three brackets and a maximum rate of 45% for annual incomes above €35,000.	Farming income taxed separately following the PIT schedule

Policy measures timeline: Portugal [20]

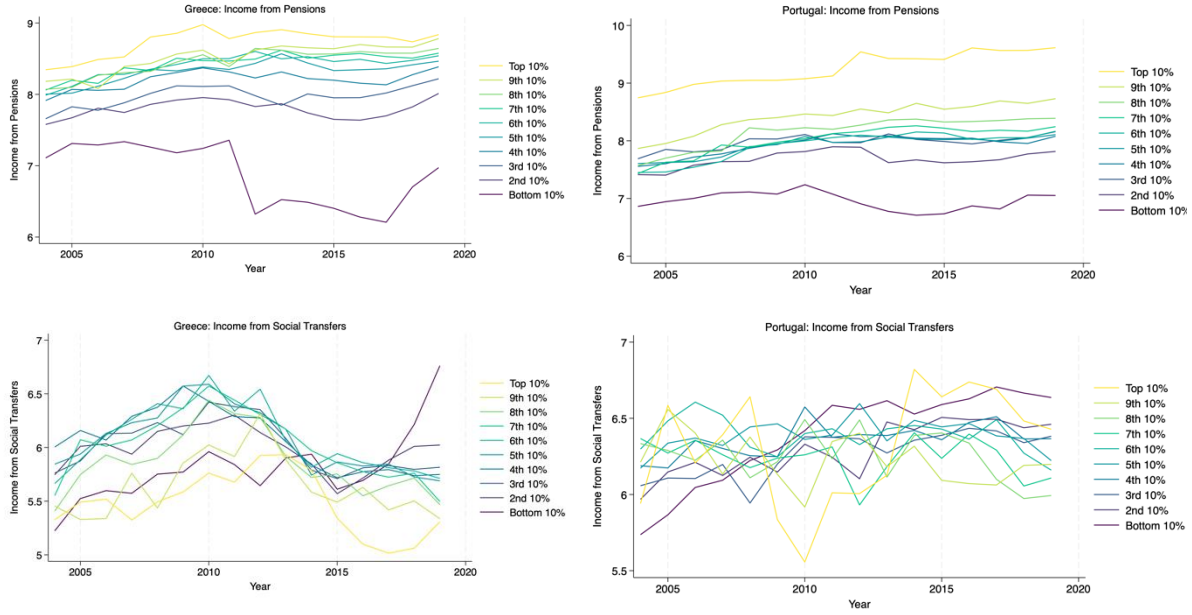
Summary of Changes in Social Benefits from 2010 to 2014	
2010	Port. 1547/09: Increase in value of reference income from €4,960 to €5,022
2010	[DL 70/10] Social Integration Income (RSI), Social Unemployment Benefit (SSD) and Social Parental Benefit (SSP): Restricting income related conditions (via rendering the equalizing scale more penalizing)
2010	[DL 72/10] Unemployment benefit: Set new limit maximum of 3× IAS (IAS is a reference measure used to fix, calculate and update several social benefits, such as the unemployment allowance)= = €1,258 (before, 3×Guaranteed Monthly Minimum Remuneration (RMMG=1,425€).
2010	[DL 77/10] Unemployment benefit: Reduces duration and ceiling. Allowances: Eliminate bonuses for students from level 2 to 5
2010	[DL 116/10] Allowances: Eliminates brackets 4 and 5. Eliminates 25% markup on brackets 1 and 2
2011	[Lei 55-A/10 – OE11]: Allowances: Creates scholarships; Pensions: Introduces CES (Extraordinary Solidarity Contribution) and pension freezes
2012	[Lei 64-B/11 – OE12]: Pensions: Suspended payment of 13th and 14th months in 2012; Changes CES (extraordinary pension contributions); Froze pensions with the exception of certain minimums
2012	[Port. 320-B/11] Pensions: Updated minimums amounts
2012	[DL 64/12] SD: Introduced a 10% reduction norm for social benefits after the 6th month of payment. Reduced duration. Reduced maximum limit for 2.5×IAS= €1048. Reduced warranty periods. Introduced 10% increase for unemployed couples with children.
2012	[DL 65/12] Unemployment benefit: Extends protection to Independent Workers economically dependent on a single entity ("false receipts green")
2012	[DL 85-A/12] Pensions: Suspended anticipation for flexibilization
2012	[DL 133/12] Pensions: Limited survival pensions of ex-spouses. Sickness: Amount of daily benefit adjusted. Allowance: Facilitates reevaluation of the condition of financial resources. Social Integration Income (RSI): Restricted resource condition (via a more penalizing equivalence scale and lower reference values), payments depend on the beginning of the conclusion of the integration contract, eliminated the automatic annual renewal and reinforced the beneficiaries' obligations.
2012	[Port. 257/12] Social Integration Income (RSI): amount changed to €189.52
2013	[Lei 66-B/12 – OE13] Pensions: Froze amounts with the exception of certain minimums; Changed Extraordinary Social Contribution. Sickness and Unemployment benefit: Fixed contributions for Social Security about installments (5% and 6% respectively, in force only during 2013).
2013	[DL 12/13]: Unemployment benefit: Extends protection to businesspeople and members of the statutory bodies
2013	[Port. 432-A/12]: Pensions: Updated of the values of determined minimums
2013	[DL 13/13] Social Integration Income: Value changed to €177.15; Solidarity Supplement for the Elderly: Reduced reference value from €5022 to €4909.
2014	[DL 167-E/13 e Port. 378-G/13]: Pensions: Advanced legal age of retirement to 66 years old and approved a more penalising Sustainability Factor
2014	[Port. 378-B/12]: Pensions: Updated values of determined minimums
2014	[Lei 83-C/13 e Lei 13/14 – OE14]: Pensions: Froze values with the exceptions of determined minimums; changed the extraordinary minimum contribution (CES)

[20] Source: Farinha Rogrigues, C., Figueiras, R., Junqueira, V. (2016), *Desigualdade do Rendimento e Pobreza em Portugal: As consequências sociais do programa de ajustamento*. Available at: https://www.ffms.pt/sites/default/files/2022-08/desigualdade-do-rendimento-e-pobreza-em-portugal.pdf

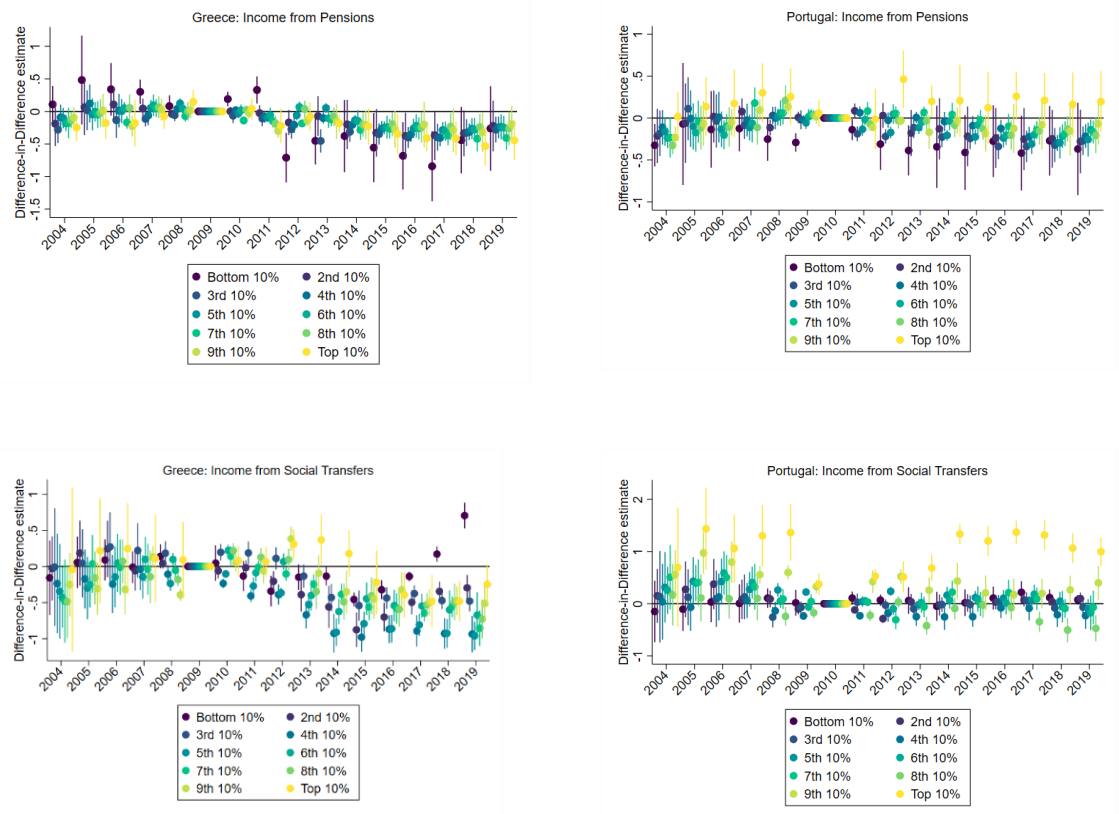
Main changes to the Personal Income Tax	
2010	Update of the taxable income scale by 0.8%
2010	The tax deductions were updated by rates between about 0.9% and 2.4%, although some may have a superior update corresponding to its indexation to minimum monthly pay (update from €450 in 2009 to €475 in 2010).
2010	Creation of a new tax bracket for highest incomes (above €150,000)
2011	Minimum tax increased from 42% to 45.88%
2011	The PIT brackets were updated by 2.2%. Incomes over €153,300 were taxed at a marginal rate of 46.5%.
2011	Increased taxation for pensioners (The tax deduction for category H applied to pensions higher than €22,500 decreased). Introduced limits for tax benefits applied to the 7th and 8th tax bracket.
2012	Special surcharge of 3.5% applied to incomes exceeding minimum national salary
2012	Kept the brackets and tax fees of the 2011 PIT
2012	Reduction of maximum tax deduction for certain pensioners from €6,000 to €4,104 .
2012	Limits on tax benefits applied from the third tax bracket – from €7,410 euros per year – and ceilings on tax deductions from €66,000 euros per year (7th bracket), with the maximum limit of €1,100.
2012	Increase in tax fees to 25% applied on interest of deposits, the dividends and capital gains
2012	An additional fee of 2.5% applied to the income of taxable amount exceeding €153,300
2013	Suspension of the Extraordinary surcharge of 3.5%
2013	The PIT brackets were reduced from 8 to 5.
2013	The first bracket, with lowest income (up to €7,000 per year) subject to a fee 14.5%, instead of previous 11.5%. The people with annual income over €80,000 pay the maximum PIT (previously from €153,300). At this level, the maximum marginal rate rises to 48%, which adds 2.5% of Solidarity Contribution and 3.5% as an Extraordinary Surcharge.
2013	Replacement of the Extraordinary Surcharge of 3.5% on income that exceed salary national minimum
2013	The release fee applied to the interest on deposits, dividends and capital gains increased to 28%
2013	Suspension of the Extraordinary Surcharge of 3.5%.
2014	No changes to the PIT table: no changes in tax brackets, neither applicable fees. The tax deductions and tax benefits kept at the 2013 limits.
2014	Kept the application of PIT surcharge 3.5% as in the 2013.
2014	Maximum taxation increased from 42% to 45.88%.

Appendix H

Appendix H. Figure 1
Pensions and Transfer: Descriptive Evidence

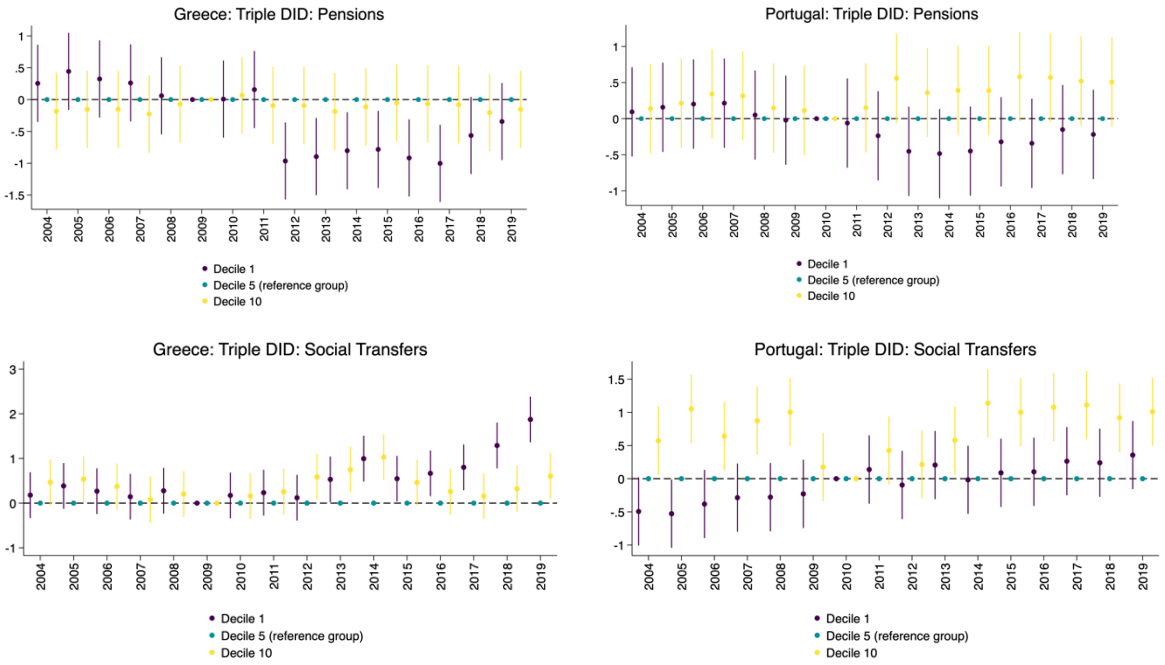


Appendix H. Figure 2
Pensions and Transfers: Difference-in-Difference Regressions



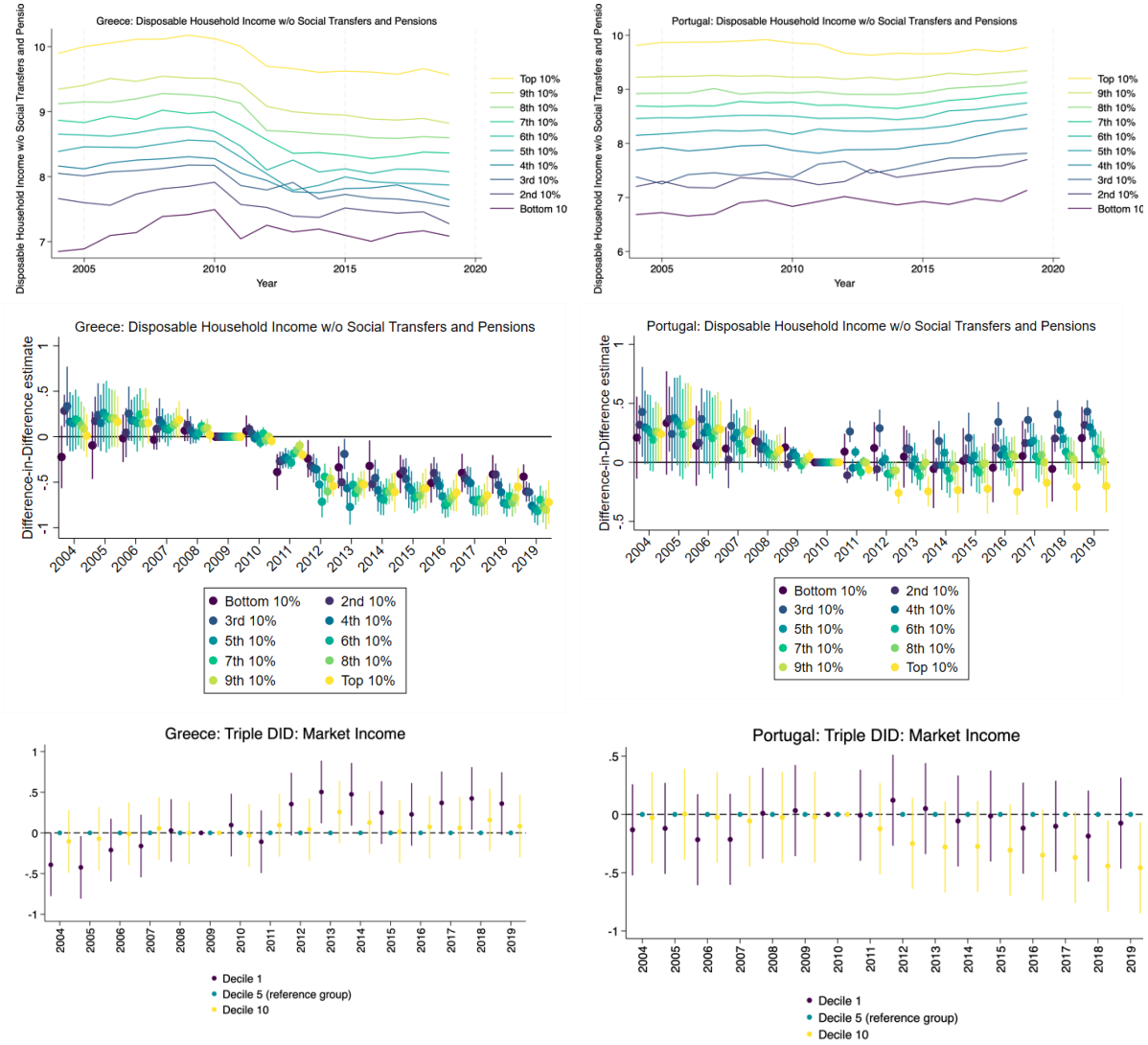
Appendix H. Figure 3

Pensions and Transfers: Triple Difference-in-Difference Regressions



Appendix H. Figure 4

Disposable income without transfers and pensions ("market income")



Note: The two graphs in the top panel show the evolution of disposable household income before transfers by decile group in Greece (left) and Portugal (right). The two graphs in the middle panel show the results of DID regressions of the same variables (Specification 2). The two graphs in the bottom panel show the results of triple-DID regressions of the same variables (Specification 3).

Appendix I

Details on the data

Microdata from EU-SILC

As our main data source, we obtained restricted-use microdata from Eurostat: the scientific use files of the EU's Statistics on Income and Living Conditions (EU-SILC). For our purpose, these data constitute an ideal and unique source. In other parts of the world, household-level income surveys are country-specific. Different approaches across national surveys render cross-country comparisons with household-level data notoriously difficult. EU-SILC, in contrast, provides income surveys that apply the same approach in each EU Member State at an annual frequency for the 2004-2023 period.

EU-SILC provides fine-grained information on income sources for each surveyed household and individual. The data differentiates between labour income, capital income, pensions, different types of social transfers and benefits, and different types of taxes. The dataset allows us to identify how the types of incomes and transfers changed during the period of the macroeconomic adjustment. Decomposition of disposable income sources across different deciles helps better understand changes in income distribution.

A key innovation compared to the existing literature in this field relates to our usage of the restricted-access EU-SILC data at both the household level and the individual level. For our analysis, we combine each survey wave for each EA country to a large individual-level dataset. We also match the individual-level data to household-level data, by nesting individuals in households. Our final dataset consists of about one million observations.

The use of EU-SILC comes with several shortcomings. Compared to some national surveys, the EU-SILC does not provide information on expenditure details and only limited information on income details. The surveys might underestimate specific programme beneficiaries or sub-population groups, since the data does not focus on particular social support programmes but on income. EU-SILC also does not differentiate between means-tested and non-means tested benefits during the analysed period. We therefore cannot distinguish contributive and non-contributive pensions and between unemployment insurance and social unemployment benefits (Rodrigues, Andrade 2020). Some tax credits are also captured incorrectly (Alves, 2012).

More generally, incomes reported in household surveys sometimes differ from those reported to tax authorities as well as amounts spent on the social transfers (for Greece see Leventi, Matsaganis, Flevotomou, 2013; and for Portugal see Alves, 2012). As a result, surveys can be missing important income layers. One reason is a general lack of survey data on households at the top of income distribution, which typically leads to an underestimation of income inequality (Alvaredo et al. 2018, Piketty et al. 2018, Caranza et al. 2021). Income underreporting motivated by tax evasion seems prevalent across all households, especially in Greece (OECD, 2009; Leventi and Picos, 2019).

As a caveat, we end by noting that the main advantage of our analysis – the use of household-level survey data – is at the same time its major disadvantage. Our findings may be affected by biases in the reporting of household incomes, especially in times of crisis. In particular, incomes from informal employment may be reported irregularly. While estimates of the informal share of the economy are prone to uncertainty, we can only speculate about general trends. During the downturn, income from informal employment will most likely be underreported, and may be larger among lower income groups. In addition, the rate of informal employment tends to fall with higher education and within the low-educated worker population women are more likely to be employed informally (Bonnet et al.,

2019; Elgin et al., 2021; Quiros-Romero et al., 2021). This would suggest that incomes of the lower income groups related to informal activities might be higher than our estimates suggest.

Our analysis compares selected countries based on EU-SILC data. In our cross-country comparison, we abstract from adjustments of the Eurostat data sample. While Leventi and Picos (2019) adjust the underlying data sample based on previous estimates, Hlasny and Verme (2018) test reweighting and replacing methods and their results confirm inconsistencies at the very top of income distribution. To avoid creating bias or inconsistencies, we make no changes to the underlying data.

The results need to be interpreted with some caution when it comes to the income reference period. In most countries, SILC surveys take place during the first half of the year. However, the specific timing can vary by country. For instance, Atkinson, Marlier, and Nolan (2017) discuss the timing discrepancies in income reporting in SILC surveys, highlighting the potential lag in the reported data. For our purposes, we attribute the income data to the year of the survey publication but note that this implies that there may be a certain time lag of up to one year in the results.

Aggregate data on social outcomes from Eurostat

In terms of aggregate country-level outcomes, we focus on two key aspects: average income and income inequality. When analysing average income, we draw on the mean equivalised net income from Eurostat. This metric considers the size and composition of households, allowing for a more accurate comparison of income levels across different household types. It adjusts the total net income based on the household's size, taking into consideration economies of scale and differing needs. To examine income inequality, we use the Gini coefficient, which is the most common metric of income inequality and quantifies the extent of income inequality (on a scale from 0 to 100).[21] We use various estimates of the Gini coefficients from Eurostat, which capture either market income only or household income, including social transfers and pensions, allowing us to analyse the redistributive impact of pensions and social transfers.

Macroeconomic indicators

When controlling for macroeconomic developments, we draw on country-level macroeconomic indicators available from Eurostat and the World Bank. We specify the set of control variables below when presenting our empirical approach.

Social spending

Data on social spending comes from Eurostat. It refers to general government expenditure by economic function according to the international *Classification of the Functions of Government (COFOG)*. The data breaks down the general government total expenditure according to its socio-economic purpose and attributes the transactions within the *European System of National Accounts (ESA 2010)*. It allows us to assess why and how the governments spent money. We zoom in on the relevant social spending categories, such as public spending on social protection (COFOG category 10), health (COFOG category 7) and education (COFOG category 9).

[21] 0 represents perfect equality (every individual receives the same income) and 100 represents maximum inequality (a single individual receives all the income.

Conditionality

As previously mentioned, we examine the conditions for four programme countries and code the area of social policy that they target. This coding reflects the COFOG spending classification. The data include conditionality clauses from around 60 different official reviews across all programmes (Moshammer and Siskind, 2020). We assigned the conditions to three categories — social, health, and education policy — depending on the COFOG categories of expenditures they relate to.

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