Politická ekonomie 2026

Volume 74 (1)
https://doi.org/10.18267/j.polek.1481
Open Access

VŠE / PRAGUE UNIVERSITY OF ECONOMICS AND BUSINESS

Importance of Government Social Expenditures for Income Inequality in EU Countries

Karina Zhemelko, Nikola Šubová

Karina Zhemelko (email: karina.zhemelko@tuke.sk), Technical University of Košice, Faculty of Economics, Košice, Slovakia

Nikola Šubová (*corresponding author*, email: nikola.subova@tuke.sk), Technical University of Košice, Faculty of Economics, Košice, Slovakia

Abstract

The issue of growing income inequality has become a central focus in global economic policy debate. This paper examines the impact of government social spending on income inequality in the 27 member states of the European Union between 2010 and 2020, utilizing regression analysis of panel data. The findings indicate that the level of government social spending reflects the varying fiscal policies on social protection across EU countries, with the largest share allocated to old age expenditures. However, the analysis reveals that old-age government expenditures do not have a statistically significant impact on income inequality. In contrast, increased spending on unemployment benefits and support for families and children is associated with a reduction in income inequality. These results underscore the need to address structural disparities and provide targeted unemployment and family support to ensure adequate living conditions for vulnerable groups.

Keywords: Income inequality, S80/S20 index, Gini coefficient, government social spending, panel analysis

JEL Classification: C23, D31, H53, I38

Citation: Zhemelko, K., Šubová, N.: Importance of Government Social Expenditures for Income Inequality in EU Countries. *Politická ekonomie,* 2026, 74 (1), 33–65.
https://doi.org/10.18267/j.polek.1481

1. Introduction

Income inequality, increasingly recognized as one of the most pressing issues in the global economy, has garnered heightened attention in recent years. Since the early 1980s, income inequality has risen significantly across all advanced economies, with the largest increases reaching about 20%, as measured by the Gini coefficient. Various factors have contributed to this upswing in inequality, including the introduction of new technologies and the migration of people from rural areas to urban centres, where they may find better-paid, more diverse, and hence more unequally paid jobs (Milanovic, 2016a).

One of the earliest and most significant explanations for rising income inequality is globalization (Borjas *et al.*, 1992; Revenga, 1992), which has led to the outsourcing of many goods and services previously produced domestically, putting a downward pressure on wages for lower-skilled workers. According to the market forces hypothesis, increasing inequality is driven by rising demand for skills at the top, facilitated by globalization and technological progress due to reduced trade and mobility barriers (Polacko, 2021). In a market-based economic system, income inequality is seen as stemming from variances in talent, effort and luck. Yet, excessive inequality has the potential to undermine social cohesion (IMF, 2024).

Since the inception of economics by figures such as Adam Smith and David Ricardo, a longstanding debate has persisted on how to equitably distribute post-production income among individuals. This phenomenon denotes the uneven allocation of income within a society, where certain individuals or groups possess a disproportionate share of resources while others struggle to meet their needs. Surges in income inequality over recent decades have sparked considerable interest in exploring its implications for various dimensions of well-being. Societies with less income inequality have longer life expectancy and lower rates of mortality, school dropout and mental illness (Elgar and Aitken, 2011). Income inequality can have detrimental effects on population health, a phenomenon explained by the Income Inequality Health (IIH) hypothesis, particularly due to increased psychological stress (Layte and Whelan, 2014; Tibber *et al.*, 2022). The rise in income inequality has been associated with disparities in health outcomes and life expectancy. There is a widening gap in survival rates between high- and low-income individuals, with affluent individuals experiencing longer life expectancy while those with lower incomes face shorter lifespans (Bor *et al.*, 2017). It is expected that the escalation of income inequality, coupled with persistent gender disparities and wealth concentration alongside limited redistribution policies, will elevate these issues to the forefront of policy agendas in many countries (Blázques-Fernández *et al.*, 2018).

Societies with wider income disparities often experience higher rates of interpersonal violence and mental illness. Mental illness frequently results from factors such as low educational attainment, unemployment and deprivation (Pickett *et al.*, 2006). It is particularly prevalent among marginalized populations exposed to social exclusion, discrimination and trauma, which further heightens their vulnerability (Rafferty *et al.*, 2015). Racial disparities in both physical and mental health are also largely shaped by inequalities in education and income (Williams *et al.*, 1997). Krieger *et al.* (1997) highlighted that social class, at both the household and community levels, is a critical determinant of health disparities, with economic inequality, poverty and social deprivation playing central roles in the emergence of adverse mental health outcomes (Compton and Shim, 2015; Manseau, 2015). Early educational failure significantly influences life trajectories by affecting the self-esteem and employment prospects of young people. These educational inequalities lay the foundation for long-term social disparities, which eventually manifest as health inequalities. A child's health and living conditions directly affect their educational attainment, which subsequently shapes their income, employment status and health outcomes in adulthood. These adult inequalities, in turn, affect the health of the next generation, underscoring the intergenerational transmission of inequality.

The relationship between income inequality and mental disorders is closely tied to institutional quality. Higher levels of institutional quality reduce the impact of this nexus, suggesting that strong institutions are an effective tool for mitigating mental health issues linked to income inequality (Goh and Law, 2022). Additionally, institutional quality plays a crucial role in moderating the effects of financial development on income inequality; ineffective governance and absence of the rule of law can exacerbate income disparities. By highlighting the correlation between early colonization strategies, mortality rates and the evolution of institutions, Acemoglu *et al.* (2018) provided evidence of the lasting effects of historical choices on income per capita. Income inequality driven by financial factors often requires greater redistribution efforts than inequality arising from other sources, indicating that policymakers can mitigate the inequality-enhancing effects of finance through targeted interventions (Van Velthoven *et al.*, 2018).

Income inequality demands attention not only due to its social and ethical undesirability but also because of its impact on economic growth and stability. Inequalities in income distribution could erode the social consensus required to adapt to significant shocks, particularly those of an economic nature (Aiyar and Ebeke, 2020). Unequally distributed income, serving as the source of numerous social and economic issues, is currently regarded as a primary cause of political instability experienced within economies. For this reason,

countries are making significant investments in tackling this issue. Moreover, significant roles are played by social norms, and government interventions through the tax and benefit system can redistribute market income. This highlights the potential for governments to influence social norms regarding market compensation and the role of the state.

Governments employ one strategy involving policies and programmes designed to support disadvantaged segments of the population. These initiatives encompass funding for healthcare, education, housing assistance, food aid and other forms of social security. These expenditures serve as a mechanism to redistribute resources from higher-income individuals to lower-income ones. In this way, they help ensure that individuals and families, regardless of their income levels, have access to essential goods and services. Effective fiscal redistribution shows promise in fostering equitable and sustainable economic development by addressing income inequality. Granger *et al.* (2022) suggested that fiscal policy has the potential to reduce within-country income inequality by up to 40%. Wealthier countries have a greater ability to implement redistributive policies compared to poorer ones. In low-income countries, fiscal policy reduces inequality by only 3% on average.

Although both expenditures and its financing method have the potential to influence income inequality, their effects can either reinforce or mitigate each other. Consequently, the anticipated impacts of government spending can differ depending on whether we assess the "overall" impact, which considers the financing approach, or the "pure" impact, which isolates the effects from the financing method (Anderson *et al.*, 2016).

The primary objective of this paper is to examine the importance of various categories of government social spending in addressing income inequality. The analysis focuses on assessing the correlations, whether positive or negative, between income inequality and different government expenditures. Drawing from prior research, our central research question is framed as follows: "*Are various government social spending programmes crucial for reducing income inequality in European Union countries?*"

This paper contributes to the existing literature by expanding the analysis to include an additional coefficient of income inequality, specifically S80/S20, which has not been extensively explored in previous studies addressing similar issues. This addition allows a more thorough examination of the impact of government social spending, thereby strengthening the robustness of the findings. Furthermore, the paper provides a comprehensive overview of the importance of various government expenditures in mitigating income inequality across European Union countries. While existing literature predominantly focuses on the relationship between different government expenditures (Frost and van Starlen, 2017; Pérez-Corral, 2018; Ulu, 2018; Alamanda, 2020; Lindert, 2021), often treating social

expenditures as a whole, our study delves into distinct categories of government social expenditures in greater detail, thereby enriching the existing literature. These insights have potential relevance for government policymakers.

2. Theoretical Background

Research into the distribution of income and the consequent impact of changes in distribution on various aspects of life, the economy and social matters have a longstanding history in economics. This topic gained prominence mainly in the works of Smith (1776), Ricardo (1817), Mill (1848), Kuznets (1955) and Friedman (Friedman and Kuznets, 1945).

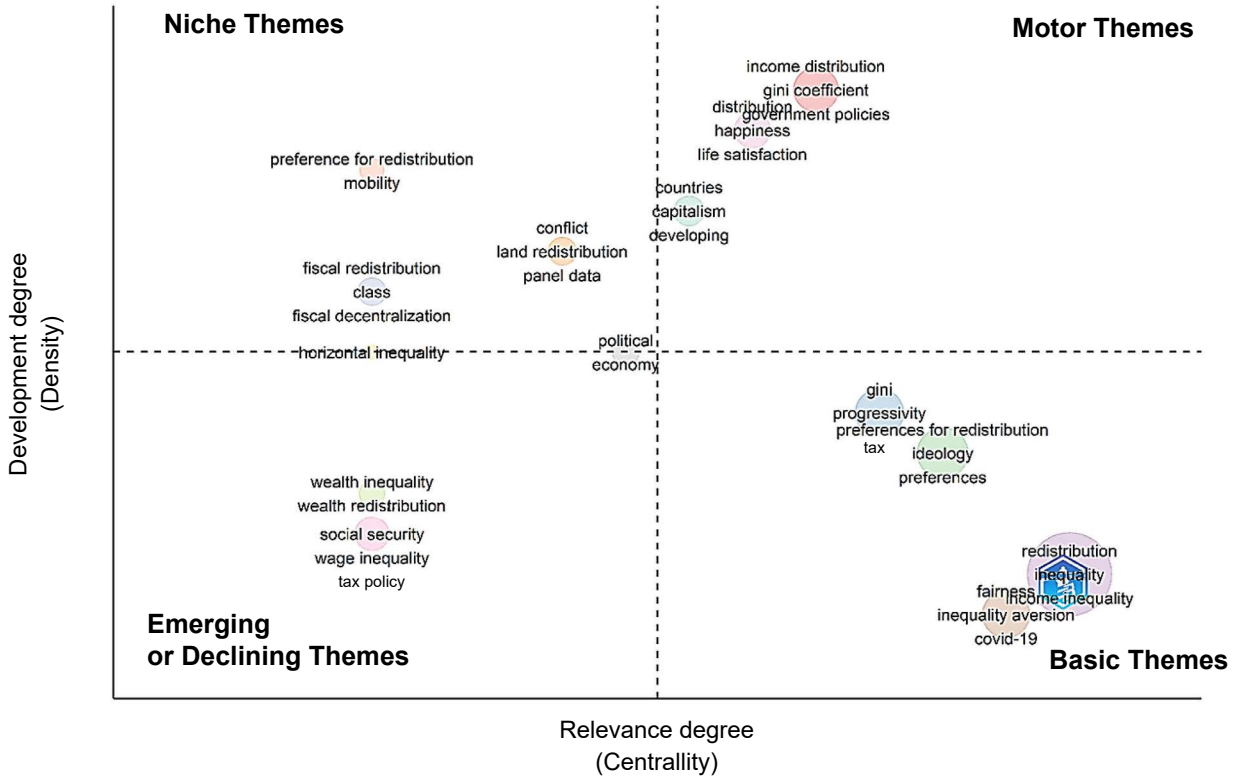
The level of income inequality is closely linked to the economic development of each country. Kuznets (1955) outlined that as economies advance from subsistence levels, inequality tends to increase, driven by two key factors. Firstly, individuals with higher incomes typically save a larger portion of their earnings, leading to a concentration of wealth among the affluent over time. This results in a widening gap in assets between the rich and those with lower incomes. Secondly, industrialization exacerbates inequality by shifting populations from rural to urban areas. This transition often leads to increased inequality as urban jobs offer higher wages and productivity compared to rural ones. As a result, the disparity in per capita income between rural and urban populations may persist or even widen. The Kuznets curve hypothesis has been confirmed in various studies (*e.g.,* Higgins and Williamson, 1999; Barro, 2008; Rattan, 2012).

According to Martínez-Navarro *et al.* (2020), the Kuznets curve remains relevant. However, advanced economies face challenges that can lead to increased inequality, as noted by Stiglitz (2012), Piketty (2013) and Milanović (2016b). Consequently, developed countries must implement policies to mitigate and reduce inequality, as suggested by Lyubimov (2017). The specific approach to income redistribution requires further discussion. Stiglitz (2012) emphasized that addressing inequality requires intervention by the state rather than relying solely on market forces, as the wealthiest individuals often exert significant influence over market dynamics. Nevertheless, striking a balance is crucial, as excessive concentration of market power or excessive regulation can both have detrimental effects.

Income inequality has increased in most Western countries since the early 1980s (Milanovic, 2016b). While this issue gained significance in the latter part of the twentieth century (Atkinson, 1997), it remains a pressing concern in contemporary times. Various economic events, pandemics and crises have contributed to the perpetuation and exacerbation of income inequality, posing novel challenges for researchers and policymakers.

A bibliometric analysis conducted on the following keywords ("S80/S20" OR "income inequality" OR "Gini coefficient") AND ("social expenditure" OR "expenditure" OR "government" OR "government spending" OR "government expenditure" OR "redistribution") in the Web of Science database revealed a significant increase in studies over the last decade. Since 1969, a total of 3,683 articles have been published, with 2,826 of these appearing after 2014. Most papers were published in the field of business economics research (1,696 papers), followed by government law (387 papers) and sociology (341 papers). Thematic mapping, utilizing authors' keywords and their interconnections, was employed to categorize existing research papers based on their relevance and developmental status. Consequently, four distinct categories emerged: niche themes, motor themes, emerging or declining themes and basic themes. The vertical axis represents density, while the horizontal axis reflects centrality. These metrics help assess the relevance and significance of topics, distinguishing between those that are central to the field and those that are more peripheral. The size of the points on the map corresponds to the volume of papers within specific research areas.

Figure 1: Thematic mapping of articles



Source: Authors' own elaboration

As shown in Figure 1, the first quadrant (upper left) contains highly specialized but more peripheral topics, focusing on specific themes related to fiscal policy, redistribution, conflict and mobility. The second quadrant (upper right) highlights well-developed and critical themes, organized into three distinct clusters. The top right cluster, which includes income distribution, the Gini coefficient and government policies, represents the most advanced and relevant areas of research. These fields remain active, continue to evolve and have the potential to influence the development of new research directions. In contrast, the findings of the thematic mapping suggest that topics such as wealth inequality, wealth distribution, social security and wage inequality, located in the lower left quadrant, are either emerging or in decline. The relevance and development of these themes are relatively weak. The fourth cluster (lower right) identifies important but not fully developed themes, such as redistribution, income inequality, fairness, inequality aversion and COVID-19, which are highly relevant but still offer opportunities for further exploration.

The research analysis results show that policy and government expenditures are crucial and useful tools in reducing income inequalities (*e.g.*, Frost and van Stralen, 2017; Ulu, 2018; Miežienė and Krutulienė, 2019; Savage *et al.*, 2019; Alamanda, 2020; Cammeraat, 2020). However, the components of government social expenditures exhibit a different relationship with income inequality, indicating the existence of an interaction effect.

The relationship between income inequality and government policies has been explored by several authors (Anderson *et al.*, 2015; Anderson *et al.*, 2016; Dotti, 2020) and is complex, varying for several reasons. One key factor is the type of spending employed as a tool of government policy. Tiongson *et al.* (2007) provided a theoretical framework and argued that government spending on health and education is often considered "pro-poor" because it can enhance the productivity and income of vulnerable groups, thereby reducing income disparities. However, targeting is crucial. Rhee *et al.* (2014) found that in Indonesia, nearly 80% of benefits were received by households in the top half of the income distribution, exacerbating inequality. Similarly, Cok *et al.* (2013) used decompositions of the redistributive effect and highlighted that in Eastern European countries, well-targeted cash transfers and progressive spending have played a significant role in income redistribution.

Wu *et al.* (2006) employed cross-sectional time-series regression models with first-order autoregressive error terms to examine the impact of government policies on income inequality. Their study revealed that while the qualitative effects of these policies on income inequality are similar in rural and urban areas, the quantitative effects differ significantly. Specifically, some policies that effectively reduce inequality in urban areas are less effective in rural areas. Taxes tend to have a smaller equalizing effect, whereas government welfare

and transfer programmes have a more pronounced equalizing effect in rural areas. This disparity is largely attributed to the higher proportion of income tax contributions and fewer welfare-eligible individuals in urban areas.

Guzi and Kahanec (2018) contended that existing literature often employs panel data regression models that may understate the true impact of government intervention on mitigating income inequality. By applying instrumental variable estimation techniques to explore the causal relationship between income inequality and government size – measured as the government expenditure share of GDP – they found that government policy serves as a powerful tool capable of reducing various indicators of net income inequality.

According to Sánchez and Pérez-Corral (2018), who analysed the relationship between government expenditures and income inequality using the generalized method of moments (GMM) and divided countries into two groups (new and old member states), the link between social expenditures and income inequality differs in the new member states. Specifically, government social spending as a whole demonstrated a greater ability to reduce income inequality in the emerging member states compared to the rest of the EU countries. Expenditures on health programmes exhibited the highest negative correlation with income inequality, but only in the new member states. Cammeraat (2020), utilizing ordinary least squares (OLS) and two-stage least squares (TSLS) regression analyses, presented distinct findings. While the impact of social expenditures on families and children is negative and statistically significant, housing expenditures exhibit a positive relationship with the Gini coefficient. Moreover, the study found no substantial evidence of a statistically significant relationship between government health expenditures and income inequality. Furthermore, government spending aimed at improving the living conditions of disadvantaged groups may not necessarily result in a reduction of income inequality. Expenditures on housing and initiatives addressing social exclusion, which target specific segments of the population, might improve the living conditions of disadvantaged groups but do not automatically reduce inequality in income distribution (Lindert, 2021).

When comparing developed and developing countries, the former have increasingly embraced social spending programmes as integral components of their welfare state practices. This trend is attributed to positive economic developments and the substantial contribution of a large working population, particularly in the period after World War II. Observations indicate that not only do these programmes play a crucial role in economic development, but they also serve vital social functions (D'Agostino *et al.*, 2020). This suggests that governments in industrially developed countries are more successful in income redistribution. However, in developing countries, high economic growth contributes to an increase

in income inequality (Bastagli *et al.*, 2012). In developing economies, governments aim to promote equality through educational and health expenditures, although this appears to be a short-term solution (Goni *et al.*, 2008). Sánchez and Pérez-Corral (2018) argued that health and social spending in developing countries exacerbate income inequality, whereas social spending serves only the redistribution function in other countries. Whittle *et al.* (2017) argued that government social spending on sickness, disability and severe disability provides only a limited level of financial support that may not be sufficient to close the income gap between those who are able to work and those who are unable to work.

According to Callan *et al.* (2018), the EUROMOD tax-benefit microsimulation software for the European Union is employed to numerically simulate tax-benefit rules. This tool allows calculation of all social contributions, direct taxes and transfers, thereby determining household disposable income. The authors decomposed the change in inequality into three components: a market income effect, an automatic stabilization effect and a discretionary policy effect. The authors stated that a well-designed tax-benefit system played a significant role in shaping income distributions, particularly during times of recovery from the Great Recession. Their findings suggest that tax policies and a greater degree of automatic benefit stabilization helped cushion income inequality among the working-age population in Portugal and Ireland. Conversely, due to a weak unemployment support system, benefits played a smaller role for this demographic group in Greece, Italy and Spain.

Similarly, Almeida *et al.* (2021) used the EUROMOD microsimulation model and data from the European Union Statistics on Income and Living Conditions (EU-SILC) to evaluate the economic impact of the COVID-19 crisis under different scenarios. The first scenario represented an economy unaffected by COVID-19, based on the EC Autumn 2019 Economic Forecast. The second scenario followed the EC Spring 2020 Economic Forecast, incorporating shutdowns and policy measures enacted by EU member states. The third scenario, a hypothetical "no policy change" scenario, excluded discretionary fiscal measures to assess their impact. The authors found that government measures, such as wage compensation and fiscal interventions in social security, reduced the regressive effects of the crisis and lowered income inequality in most European countries.

Eydam and Qualo (2023) provided an empirical analysis of the long-term relationship between income inequality and taxation using multivariate regression. The results show a negative association between income inequality and both average and marginal tax rates, indicating that higher taxation has the potential to reduce inequality. This finding holds across different taxation measures, such as the average tax rate, top marginal rate and average progression, as well as various inequality indicators, including the Gini coefficient,

the 90/10 ratio and the 80/20 ratio. The results are robust, even after accounting for control variables such as GDP, trade share, social spending and financial liberalization. The authors emphasized a statistically significant negative relationship between tax progressivity and personal income inequality. Gupta (2014) confirmed that implementing progressive income tax rate structures can contribute to reducing inequality.

Poterba (2007) provided an overview of the before- and after-tax income distribution in the United States from 1984 to 2004, along with data on effective tax rates across different income quintiles. The tax system plays a critical role in shaping income inequality, influencing it through both direct and indirect effects. Direct effects come from the varying tax burden across income levels, which changes the distribution of income after taxes. Indirect effects result from changes in taxpayer behaviour in response to tax policies, which can affect pre-tax distribution. For example, lowering marginal tax rates for certain groups may increase both their pre- and post-tax income shares. While existing research recognizes that taxpayer behaviour affects tax revenue, its influence on income distribution is less understood. Poterba highlighted that the tax system is the main public policy tool for addressing inequality, with income tax systems being the most visible. Additionally, programmes such as education, social insurance and immigration policies also shape after-tax income distribution.

To sum up, the literature review reveals that the impact of government expenditures on income inequality is still ambiguous. This ambiguity can be attributed to several reasons. Firstly, the results depend on the countries included in the analysed sample, with variations observed based on the level of development. Additionally, when differentiating between various types of government expenditures and their effects on income inequality, the results of various studies are inconclusive.

3. Data

To assess the importance of government social spending for income inequality in EU countries, we utilize annual data extracted from the Eurostat database spanning the years 2010 to 2020. The sample consists of 27 EU countries: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES) and Sweden (SE).

To determine income inequality, we employ two indicators: specifically, the Gini coefficient sourced from the EU-SILC survey-based equivalent disposable income data in the [ILC_DI12] database and the S80/S20 ratio obtained from the [ILC_DI11_R] database. The Gini coefficient is formally defined as the ratio of the cumulative shares of the population, ordered by their level of equivalent disposable income, to the cumulative share of the total equivalent disposable income received by them. The Gini coefficient values span a scale from 0 to 100, where 0 signifies a state of complete income equality among households and a value of 100 denotes the utmost degree of income inequality. The values of the S80/S20 coefficient are likewise measured on a scale ranging from 0 to 100, where a score of 100 signifies complete income inequality.

To incorporate government social expenditures into our analysis, we employ data sourced from the [GOV_10A_EXP] database, organized in accordance with the COFOG classification. Government social expenditures are presented as a percentage of gross domestic product (GDP) and vary from 0 to 100. Government social expenditures are categorized into eight distinct groups. These include sickness, disability and severe disability; old age; survivors; family and children; unemployment; housing; social assistance to citizens in material and social need; and government social expenditures not classified elsewhere.

In line with relevant studies addressing analogous concerns, control variables such as gross domestic product, distribution of direct taxes paid by households as a percentage of their gross income and the proportion of the population aged 65 and over are also incorporated into the analysis. We utilize the variable GDP, as per references in Sánchez and Pérez-Corral (2018), Cammeraat (2020) and Alamanda (2020). Likewise, the percentage of the population aged 65 and over, as cited in Ulu (2018), Sánchez and Pérez-Corral (2018) and Cammeraat (2020), is employed in our analysis as a control variable. The source of the data on GDP per capita in purchasing power standards (PPS) is the [tec00114] database. The volume index of GDP per capita is expressed in relation to the European Union 2020 average set to equal 100. The data concerning the population aged 65 and over by household type, presented in percentage units, are extracted from the [ILC_LVPS30] database from the EU-SILC survey. The distribution of data on direct taxes paid by households as a percentage of their gross income is available in [icw_tax_06], using the first and fifth income quintiles.

4. Descriptive Statistics

Table 1 presents the descriptive statistics for key variables, including the Gini coefficient of income inequality, the S80/S20 index, social expenditure variables, as well as control var-

iables such as GDP, distribution of direct taxes paid by households as a percentage of their gross income and the population aged 65 and over. These statistics pertain to our sample of EU member states for the period from 2010 to 2020.

Table 1: Descriptive statistics

Variable	Min	Max	Average	Median	Standard deviation	Number of observations
Gini	20.90	40.80	29.86	29.30	3.86	270
S80/S20	3.00	8.30	4.88	4.50	1.17	270
Spending on unemployment	0.10	3.50	1.06	0.85	0.79	270
Spending on families and children	0.70	5.30	1.91	1.80	0.90	270
Spending on sickness and disability	0.20	5.40	2.46	2.30	1.16	270
Spending on old age and survivors	4.20	17.80	10.18	9.70	3.01	270
Population aged 65 and over	16.10	46.90	32.52	32.80	6.36	270
GDP per capita	46.00	284.00	100.60	90.00	43.96	216
Tax first income quintile	0.00	31.10	7.00	3.00	7.82	269
Tax fifth income quintile	7.20	33.00	16.42	16.30	5.96	269

Note: Government spendings (% of GDP), Gini index, S80/S20 index and GDP per capita (indices), other variables (%).

Source: Authors' own elaboration based on Eurostat (2024) data

5. Methodology

Drawing upon previous research, our study examines the importance of government social spending for income inequality using regression analysis of panel data. In our analysis, we employ pooled OLS, fixed effects and random effects models. The primary distinction between random effects models (REM) and fixed effects models (FEM) lies in the treatment of the correlation between observed predictors and individual effects. Specifically, the ran-

dom effects model does not account for the correlation between these elements, whereas the fixed effects model permits such correlation. The Hausman test is employed to determine the most appropriate model. The null hypothesis of the Hausman test asserts that the random effects model represents the superior model, while the alternative hypothesis contends that the fixed effects model exhibits greater appropriateness. If the calculated *p*-value falls below the designated significance level of $\alpha = 0.05$, we will reject the null hypothesis, thereby indicating that the fixed effects model is deemed more suitable. Conversely, if the calculated *p*-value exceeds the predefined significance level of $\alpha = 0.05$, the random effects model is regarded as the more suitable model (Greene, 2017).

As mentioned, the variable selection process initially relies on existing literature and our objectives. Rigorous testing through multiple iterations ensures a robust model specification, capable of withstanding alterations such as variable removal or replacement. Each iteration undergoes meticulous evaluation for compliance with key assumptions, with necessary adjustments made using the variance-covariance matrix. The final model is formulated as follows:

$$GINI_{it} = \alpha + \beta_1 Unem_{it} + \beta_2 Fam_{it} + \beta_3 Sick_{it} + \beta_4 OldSurv_{it} + \beta_6 Pop65_{it} + \\ + \beta_8 GDP_{it} + \beta_9 TAXq5_{it} + \beta_{10} TAXq1_{it} + \varepsilon_{it} \quad (1)$$

where $GINI_{it}$: Gini coefficient of equivalized disposable income; $Unem_{it}$: government social spending on unemployment; Fam_{it}: government social spending on families and children; $Sick_{it}$: government social spending on sickness and disability; $OldSurv_{it}$: government social spending on old age and survivors; $Pop65_{it}$: population aged 65 and over; GDP_{it}: gross domestic product; $TAXq5_{it}$: distribution of direct taxes paid by households as a percentage of their gross income by fifth income quintile; $TAXq1_{it}$: distribution of direct taxes paid by households as a percentage of their gross income by first income quintile; i: group index, whereas $i = 1, \ldots, n$, in our model $i = 1,2, \ldots, 27$; t: time index, whereas $t = 1, \ldots, T$, in our model $t = 1,2, \ldots, 11$; ε_{it}: error term.

The subsequent phase in the analysis involves constructing a model where the S80/S20 index serves as the dependent variable, while the independent variables correspond to various categories of government social expenditures. The model is structured as follows:

$$S80/S20_{it} = \alpha + \beta_1 Unem_{it} + \beta_2 Fam_{it} + \beta_3 Sick_{it} + \beta_4 OldSurv_{it} + \\ + \beta_6 Pop65_{it} + \beta_8 GDP_{it} + \beta_9 TAXq5_{it} + \beta_{10} TAXq1_{it} + \varepsilon_{it} \quad (2)$$

where $S80/S20_{it}$ represents the S80/S20 income inequality index; the descriptions of all other variables included in the Equation (2) correspond to those in the Equation (1).

We conduct estimations of fixed and random effects models within the R Studio utilizing the PLM package. To initiate the analysis, we examine the optimal number of lags for the explanatory variables by applying the VARselect function available in the VARS package within R Studio. This function encompasses the subsequent information criteria: Akaike's information criterion (AIC), Schwarz criterion (SC), Hannan-Quinn criterion (HQ) and final prediction error (FPE) (Pfaff, 2008). In determining the suitable number of lags, the selection is based on identifying the number associated with the lowest value among the information criteria.

To assess whether the model satisfies the key assumptions for panel data regression, several tests are employed. To assess stationarity, we use the Maddala–Wu panel unit root test (also known as a Fisher-type test) provided by Maddala and Wu (1999). The assumption of homoskedasticity is tested using the studentized Breusch–Pagan test, while serial correlation is examined using the Breusch–Godfrey/Wooldridge test. Multicollinearity is checked using the variance inflation factor and cross-sectional dependence is evaluated using the Pesaran CD test. The results of these additional tests, conducted to validate the assumptions of the regression models, are summarized in the Appendix.

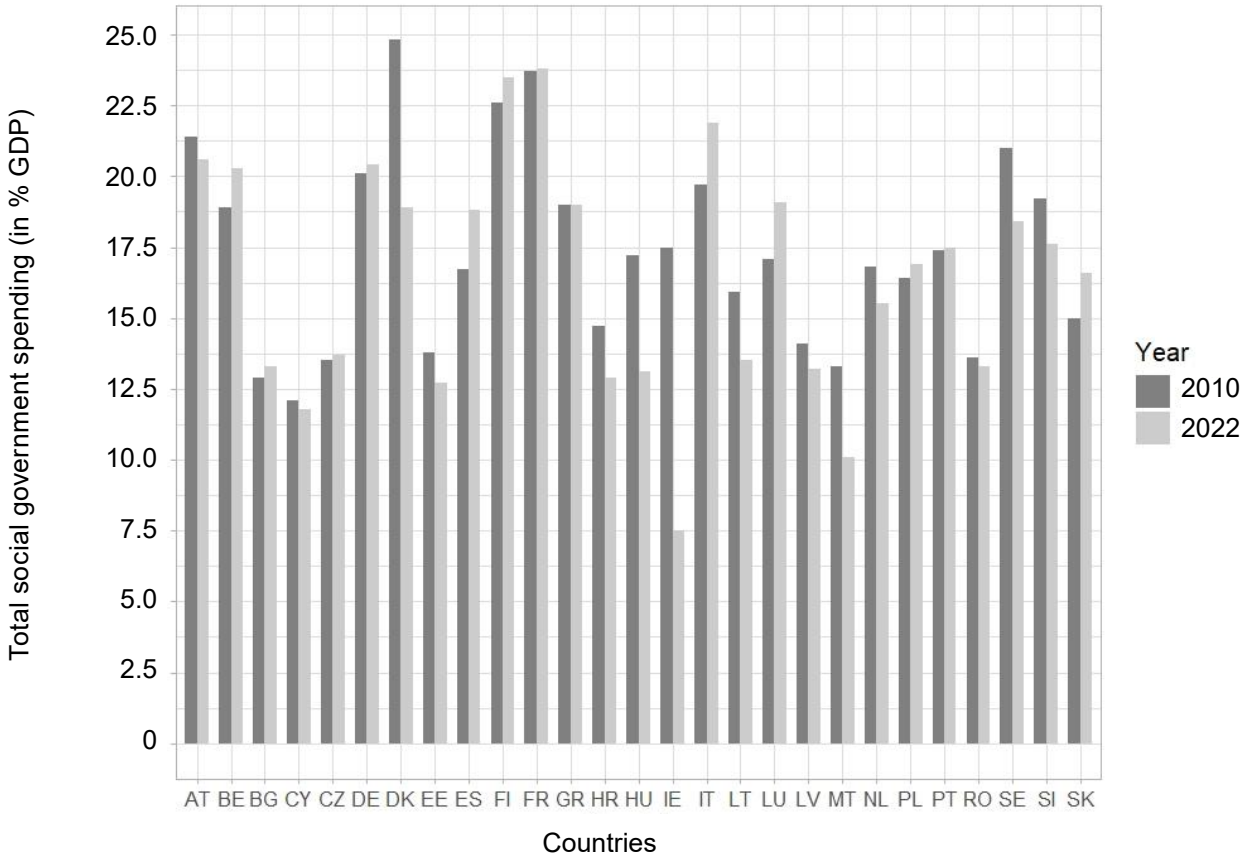
6. Results

Government social spending constitutes a substantial portion of EU budgets. Despite their apparent developmental similarities, distinct variations exist among EU countries in the extent of their social spending. Figure 2 illustrates the total government social spending as a percentage of GDP for each EU country in the years 2010 and 2022.

In the last decade, the COVID-19 crisis significantly exacerbated existing inequalities and various forms of deprivation (UN, 2024). Consequently, the ratio of public social spending to GDP rose from 20% in 2019 to 23% in 2020 across the OECD on average (OECD, 2023).

As observed, Denmark led in 2010 with the highest total government social spending, accounting for 24.8% of GDP. France, Finland, Austria, Sweden and Germany demonstrated substantial levels of total government social expenditures, likewise surpassing 20% of GDP. By 2022, there was a notable shift in the social spending of many countries as a consequence of the ongoing crisis. France (27.2% of GDP), Finland (25.5% of GDP) and Italy (25.1% of GDP) recorded the highest levels of total government social spending. Overall, more than half of the countries at the European level experienced a reduction in the level of government social expenditures during the observed period.

Figure 2: Comparison of total government social spending in EU countries



Source: Authors' own elaboration based on Eurostat (2024) data

Considering all European Union members, Ireland stands as the sole country that witnessed a significant reduction in spending across all areas of social security during the analysed period. Garcia and Taheri Sanjani (2022) and Social Justice Ireland (2023) argued that this trend is a consequence of the policy agenda set by the Irish government, which opted to prioritize funding in different sectors such as infrastructure, healthcare, or defence during this timeframe. Concurrently, the Irish economy has experienced consistent growth in the years following the financial crisis, which may have led the government to believe that reducing social expenditures would not significantly affect the population. This high GDP growth has further contributed to the decline in social spending as a percentage of GDP, as it effectively lowers the denominator in this measure. However, this fiscal policy orientation does not signify neglect in the realm of social security. In fact, Ireland is among the countries most adept at diminishing income inequality through its government expenditures on social security (Miežienė and Krutulienė, 2019).

Additionally, the total amount of government expenditures on social protection as a percentage of GDP is not the only critical factor to consider. Equally important is how these funds are allocated in different countries. Variations in allocation strategies can significantly influence the effectiveness of social policies and the overall impact of government spending on social protection in addressing income inequality. Understanding these differences is essential for evaluating the success of social welfare initiatives and their role in promoting equity. Comparing different geographical parts of Europe, variances are evident. For instance, Nordic countries, the Netherlands and certain continental countries such as Luxembourg demonstrate superior performance in family support, healthcare, unemployment assistance and addressing income inequality and poverty (Antonelli and De Bonis, 2018). As noted by Sundsbø and Sihvonen (2018) and Broom (2019), the Nordic countries stand out as prime locations for raising children. These countries often serve as benchmarks for family policies worldwide, particularly in Scandinavia.

Mediterranean countries excel primarily in healthcare and eldercare, while indicators related to poverty and income inequality reveal comparatively weaker performance. However, despite the greater share of spending on healthcare and eldercare, these expenditures are still below the European Union average (EC, 2024a).

Anglo-Saxon countries exhibit strength in the unemployment and poverty alleviation sectors. This can be attributed to variations in social protection policies among countries, which stem from differing priorities on various objectives in relation to social exclusion, overall inequality and labour market engagement. The traditional division of welfare systems highlights significant differences in efficiency scores among EU countries. The Netherlands and the Nordic countries, namely Denmark, Finland, Norway and Sweden, consistently achieve higher efficiency scores in both input (social protection expenditure level) and output (general social protection performance index) orientations. In contrast, Mediterranean countries (Greece, Italy, Portugal and Spain) and Anglo-Saxon countries (Ireland and the UK) show lower efficiency, which indicates that while both may allocate a similar percentage of GDP to social protection, the effectiveness of these funds varies greatly (Antonelli and De Bonis, 2018).

Analysis of government expenditure levels between 2010 and 2022 yields results similar to those suggested by Korzeniowska (2021), who explained that neighbouring countries often exhibit similarities in terms of social expenditures. However, explaining similarities between geographically distant countries can be more challenging. Instead, these similarities likely stem from the unique economic and social policies of each country.

Furthermore, this chapter presents an overview of the results obtained from regression analyses of panel data developed in the R Studio software. In the estimated model, the Gini coefficient represents the dependent variable, while the independent variables include various types of government social expenditures classified according to the COFOG, as well as macroeconomic and demographic control variables. The control variables consist of *GDP,* variables representing taxation and the proportion of the population aged 65 and over. According to Cammeraat (2020), expenditures on old age and survivors were merged into a single category. Excluding government social expenditures related to housing, social exclusion and miscellaneous categories from our model is warranted due to their low share relative to the entirety of government social spending.

The assumption implies that income inequality responds to changes in different categories of government spending with a lag. The independent variables are lagged by one year to account for the non-contemporaneous effects suggested by the literature (Sánchez and Pérez-Corral, 2018). As elucidated by Cammeraat (2020), the determination of the optimal number of lags for the independent variables was conducted at the outset of the analysis. Following a thorough examination of the results for each information criterion, the optimal number of lags was established as 1. Detailed outcomes of the VARselect test are provided in Table A1 in the Appendix.

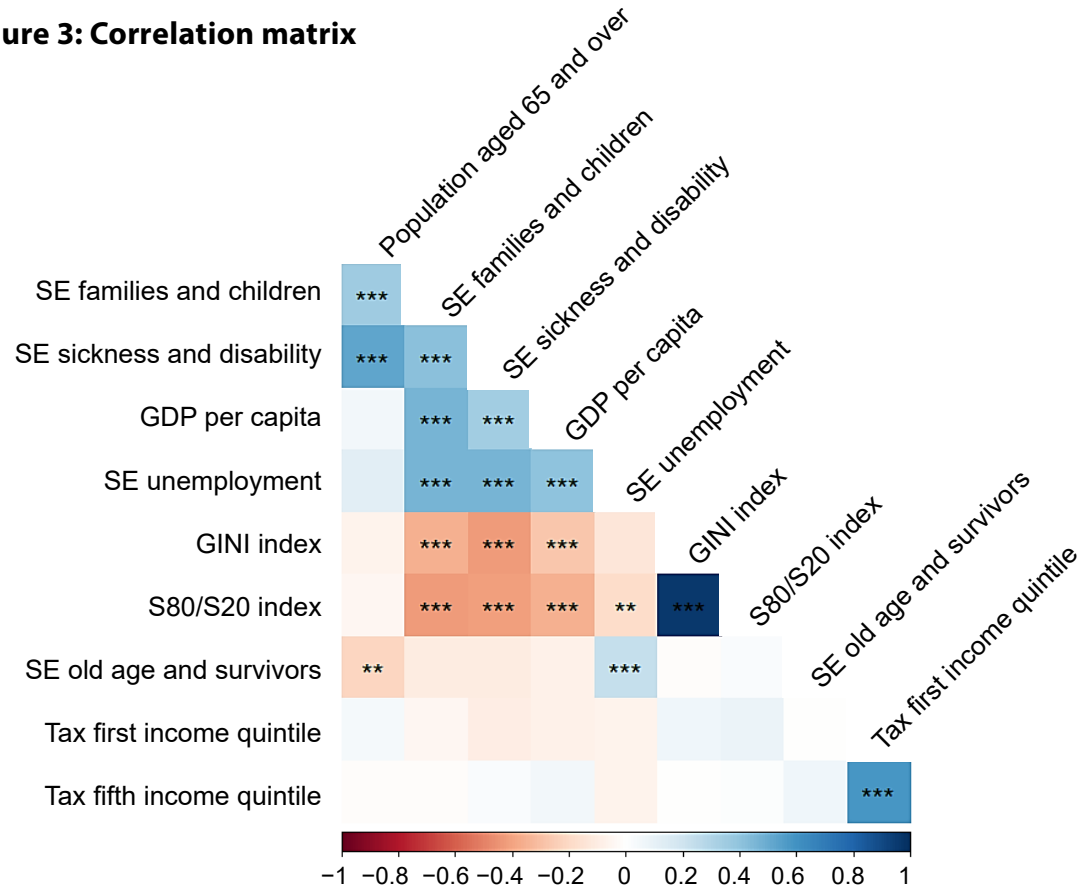
Given the similar nature of the various government social expenditures included in a single model, we assess the degree of dependence between the variables by examining the correlation matrix presented in Figure 3.

We observe a positive correlation between the Gini coefficient and the S80/S20 index, as both metrics gauge income inequality and are not concurrently incorporated into the model. There is a moderate positive correlation among all types of government social expenditures. The variable representing the population aged 65 and over demonstrates a positive correlation with two categories of government social expenditures: namely, those related to families and children, as well as those pertaining to sickness and disability. Income inequality variables exhibit a mild negative correlation with expenditures associated with two distinct groups, specifically those on sickness and disability and those on families and children. In other instances, we observe a limited level of correlation between these variables.

However, it should be noted that individuals receiving one type of social benefit from the government are typically eligible for additional types of benefits.

Regarding the control variable *GDP*, we notice a slight positive correlation with some types of government social expenditures. The control variables *TAXq*1 and *TAXq*5 show no statistically significant correlation with other variables.

Figure 3: Correlation matrix



Note: ***, ** denote statistical significance at the 0.1% and 1% levels, respectively.
Source: Authors' own elaboration based on Eurostat (2024) data

The subsequent stage involved estimating individual regression models for the panel data and conducting tests. The results of these tests are presented in Table A2 and Table A3 in the Appendix. Based on the outcomes of the *F*-test for individual and time effects, it was deemed appropriate to include individual effects representing the EU countries in both models. Additionally, the outcomes from the *F*-test and the Lagrange multiplier test suggested that employing the pooled regression model was inappropriate. In the context of testing statistical problems, both models exhibited confirmed heteroskedasticity and serial correlation. There is also no cross-sectional dependence in the models. The results presented in Table A2 indicate that three control variables are non-stationary. However, by applying differencing, the stationarity of all the variables included in the model was achieved.

At the conclusion of the analysis, the statistical issues that arose within the model were resolved. A summary comparing the models after the removal of heteroskedasticity and serial correlation, achieved through the variance-covariance matrix using the Arellano method, is presented in Table 2.

Table 2: Outcomes of models after removal of autocorrelation and heteroskedasticity

Variable	GINI (1) RE model	S80/S20 (2) RE model
SE unemployment (*t* – 1)	1.550 *** (0.414)	0.491 *** (0.104)
SE families and children (*t* – 1)	–1.771 *** (0.477)	–0.551 *** (0.154)
SE sickness and disability (*t* – 1)	–0.484 (0.395)	–0.125 (0.129)
SE old age and survivors (*t* – 1)	0.011 (0.198)	0.025 (0.068)
Population aged 65 and over (*t* – 1)	0.067 * (0.033)	0.024 * (0.01)
GDP per capita (*t* – 1)	–0.042 (0.034)	–0.011 (0.009)
Tax fifth income quintile (*t* – 1)	–0.008 (0.006)	–0.003 (0.002)
Tax first income quintile (*t* – 1)	0.002 (0.011)	0.003 (0.003)
Hausman test	0.7014	0.5423
Multiple R^2	0.220	0.243

Notes: SE: social expenditures, RE: random effects. Variables population aged 65 and over, GDP per capita and tax fifth income quintile are differentiated. Standard errors in parentheses. ***, **, * denote statistical significance at the 0.1%, 1%, and 5% levels, respectively.

Source: Authors' own elaboration based on Eurostat (2024) data

According to the empirical findings derived from the random individual effects model encompassing a sample of 27 European countries, a discernible positive association is evident between government social spending on unemployment and income inequality. A 1% rise in government spending on unemployment is associated with a subsequent increase of 1.550 units in income inequality after one year; these outcomes maintain statistical significance at the 0.1% level. Analogous findings persist within the random effects model, where the dependent variable is represented by the S80/S20 index. A 1% increase in this spending as a percentage of GDP correlates with a subsequent rise of 0.491 units in the S80/S20 index one year later, maintaining significance at the 0.1% level.

This result can be rationalized by the potential of unemployment benefits to discourage workforce participation, especially if benefits are relatively high and the labour market exhibits weakness (Biegert, 2017). It can potentially result in prolonged periods of unemployment, consequently contributing to an escalation in income inequality over time.

Amidst rising unemployment rates and heightened support for unemployed workers during the crises of 2007–2009 and the recent COVID-19 crisis showed that extensive unemployment entitlements, in terms of both level and duration, coupled with a weak job search requirements, tend to dampen job search incentives and lower unemployment exit rates (Chetty, 2008; Ekkehard, 2015; Farber *et al.*, 2015; Rebollo-Sanz and Rodríguez-Planas, 2020; Petrosky-Nadeau and Valletta, 2021). Consequently, it is imperative for policymakers to carefully consider the design and implementation of unemployment benefit programmes to ensure they effectively address income inequality. This entails targeting benefits towards those most in need while avoiding disincentives to workforce participation.

Similarly, Almeida *et al.* (2021) suggested that income inequality has, to some extent, diminished in several EU countries following the implementation of fiscal welfare measures targeting the unemployed amidst the COVID-19 pandemic crisis. Exceptions exist in countries such as Bulgaria, Finland, France and Poland, where the provision of individual unemployment benefits and social insurance contributions for the unemployed has resulted in an intensification of income inequality. However, Cammeraat (2020) drew disparate conclusions regarding this category of expenditures. The research findings indicate that there is no statistically significant relationship between the Gini coefficient of income inequality and government expenditures on the unemployed. This discrepancy might be attributed to the specific sample under scrutiny (OECD countries) and the temporal scope considered.

As can be seen, government spending on families and children is also important for income inequality measured by both indicators, the Gini coefficient and the S80/S20. According to the outcomes derived from the panel data analysis, a rise in expenditures allocated to families and children by 1% of GDP correlates with a subsequent reduction in income inequality by 1.771 units (for the model with the Gini coefficient as the dependent variable) and 0.551 units (for the model with the S80/S20 as the dependent variable) one year later, maintaining significance at the 0.1% level. In the provided sample, a higher allocation by the government towards families and children is associated with a more pronounced reduction in the disparity between the affluent and the less affluent, resulting in a reduction of the income gap. In our analysed sample, government spending on families and children recorded one of the lowest values. However, as Miežienė and Krutulienė (2019) elucidated, households with children are threatened by income inequality and poverty more often compared to households without children. According to Eurostat data, in 2020, the poverty risk rate among households with three or more dependent children stood at 28.5% in the EU-27, while the corresponding figure among households without dependent children was notably lower, at 16.5% (EC, 2024b).

Our findings align with previous literature, affirming a negative association between the Gini coefficient of income inequality and social welfare programmes targeting families and children in OECD countries (Cammeraat, 2020). Additionally, the research findings indicate that this particular expenditure category is associated with the greatest decrease in income inequality. Therefore, it should be considered a priority to allocate resources towards social welfare programmes targeting families and children. This allocation should not only include spending in the form of social benefits but also support access to quality education, healthcare and childcare services for families with children. Policies that support early childhood education and development programmes can help break the cycle of intergenerational poverty and inequality. Also, government spending programmes aimed at supporting families and children, such as child tax credits and childcare subsidies, contribute to the reduction of income inequality (Congressional Budget Office, 2022). According to Sidek (2021), the impact of government expenditures relies heavily on two key factors: the actual level of spending and the critical threshold at which spending becomes significant enough to effectively alleviate inequality. In developed countries, this pattern conforms to the inverted U-shaped Kuznets curve, wherein higher government expenditures initially contribute to increased inequality but eventually yield a positive effect after surpassing a certain threshold level. Therefore, it is crucial to allocate enough resources to support families and children in order to effectively reduce inequality.

As can be seen, government spending on sickness, disability and severe disability is not associated with statistically significant changes in the Gini coefficient or S80/S20. Government expenditures on sickness, disability and severe disability do not display any association with the inequality indicators, aligning with the findings of Cammeraat (2020).

Spending on sickness, disability and severe disability typically provides financial aid to individuals unable to work due to health conditions. These programmes encompass various benefits such as disability insurance, medical care and rehabilitation services. While these programmes offer crucial support to certain vulnerable populations, their impact on reducing income inequality in society as a whole is limited. Often, they cater to only a subset of the population meeting stringent eligibility criteria. It implies that individuals experiencing income inequality and financial hardship might not qualify for these programmes, resulting in unequal access to support compared to those meeting the eligibility criteria. Governmental allocation towards sickness, disability and severe disability offers constrained financial aid, often insufficient to bridge the income disparity between individuals capable of employment and those unable to work (Whittle *et al.*, 2017).

Although government social spending on old age and survivors constitutes the largest portion of total government social spending, these expenditures do not emerge as statistically significant in changing the Gini coefficient and the S80/S20 index within our sample of countries. This finding contrasts with Cammeraat (2020), wherein government social expenditures allocated to old age and survivors exhibited a negative correlation with the Gini coefficient of income inequality. Old age and survivor spending is notably prominent among government social expenditures, characterized by significantly larger allocations compared to other categories of government social spending. However, despite the substantial resources dedicated to these programmes, their impact on reducing income inequality is not always straightforward or guaranteed.

According to Giuliani (2022) and Rabaté and Rochut (2019), the replacement income provided to retirees, often set at 50–70% of their pre-retirement salary, is proportional to their earnings before retirement. This proportionality means that individuals who earned more during their working years will continue to receive higher benefits in retirement, thereby preserving the existing income disparities rather than reducing them. As a result, while these expenditures are crucial in ensuring financial stability for the elderly, they do not necessarily contribute to diminishing income inequality.

Furthermore, Ketkaew *et al.* (2019) highlighted that the wealth that individuals accumulate throughout their working lives significantly contributes to their income security in retirement. This accumulated wealth, however, does not substantially alter the overall distribution of income among retirees. Instead, it helps maintain the pre-existing income distribution, ensuring that retirees can sustain a standard of living consistent with their earlier earnings. This further reinforces the idea that even though old age benefits constitute a large share of social spending, they often serve to maintain income levels rather than redistribute wealth in a way that would reduce overall income inequality.

The results indicate a positive correlation between the proportion of the population aged 65 and over and both indicators of income inequality. A 1% increase in the share of the population aged 65 and over correlates with a 0.066-unit increase in income inequality (measured by the Gini coefficient) and a 0.024-unit increase (measured by the S80/S20) one year later. This examination of the importance of government social spending for income inequality encompasses additional variables that could contribute to changes in income inequality. The swift aging of a population can trigger several macroeconomic challenges within a country, including a shrinking labour force, decreased economic productivity leading to sluggish growth and fiscal strains that are difficult to sustain (Wang *et al.*, 2018). Individuals aged 65 and above are retired from the labour market, which often leads

to a decline or partial replacement in their income. Consequently, the growing proportion of elderly individuals intensifies income inequality (Hwang *et al.*, 2021). According to Deaton and Paxson (1994), income inequality shows slight upward movement or stagnation as a result of population aging, possibly due to changes in the effective income tax rate and increased public transfers. Therefore, policymakers need to anticipate and address these challenges through targeted policies and reforms to ensure sustainable economic growth and fiscal stability and reduce social inequalities.

In contrast to the prior control variable, the results indicate no statistically significant relationship between income inequality and GDP per capita. The absence of a significant impact of GDP on income inequality in the context of EU countries is supported by the study of Mdingi and Hu (2021), which presented ambiguous results regarding the direct relationship between GDP and income inequality. Through an extensive literature review, the authors highlighted various perspectives on this issue, including the possibility that no significant relationship exists between these two variables. These findings are consistent with those of Niyimbanira (2017) and Benos and Karagiannis (2018), who similarly found no evidence of a direct link between GDP and income inequality. This ambiguity can be attributed to structural economic differences and the heterogeneity among EU countries. The EU encompasses a diverse range of economies with varying levels of development, social policies and income distribution patterns. This diversity may dilute the overall relationship between GDP and income inequality, rendering GDP insignificant in the panel model when considering the entire bloc of countries.

Similarly, the analysis of direct taxes paid by households did not yield significant insights into their association with income inequality indicators. It could be explained because the impact of the tax system may differ considerably across the countries included in our sample. The results suggest that, although household taxes can theoretically influence income distribution, their impact on inequality indicators is insignificant in our model. Despite the progressive nature of taxation, research suggests that reducing taxes for low-income individuals and raising them for the wealthy can unintentionally increase inequality. This occurs when low-income individuals spend their extra income at businesses owned by the wealthy, boosting the latter's income. Additionally, high-income individuals often respond to higher taxes by reducing taxable income through tax evasion or avoidance, which is more prevalent among the rich. As a result, the observed effect of higher taxes on income inequality may be overstated compared to actual inequality (Jackson *et al.*, 2020; Duncan and Sabirianova, 2016).

7. Conclusions

In this study, we analysed the importance of various government social expenditures and income inequality using regression analysis on panel data. The outcomes derived from the regression analysis of panel data were elucidated based on a robust variance-covariance matrix. The adoption of this approach was necessitated by the failure of our models to meet fundamental econometric assumptions, resulting in biased estimates of regression coefficients influenced by underlying statistical issues.

In the initial model with the Gini coefficient and similarly in the alternate model using the S80/S20 index as the dependent variable, the findings revealed that increasing government expenditures on families and children is associated with the greatest decrease in income inequality. This finding holds significant implications, as it underscores the imperative for countries to prioritize mitigating structural disparities and ensuring essential living conditions for children and low-income families.

Our results also indicate that an increase in government spending on unemployment is associated with an increase in income inequality measured by the Gini coefficient. The second model, using the S80/S20 index as the dependent variable, also substantiated similar outcomes, establishing a positive association between the S80/S20 index and government spending on unemployment. Therefore, it is crucial to carefully consider the design and implementation of unemployment benefit programmes to effectively mitigate income inequality while avoiding unintended consequences in the form of long-term unemployment.

Government social expenditures directed towards sickness, disability and severe disability and programmes aiding the elderly and survivors do not exhibit a statistically significant association with income inequality across EU countries.

Among the control variables, a notable positive association was solely apparent between the proportion of the population aged 65 and over and income inequality. To ensure sustainable economic growth, fiscal stability and a reduction in social inequalities, policymakers must anticipate and address these challenges through well-designed, targeted policies and reforms. In contrast, there was no correlation between the other control variables.

Given the partial divergence of the present conclusions from those of other scientific studies, it would be prudent to expand the analysis in this domain using alternative methodologies. Moreover, further investigations could encompass the incorporation of additional government expenditures, such as allocations for health, infrastructure or education, as well as other pertinent macroeconomic variables intricately linked with income inequality. Future research initiatives could investigate private sector spending and transfers, acknowl-

edging their impact on mitigating income inequality. It is noteworthy that while government social spending bears significance, it may not entirely mitigate income inequality. Additional approaches such as progressive taxation systems and strategies focused on enhancing economic growth are crucial to fostering greater equity within society.

Acknowledgement

Funding: There was no funding, either externally or internally, towards this study.

Conflicts of interest: The authors hereby declare that this article was neither submitted nor published elsewhere.

Data availability: The data used in the analysis are available.

AI usage statement: The authors confirm that no artificial intelligence (AI) or AI-assisted tools were used in the creation of this manuscript.

References

Acemoglu, D., Johnson, S., Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 91, 1369–1401. https://doi.org/10.1257/aer.91.5.1369

Aiyar, S., Ebeke, C. (2020). Inequality of opportunity, inequality of income and economic growth. *World Development*, 136, 1–10. https://doi.org/10.1016/j.worlddev.2020.105115

Alamanda, A. (2020). The effect of government expenditure on income inequality and poverty in Indonesia. *Info Artha*, 4(1), 1–11.

Almeida, V., Barrios, S., Christl, M., et al. (2021). The impact of COVID-19 on households' income in the EU. *The Journal of Economic Inequality*, 19, 413–431. https://doi.org/10.1007/s10888-021-09485-8

Anderson, E., D'Orey, M. A. J., Duvendack, M., et al. (2015). The impact of government policies on income inequality and the translation of growth into income poverty reduction: protocol for two systematic reviews. *Journal of Development Effectiveness*, 7(4), 484–498. https://doi.org/10.1080/19439342.2015.1105847

Anderson, E., D´Orey, M. A. J., Duvendack, M., et al. (2016). Does government spending affect income inequality? A meta-regression analysis. *Journal of Economic Surveys*, 31(4), 961–987. https://doi.org/10.1111/joes.12173

Antonelli, M. A., De Bonis, V. (2018). The efficiency of social public expenditure in European countries: a two-stage analysis. *Applied Economics*, 51(1), 1–14. https://doi.org/10.1080/00036846.2018.1489522

Atkinson, A. B. (1997). Bringing income distribution in from the cold. *The Economic Journal*, 107(441), 297–321. https://doi.org/10.1111/j.0013-0133.1997.159.x

Barro, R., (2008). *Inequality and growth revisited*. Asian Development Bank Working Paper Series on Regional Economic Integration No. 14.

Bastagli, F., Coady, D. Gupta, S. (2012). *Income inequality and fiscal policy*. IMF Staff Discussion Note No: SDN/12/08.

Benos, N., Karagiannis, S. (2017). Inequality and growth in the United States: Why physical and human capital matter. *Economic Inquiry*, 56(1), 572–619. https://doi.org/10.1111/ecin.12475

Biegert, T. (2017). Welfare benefits and unemployment in affluent democracies: The moderating role of the institutional insider/outsider divide. *American Sociological Review*, 82(5), 1037–1064. https://doi.org/10.1177/0003122417727095

Blázquez-Fernández, C., Cantarero-Prieto, D., Pascual-Saez, M. (2018). Does Rising Income Inequality Reduce Life Expectancy? New Evidence for 26 European Countries (1995–2014). *Global Economic Review*, 47(4), 464–479. https://doi.org/10.1080/1226508X.2018.1526098

Bor, J., Cohen, G. H., Galea, S. (2017). Population health in an era of rising income inequality: USA, 1980–2015. *Lancet*, 389(10077), 1475–1490. https://doi.org/10.1016/S0140-6736(17)30571-8

Borjas, G. J., Freeman, R. B., Katz, L. F. (1992). On the Labor Market Effects of Immigration and Trade. In: Borjas, G. J., Freeman, R. B. *Immigration and the Workforce*, 213–244. Chicago: University of Chicago Press.

Broom, D. (2019). *Why Nordic nations are the best places to have children.* [Retrieved 2024-04-16] Available at: https://www.weforum.org/agenda/2019/03/nordic-nations-best-places-for-parents-children/

Callan, T., Doorley, K., Savage, M. (2018). *Inequality in EU crisis countries: how effective were automatic stabilisers?* IZA Discussion paper No.11439.

Cammeraat, E. (2020). The relationship between different social expenditure schemes and poverty, inequality and economic growth. *International Social Security Review*, 73(2), 101– 123. https://doi.org/10.1111/issr.12236

Chetty, R. (2008). Moral hazard versus liquidity and optimal unemployment insurance. *Journal of Political Economy*, 116(2), 173–234. https://doi.org/10.1086/588585

Čok, M., Urban, I., Verbič, M. (2013). Income redistribution through taxes and social benefits: The case of Slovenia and Croatia. *Panoeconomicus*, 60, 667–686. https://doi.org/10.2298/PAN1305667C

Compton, M. T., Shim, R. S. (2015). *Social determinants of mental health*. Washington: American Psychiatric Publishing.

Congressional Budget Office (2022). *The Distribution of Household Income in 2021*. Washington, D.C.: Congressional Budget Office.

D'Agostino, G., Pieroni, L., Scarlato, M. (2020). Social transfers and income inequality in OECD countries. *Structural Change and Economic Dynamics*, 52, 313–327. https://doi.org/10.1016/j.strueco.2019.11.004

Deaton, A., Paxson, C. (1994). Intertemporal choice and inequality. *Journal of Political Economy*, 102(3), 437–467. https://doi.org/10.1086/261941

Dotti, V. (2020). Income inequality, size of government, and tax progressivity. *European Economic Review*, 121, 103327. https://doi.org/10.1016/j.euroecorev.2019.103327

Duncan, D., Sabirianova, P. K. (2016). Unequal inequalities: Do progressive taxes reduce income inequality? *International Tax and Public Finance*, 23, 762–783. https://doi.org/10.1007/s10797-016-9412-5

Ekkehard, E. (2015). Supporting jobseekers: How unemployment benefits can help unemployed workers and strengthen job creation. *International Social Security Review*, 68(3), 43–67. https://doi.org/10.1111/issr.12079

Elgar, F. J., Aitken, N. (2011). Income inequality, trust and homicide in 33 countries. *European Journal of Public Health*, 21(2), 241–246. https://doi.org/10.1093/eurpub/ckq068

EC (2024a). *General government expenditure by function (COFOG)*. Luxembourg: European Commission. [Retrieved 2024-04-11] Available at: https://ec.europa.eu/eurostat/databrowser/view/gov_10a_exp__custom_10819096/default/table?lang=en.

EC (2024b). *Persons at risk of poverty or social exclusion by income quantile and household composition - EU 2020 strategy*. Luxembourg: European Commission. [Retrieved 2024-04-11] Available at: https://ec.europa.eu/eurostat/databrowser/view/ilc_peps03__custom_10825244/default/table?lang=en.

Eydam, U., Qualo, H. (2023). Income inequality and taxes – an empirical assessment. *Applied Economics Letters*, 31(18), 1828–1835. https://doi.org/10.1080/13504851.2023.2208328

Farber, H. S., Rothstein, J., Valletta, R. G. (2015). The effect of extended unemployment insurance benefits: Evidence from 2012–2013 Phase-Out. *American Economic Review*, 105(5), 171–176. https://doi.org/10.1257/aer.p20151088

Friedman, M., Kuznets, S. (1945). *Income from Independent Professional Practice*. Publications of National Bureau of Economic Research No. 45.

Frost, J., van Stralen, R. (2017). Macroprudential policy and income inequality. *Journal of International Money and Finance*, 85, 278–290. https://doi.org/10.1016/j.jimonfin.2017.11.010

Garcia, K., Taheri Sanjani, M. (2022). *Ireland selected issues*. IMF Country Report No. 22/214. ISBN 9798400213380.

Giuliani, G. A. (2022). Welfare systems. In: Trigilia, C. *Capitalisms and Democracies: Can Growth and Equality be Reconciled?* 110–130. London: Routledge. ISBN 9781003297130.

Guzi, M., Kahanec, M. (2018). *Income Inequality and the Size of Government: A Causal Analysis*. IZA Discussion Paper Series, No. 12015.

Goh, L. T., Law, S. H. (2022). Deadly income inequality? A panel data analysis on the impact of income inequality on mental disorder mortality. *International Journal of Business and Society*, 23(3), 1499–1515. https://doi.org/10.33736/ijbs.5178.2022

Goni, E., Lopez, J.H., Serven, L. (2008). *Fiscal redistribution and income inequality in Latin America*. Policy Research Working Paper No. 4487.

Granger, H., Abrahamovsky, L., Pudussery, J. (2022). *Fiscal policy and income inequality*. London: ODI.

Greene, W. (2017). *Econometric Analysis*. 8th edition. Upper Saddle River: Pearson Education. ISBN: 9780134811932.

Gupta, S. (2014). *Fiscal Policy and Income Inequality*. IMF Policy Paper No. 68.

Higgins, M., Williamson, J.G. (1999). *Explaining inequality the world round: Cohort size, Kuznets curves, and openness*. National Bureau of Economic Research Working Paper 7224, 57. https://doi.org/10.1111/roiw.12337

Hwang, S., Choe, C., Choi, K. (2021). Population ageing and income inequality. *The Journal of the Economics of Ageing*, 20, 100345. https://doi.org/10.1016/j.jeoa.2021.100345

IMF (2024). *Income Inequality, Introduction to inequality*. [Retrieved 2024-04-11] Available at: https://www.imf.org/en/Topics/Inequality/introduction-to-inequality

Jackson, L. E., Otrok, C., Owyang, M. T. (209). *Tax Progressivity, Economic Booms, and Trickle-Up Economics*. Federal Reserve Bank Working Paper 2019-034A.

Ketkaew, C., Van Wouwe, M., Vichitthamaros, P., et al. (2019). The Effect of Expected Income on Wealth Accumulation and Retirement Contribution of Thai Wageworkers. *SAGE Open*, 9(4). https://doi.org/10.1177/2158244019898247

Korzeniowska, A. M. (2021). Heterogeneity of government social spending in European Union countries. *Future Business Journal*, 7(38), 1–9. https://doi.org/10.1186/s43093-021-00084-7

Krieger, N., Williams, D. R., Moss, N. E. (1997). Measuring social class in US public health research: concepts, methodologies, and guidelines. *Annual Review of Public Health*, 18, 341–378. https://doi.org/10.1146/annurev.publhealth.18.1.341

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, 45(1), 1–28.

Layte, R., Whelan, C. T. (2014). Who Feels Inferior? A Test of the Status Anxiety Hypothesis of Social Inequalities in Health. *European Sociological Review,* 30(4), 525–535. https://doi.org/10.1093/esr/jcu057

Lindert, P. (2021). *Social spending and the welfare state. How Was Life? Volume II: New Perspectives on Well-being and Global Inequality since 1820*. Paris: OECD Publishing.

Lyubimov, I. (2017). Income inequality revisited 60 years later: Piketty vs Kuznets. *Russian Journal of Economics*, 3(1), 42–53. https://doi.org/10.1016/j.ruje.2017.02.003

Maddala, G. S., Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics,* 61(S1), 631–652. https://doi.org/10.1111/1468-0084.0610s1631

Manseau, M. W. (2015). Economic inequality, poverty and neighbourhood deprivation. In: Compton, M. T., Shim, R. S. *The social determinants of mental health*. Washington, D.C.: American Psychiatric Publishing.

Martínez-Navarro, D., Amate-Fortes, I., Guarnido-Rueda, A. (2020) Inequality and development: is the Kuznets curve in effect today? *Economia Politica*, 37, 703–735. https://doi.org/10.1007/s40888-020-00190-9

Mdingi, K., Ho, S.-Y. (2021). Literature review on income inequality and economic growth. *MethodsX*, 8, 101402. https://doi.org/10.1016/j.mex.2021.101402

Miežiené, R., Krutulienė, S. (2019). The impact of social transfers on poverty reduction in EU countries. *TalTech Journal of European Studies*, 9(1), 157–175. https://doi.org/10.1515/bjes-2019-0009

Milanovic, B. (2016a). Income inequality is cyclical. *Nature,* 537, 479–482. https://doi.org/10.1038/537479a

Milanovic, B. (2016b). *Global Inequality. A New Approach for the Age of Globalization*. Cambridge: Harvard University Press. ISBN 9780674984035.

Mill, J. S. (1848). *Principles of Political Economy, Collected Works of John Stuart Mill*. Toronto: University of Toronto Press.

Niyimbanira, F. (2017). Analysis of the Impact of Economic Growth on Income Inequality and Poverty in South Africa: The Case of Mpumalanga Province. *International Journal of Economics and Financial Issues*, 7(4), 254–261.

OECD (2023). *The rise and fall of public social spending with the COVID-19 pandemic*. [Retrieved 2024-04-16] Available at: https://www2.oecd.org/els/soc/OECD2023-Social-Expenditure-SOCX-Update-Rise-and-fall.pdf

Petrosky-Nadeau, N., Valletta, R. G. (2021). *UI generosity and job acceptance: Effects of the 2020 CARES Act.* Federal Reserve Bank of San Francisco Working Paper 2021–13.

Pfaff, B. (2008). VAR, SVAR and SVEC models: Implementation within R package vars. *Journal of Statistical Software*, 27(4), 1–32. https://doi.org/10.18637/jss.v027.i04

Pickett, K. E., James, O. W., Wilkinson, R. G. (2006). Income inequality and the prevalence of mental illness: A preliminary international analysis. *Journal of Epidemiology and Community Health*, 60(7), 646–647. https://doi.org/10.1136/jech.2006.046631

Piketty, T. (2013). *Capital in the twenty-first century*. Cambridge: The Belknap Press of Harvard University Press.

Polacko, M. (2021). Causes and Consequences of Income Inequality – An Overview. *Statistics, Politics and Policy*, 12(2), 341–357. https://doi.org/10.1515/spp-2021-0017

Poterba. J. M. (2007). Income inequality and income taxation. *Journal of Policy Modelling*, 29(4), 623–633. https://doi.org/10.1016/j.jpolmod.2007.05.010

Rabaté, S., Rochut, J. (2019). Employment and substitution effects of raising the statutory retirement age in France. *Journal of Pension Economics & Finance*, 19(3), 293–308. https://doi.org/10.1017/s1474747218000392

Rafferty, J. A., Abelson, J. M., Bryant, K., et al. (2015). Discrimination. In: Compton, M.T., Shim, R. S. *The Social Determinants of Mental Health*. Washington: American Psychiatric Publishing.

Rattan, D. (2012). Exploring the Kuznets Curve and the "Latin American Effect" in Latin America. In: Kulkarni, K. *International economic review: Post recession challenges & analyses*, 277–287. Daryaganj: Matrix Publishers.

Rebollo-Sanz, Y. F., Rodríguez-Planas, N. (2020). When the going gets tough. Financial incentives, duration of unemployment, and job-match quality. *Journal of Human Resources*, 55(1), 119–163. https://doi.org/10.3368/jhr.55.1.1015.7420R2

Revenga, A. (1992). Exporting Jobs? The Impact of Import Competition on Employment and Wages in U.S. Manufacturing. *Quarterly Journal of Economics*, 107(1), 255–284. https://doi.org/10.2307/2118329

Rhee, C., Zhuang, J., Kanbur, R., et al. (2014). Confronting Asia's rising inequality: Policy options. In: Kanbur, R., Rhee, C., Zhuang, J. *Inequality in Asia and the Pacific: Trends, drivers and policy implications*. London: Routledge.

Ricardo, D. (1817). *On the Principles of Political Economy and Taxation, third ed. John Murray, London, 1821*. *The Works and Correspondence of David Ricardo*. Cambridge: Cambridge University Press.

Sánchez, A., Pérez-Corral, A. L. (2018). Government social expenditure and income inequalities in the European Union. *Review of Public Economics*, 227(4), 133–156. https://doi.org/10.7866/HPE-RPE.18.4.5

Savage, M., Callan, T., Nolan, B., et al. (2019). The Great Recession, austerity and inequality: lessons from Ireland. *The Review of Income and Wealth*, 65(2), 312–336. https://doi.org/10.1111/roiw.12337

Sidek, N. Z. M. (2021). Do government expenditure reduce income inequality: evidence from developing and developed countries. *Studies in Economics and Finance*, 38(2), 447–503. https://doi.org/10.1108/SEF-09-2020-0393

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. Oxford: Clarendon.

Social Justice Ireland (2023). *Analysis and Critique of Budget 2023*. Dublin: Social Justice Ireland.

Stiglitz, J. E. (2012). *The price of inequality: How today's divided society endangers our future*. New York: W. W. Norton & Company.

Sundsbø, A., Sihvonen, E. (2018). Introduction: Parenting Support in the Nordic Countries: Is there a Specific Nordic Model? *Social Policy and Society*, 17(3), 425–429. https://doi.org/10.1017/S1474746417000604

Tibber, M. S., Walji, F., Kirkbirde, J. B.., et al. (2021). The association between income inequality and adult mental health at the subnational level – A systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 57(1), 1–24. https://doi.org/10.1007/s00127-021-02159-w

Tiongson, E. R., Paternostro, S., Rajaram, A. (2007). How Does the Composition of Public Spending Matter? *Oxford Development Studies*, 35(1), 47–82. https://doi.org/10.1080/13600810601167595

Ulu, M. I. (2018). The effect of government social spending on income inequality in OECD: a panel data analysis. *International Journal of Economics Politics Humanities and Social Sciences*, 1(3), 1–19.

UN (2024). *Spending on social protection rose nearly 270% with pandemic*. [Retrieved 2024-04-16] Available at: https://news.un.org/en/story/2022/02/1111442

Van Velthoven, A., De Haan, J., Sturm, J. E. (2018). Finance, income inequality and income redistribution. *Applied Economics Letters*, 26(14), 1202–1209. https://doi.org/10.1080/13504851.2018.1542483

Wang, C., Wan, G., Luo, Z., et al. (2018), Aging and inequality: the link and transmission mechanisms. *Review of Development Economics*, 22(3), 885–903. https://doi.org/10.1111/rode.12394

Whittle, H. J., Palar, K., Ranadive, N. A., et al. (2017). The land of the sick and the land of the healthy: disability, bureaucracy, and stigma among people living with poverty and chronic illness in the United States. *Social Science & Medicine*, 190, 181–189. https://doi.org/10.1016/j.socscimed.2017.08.031

Williams, D. R., Yu, Y., Jackson, J. S., et al. (1997). Racial differences in physical and mental health: Socio-economic status, stress and discrimination. *Journal of Health Psychology*, 2(3), 335–351. https://doi.org/10.1177/135910539700200305

Wu, X., Perloff, J. M., Golan, A. (2006). Effects of government policies on urban and rural income inequality. *Review of Income and Wealth*, 52(2), 213–235. https://doi.org/10.1111/j.1475-4991.2006.00185.x

Appendix

Table A1: Results of VARselect test

Criterion	Lag 1	Lag 2	Lag 3	Lag 4
AIC	11.39	11.75	12.21	12.59
HQ	11.97	12.84	13.83	14.72
SC	12.82	14.46	16.21	17.88
FPE	88,878.37	126,917.85	203,404.57	302,410.21

Source: Authors' own elaboration based on Eurostat (2024) data

Table A2: Results of Maddala–Wu test

Maddala–Wu test	*p*-value before adjustment	*p*-value after differentiation
SE unemployment	0.001	–
SE families and children	0.000	–
SE sickness and disability	0.001	–
SE old age and survivors	0.000	–
Tax first income quintile	0.000	–
Tax fifth income quintile	0.656	0.000
Population aged 65 and over	0.228	0.000
GDP per capita	0.061	0.000

Note: "–" indicates that the variables were stationary at the level and therefore no differentiation was applied.
Source: Authors' own elaboration based on Eurostat (2024) data

Table A3: Results of assumption testing

Test	GINI model	S80/S20 model	Conclusion
***F*-test for individual and/or time effects**	*p*-value = 0.8318	*p*-value = 0.5949	Including a time effect is deemed unwarranted.
***F*-test for individual and/or time effects**	*p*-value < 0.001	*p*-value < 0.001	Differentiation of individual effect is deemed necessary.
Lagrange multiplier test (Breusch–Pagan)	*p*-value < 0.001	*p*-value < 0.001	Statistically significant individual or time effects are evident.
Breusch–Pagan test for monitoring heteroskedasticity	*p*-value < 0.001	*p*-value < 0.001	The residuals exhibit heteroskedasticity.
Breusch–Godfrey (Wooldridge) test for testing serial correlation	*p*-value < 0.001	*p*-value < 0.001	Serial correlation occurs in the random components.
Pesaran CD test for testing cross-sectional dependence	*p*-value = 0.41	*p*-value = 0.489	There is no observed cross-sectional dependence.
Multicollinearity			
SE unemployment	1.4056	1.4048	Multicollinearity between independent variables is not present.
SE families and children	1.1557	1.1556	
SE sickness and disability	1.2960	1.2966	
SE old age and survivors	1.1720	1.1730	
Population aged 65 and over	1.1088	1.1083	
GDP per capita	1.2127	1.1959	
Tax fifth income quintile	1.7422	1.7297	
Tax first income quintile	1.7303	1.7419	

Source: Author's own elaboration based on Eurostat (2024) data