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The Effect of Government Intervention on Income Inequality

Student name: Serry Ezbidi
Student ID number: 524393
Supervisor: Prof. Dr. Ivo J. M. Arnold

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Abstract

Whether governments can effectively reduce income inequality remains an open question due to the adverse behavioural effects triggered by redistributive policies. This paper contributes to the research by investigating income inequality in nearly 200 countries over the period 1960-2020 using the Standardized World Income Inequality Database (SWIID). It examines income inequality trends and looks at whether governments can effectively reduce income inequality. As identification strategies, it uses both fixed effects and instrumental variables models and finds that governments can indeed slightly lower inequality. It suggests that various government activities might jointly reduce inequality further than transfers-and-subsidies programs alone.

Contents

1 Introduction

Income inequality is debated and addressed increasingly in many societies. The large body of literature that has emerged since the 1970s finds that high levels of income inequality trigger adverse socioeconomic outcomes in, for example, economic growth, well-being, and social cohesion. Additionally, some scholars conclude that mental illness, drug abuse, and many other societal problems are sensitive to the scale of social stratification and the status competition reflected by material inequality in societies (Wilkinson, 2009).

Widespread concern about the adverse effects of income inequality has motivated scholars to examine the causes and determinants of cleavages in income distribution. Some of the earliest attempts begin with Kuznets, where the GDP serves as an explanation. More recent sources cite globalization, unemployment, or inflation as sources of uneven income distribution. The increases in income inequality observed over recent years among more than 70 percent of the global population (UN Department of Economic and Social Affairs, 2020) have fueled the question of what a government can do to reduce inequality. But as counteracting behavioral effects come into play, it is questioned whether government intervention can indeed reduce income inequality.

An important aspect to consider when studying the effects of government intervention on income inequality is the distinction between first-round and second-round effects. While immediate, first-round effects of monetary transfers to low-income households undoubtedly reduce post-government-intervention income inequality, one must also consider indirect second-round effects that might oppositely affect the pre-government-intervention income distribution (Doerrenberg & Peichl, 2016; Poterba, 2007). Many redistributive policies, such as an increase in transfers and subsidies, have been found to reduce the incentive to work or invest (Moffitt, 2002). Furthermore, Røed and Strøm (2002) find that adverse behavioral effects due to redistributive intervention are more prevalent at the lower ends of income levels. This means that lower-income households adversely respond to redistributive measures and reduce their labor supply more than higher-income households. Such responses increase pre-government-intervention inequality and render the question of whether governments can effectively reduce inequality an open question and empirical matter.

In this paper, I contribute to the research that tackles this question by first looking at income inequality trends in selected countries between 1960 and 2020 and then examining whether government intervention can successfully lower inequality, using data from nearly 200 countries. Specifically, I study the effects on the disposable-income Gini coefficient of two indices from the Economic Freedom of the World (EFW) database: *government size* and *transfers and subsidies*. While this paper examines the single policy variable

transfers and subsidies, it also looks at the more general effect of *government size* that includes many different areas of government activities and policies. I chose this approach because policies are frequently complementary, and looking only at separate policies might lead to untrue deductions about the role of the government in combating inequality. I thus test the hypothesis that *government size* and *transfers and subsidies* effectively reduce the disposable-income Gini coefficient. If this hypothesis holds, the study shows that first-round effects tend not to be counteracted by second-round effects.

Income inequality research is generally challenging due to the available multitude of sources that document income inequality and the variety of measures that are utilized to assess it. Ferreira, Lustig, and Teles (2015) argue that deviations in inequality databases in some country- and year cells can lead researchers to radically contrasting results about inequality. Therefore, to avoid biases toward a database, this study uses the Standardized World Income Inequality (SWIID) database that incorporates Gini estimates from many different databases and sources. SWIID displays information for 198 countries over the period of 1960 to 2020, allowing researchers to compare data between countries over time.

However – as is the case in most observational empirical studies that aim to estimate the effect of a policy on an outcome variable – this study has to be cautious of the endogeneity of the research question. While government intervention might affect inequality, the government's redistribution choice is responsive to the existing income distribution and other economic and political conditions. Meltzer and Richard (1981) use the median voter theorem to argue in their theoretical article that higher income inequality leads to more income redistribution because the median voter favors more redistribution the further away he is from the mean income. Thus, merely regressing inequality on a government's policy measures ignores that initial high inequality levels might have triggered a stronger governmental distribution response. Therefore, the mechanism of *reverse causality* makes this research especially difficult (more details are discussed in Section 5).

Several steps are taken, and multiple identification strategies are used in this paper to address the prevailing endogeneity issue. Making use of the relatively long time span of data (1960-2020), this paper exploits within-country variation in inequality- and governmental intervention measures by using both a fixed effects model and an instrumental variable model. In both identification strategies, I test the robustness of the results by gradually introducing the control variables.

The results generally confirm the hypothesis that government intervention does indeed lower income inequality. The results mostly hold in both identification strategies and are relatively robust to the control variables used. While the results hint that multiple government redistributive policies – measured by the variable *government size* – jointly might play a bigger role in reducing inequality than *transfers and subsidies* alone, no definite conclusion can be drawn because the magnitudes of the coefficients differ

across the estimation methods. However, the results could motivate researchers to look for alternative identification strategies or instrumental variables that also properly deal with endogeneity. Furthermore, the results could hint that one has to be cautious in examining single policies, such as transfers and subsidies, alone, because such policies are often complemented with other government intervention measures.

This paper is structured as follows: An overview of literature on income inequality is presented in Section 2. Section 3 explains all the data sources used in this research and displays inequality trends in selected countries from various regions of the world.[1] Section 4 explains the fixed effects and instrumental variables methodologies and the regression analyses are presented in Section 5. Section 6 presents the conclusions.

2 Literature Review

Research on income inequality is generally inconclusive because researches face a multitude of options when choosing inequality measures, relevant and appropriate data sources, control variables, and econometric estimation techniques. This section serves as a brief overview of literature on income inequality: Sub-section 2.1 provides a historical overview of data collection efforts regarding income inequality. Sub-section 2.2 discusses observed income inequality trends across various regions worldwide. Sub-section 2.3 presents the literature on the determinants of income inequality. And Sub-section 2.4 discusses the role of the government in combating income inequality by reviewing both theoretical and empirical literature.

2.1 Data Collection Efforts

The work on income inequality using modern data collection started with Kuznets in the 1950s (Kuznets & Jenks, 1953). Kuznets constructs top income shares in the United States, using the federal income taxes from the early 1910s to the late 1940s and statistical interpolation techniques, and proposes his famous inverted U-curve hypothesis. This predicts that as an economy develops, market forces first increase then decrease income inequality (Kuznets, 1955). Following in Kuznets' footsteps in the 1960s and 1970s – mainly in the United States (US), France, and the United Kingdom (UK) – scholars began to construct top wealth and income shares using inheritance declarations that date as far back as the 18th and 19th centuries (Daumard, 1973; Lindert, 1986).

Researchers face an abundance of databases and sources when aiming to research income inequality. Unlike national accounts data, income inequality falls under a wide definition, and scholars frequently disagree over how income inequality should be measured. Thus, income inequality databases utilize different

[1] The selected countries are the United States, Mexico, Argentina, Germany, Malawi, Madagascar, Iran, China, and Japan. The reasoning behind this selection is explained in sub-section 3.4.

methods and criteria to construct their data. For example, decile ratios focus on specific areas of the income distribution, while the Gini coefficient uses information from the entire distribution. Thus, more inequality in the middle of the income distribution is captured by the Gini coefficient. The 90-10 ratio captures less, because it only looks at the upper and lower deciles of the distribution (Trapeznikova, 2019). Ferreira et al. (2015) study eight widely used inequality databases and argue that there are non-negligible discrepancies between estimates that are due mainly to the tradeoff between broader coverage and comparability. They warn that different databases could lead researchers to radically different results about inequality in different countries and over different time periods.

The most widely used databases are the Luxembourg Income Study (LIS), the Penn World Table (PWT), and the World Income Inequality Database (WIID); they are further elaborated on and discussed in part 3.1.1.

2.2 Levels and Trends

The Kuznets curve is among the first attempts to make a statement about income inequality trends. Kuznets found that inequality in the US peaked in the 1890s, stayed constant for a few decades, and then declined after the 1920s (Alderson & Nielsen, 2002). Scholars globally have since heavily tested the Kuznets hypothesis and generally confirmed it for the US (Rati, 1997; Piketty & Saez, 2003) and for other industrialized societies (Lindert & Williamson, 1985; Lindert, 2000). Another recurring, wide agreement among scholars is that income inequality in the US and a number of other developed countries has increased dramatically since the 1980s. Some scholars even argue that in the mid-2000s, market disposable income inequality in the US was the highest since the 1960s, and might have been as high as during the late 1910s or 1920s (McCall & Percheski, 2010; Piketty & Saez, 2003). They find that the details differ by the measurements and units used by the different analyses.

More generally, Lindert (2000) and Alderson and Nielsen (2002) summarize the inequality experience of OECD countries and find moderate inequality until roughly the 1970s, although the timing differs across countries. This trend was followed by the great U-turn in the 1970s, when income inequality increased rapidly (Harrison, Tilly & Bluestone, 1986). Similar trends are observed in other non-OECD nations, indicating that they might be an international phenomenon (Freeman & Katz, 2007; OECD, 1995; Ram, 1997; Brandolini & Smeeding, 2009).

Castells-Quintana, Ramos, and Royuela (2015) look at 39 regions in Europe and find that income inequality generally decreased between 1996 and 2007, whereas for 29 out of the 39 regions that were analyzed, income inequality increased between 2007 and 2010. The study also points out that the more developed regions in Europe showed lower levels of income inequality.

Although reliable data is scarcely available, Bhorat, Naidoo, Odusola, Cornia, and Conceição (2017) find that the mean and median levels of income inequality in Africa are higher than in other developing regions. However, they conclude that there are no obvious trends and patterns of African inequality over time. Bhorat et al. (2017) point out that seven economies show extreme income inequality, most noticeably South Africa, which in 2020 also ranked as the most income-unequal nation in the world according to a World Bank report (Francis, Valodia, & Webster, 2020). More creatively, to overcome the problem of lacking reliable sub-national and regional income data in Africa, Mveyange (2015) uses night lights from satellite images to estimate income inequality trends. He concludes that an increase in income inequality occurred between 1992 and 2003, followed by a decrease between 2004 and 2012.

In Asia, Kanbur, Rhee and Zhuang (2014) find that 12 out of 30 developing Asian countries – accounting for 82 percent of developing Asia's population – saw an increase in income inequality in between the early 1990s and the late 2000s. In 2014, 14 Asian countries had a Gini coefficient higher than 40; most noticeably, the coefficients were 48.2 in Singapore and 46.2 in Malaysia. China showed the worst annual increase in income inequality: from 32.4 in 1990 to 43.4 in 2008 (Economic Freedom Rankings, 1970-2019).

Gasparini and Lustig (2011) review the historical income inequality trends in Latin America and conclude that inequality fell in the 1970s in several countries that include Mexico, Panama, and Columbia; but it increased in the 1980s – also known as the lost decade due to the poor macroeconomic performance in this region at the time. Moreover, Londoño and Székely (2000) find that the average top-to-bottom quintile ratio in Latin America increased from 18.0 to 22.9 between 1982 and 1991. Using population-weighted Gini coefficients, Gasparini and Lustig (2011) conclude that inequality remained relatively constant between the early 1990s and the late 2000s. Galli, Theodoridis, and Rönnbäck (2022) find that Latin America in recent decades has witnessed narrowing income-inequality indicators, but they remain high in comparison to other developing regions such as Africa.

According to these authors, income inequality seems to have generally been on the rise in the last decades of the 20th century and higher in less developed countries, but no clear overall development has been identified.

2.3 Explaining Income Inequality

What determines income inequality is a widely discussed and controversial topic. Karl Marx (1996) as early as 1867 asserted that the forces associated with capital accumulation ultimately lead to an increasing concentration of income and wealth piles among fewer and fewer people. Kuznets (1955), however, hypothesizes that innovation and competition lead to a more equal distribution of wealth and income in the long run.

The earliest attempts to explain income inequality begin with the documentation of the GDP, economic growth, and development (Kuznets, 1955; Kuznets, 1963; Jackman, 1974; Rubinson, 1976; Hewitt, 1977). Rubin and Segal (2015) deliberate whether economic growth is like "a rising tide that lifts all boats," as John F. Kennedy metaphorized in the 1960s to explain that growth is good for the rich and the poor. Ali, Tariq, and Azam Khan (2022) study six Asian countries from 1991 to 2018 and find that there is an S-shape pattern that correlates income inequality with economic growth, indicating that as an economy grows, income inequality initially increases and then decreases. Chambers (2010) studies 55 developed and developing countries at different points in time and highlights the importance of distinguishing between short-run and long-run growth. He concludes that growth in the short run (5 years) increases inequality regardless of initial development, and that growth in the long run (20 years) increases inequality in developed counties but decreases it in developing countries. Stiglitz (1996) concludes that only considering the GDP is insufficient because several Asian economies have grown from low to middle incomes while consistently reducing income inequality. Globalization is another widely blamed driver of inequality. Dorn Fuest and Potrafke (2018) and Bergh and Nilsson (2010) look at 140 countries from 1970 to 2014, and at 80 countries from 1970 to 2005, and find that globalization is especially harmful for income inequality in less-developed societies.

A new wave of research includes less traditional channels to explain inequality (Piketty & Saez, 2014). For example, Hartmann, Guevara, Jara-Figueroa, Aristarán, and Hidalgo (2017) look at economic complexity and find that countries that produce and export more sophisticated products tend to have lower income inequality in the long run than countries that produce simpler products; the authors highlight the importance of institutions that facilitate productive activities in order to achieve more equal economic outcomes. Munir and Kanwal (2020) study South Asian countries and find that an unequal distribution of education among boys and girls, especially at the primary education level, increases income inequality in the long run. Acemoglu, Naidu, Restrepo, and Robinson (2015) emphasize the role, structure, and concentration of political institutions in distributing income, and find that democracy significantly affects tax revenues as a percentage of GDP but leaves no robust effect on inequality.

Overall and roughly, these analysts have associated higher levels of economic development, education, democratization, rights, and the production of specialized goods with lower levels of income inequality, while globalization is deemed as driving income inequality in countries where these conditions are not met.

2.4 The Role of the Public Sector

Given the complexity of income inequality determinants, research on the role of the government has gained popularity, and researchers have examined government influence from both theoretical and empirical perspectives.

From a theoretical point of view, the government's role in the redistribution of wealth has been highlighted in economic social welfare theory dating back as far as Bentham (1789, 1976 and 1789, 2007) and Edgeworth (1881). The basic economic principle that drives the social welfare function of an economy and its redistribution choice is the decreasing marginal utility of income among lower-income segments of society. This means that more utility is derived from additional income when it is in the hands of the poor rather than the rich. Taxes, however, have a distortionary effect on economic agents, which makes taxes costly in terms of economic efficiency. A tax on labor income, for example, distorts a worker's choice of labor hours and tends to make one choose to work less hours than one would in the absence of labor income taxes, foregoing useful economic activity. Ultimately, the redistributive choice that a government makes relies on the marginal costs and marginal benefits valuation that is assigned to and associated with income redistribution.

In the literature, theoretical arguments for the effect of government intervention on income inequality remain mixed. Stack (1978) argues that sociology literature lacks documentation of the Keynesian perspective when discussing income inequality. He proposes the Keynesian notion that direct government involvement in the economy reduces inequality when it engages through channels such as maximizing employment and facilitating economic growth. Such a notion encourages government engagement and facilitation of economic activity to generate more-equal outcomes, rather than the direct redistribution of capital through labor income taxes that distort work incentives.

While the question of whether redistributive government spending reduces income inequality might initially seem trivial, the effect is less straightforward when examined theoretically. This becomes clearer when government spending is considered to have two effects (Chu, Davoodi & Gupta, 2000; Bastagli, Coady & Gupta, 2015): Initially, the direct, first-round effect of government cash transfers to low-income households increases their *disposable* income. The second-round effect however, captures behavioral responses to such transfers. For example, if a low-income household chooses to work less after receiving a generous cash transfer, its *market* income decreases, also decreasing its disposable income. Similarly, high-income households might choose to work less if labor taxes become too high, which in turn decreases the transfer budget received by low-income households and lowers their disposable income. Thus, second-round effects could either reinforce or counteract the first-round effect. Studying these two effects together makes the total effect of redistributive policies on inequality less obvious (Anderson, Jalles D'Orey, Duvendack, and Esposito, 2017). Furthermore, although investing in health and education does not include direct transfers, this kind of government spending can have significant second-round effects and reduce income inequality – but this is often visible only in the long run. The intuition is that through such spending, the government

invests in human capital and grants low-income individuals a more equal access to opportunities to gain better economic outcomes (Chu et al., 2000; Bastagli et al., 2012).

Additionally, two important distinctions we must make are the effects of the spending itself and of the financing of the spending. For example, in low-income countries, due to the widespread evasion of income taxes and the heavy reliance on indirect taxes, taxation tends to have a limited redistributive effect (Tanzi, 1974; Claus, Martinez-Vazquez, & Vulovic, 2012). Similarly, Easterly and Fischer (2001) find that redistributive spending that is financed through monetary expansion is frequently ineffective because the latter increases inflation, which might offset redistribution benefits.

Borrowing from political economic theory, a few points can be addressed. Milanovic (1994) highlights the importance of addressing the targeting of government spending when discussing its effect on income inequality. He finds that for political economy reasons, spending is frequently captured mainly by the middle class and leaves inequality largely unaffected. Similarly, Tanzi (1974) and Asawanuchit, Davoodi, and Tiongson (2003) find that the benefits of health and education spending tend to be captured largely by middle-income groups in urban areas, as seen in many developing countries.

Research on the effect of government policies on income inequality is characterized by a range of theoretical difficulties. Endogeneity due to reverse causality and simultaneity are among the most challenging concerns.[2] It is logical to assume that countries with high levels of income inequality may choose to increase government spending, for example. Borrowing from the median voter theorem: the further away the median income is from the mean income, the more the median voter favors redistribution. Thus, in a democracy, the government will ultimately respond to the needs of the median voter and choose to redistribute more. Even in non-democracies, through channels such as revolutions and social uprising, governments might be forced to redistribute wealth more in cases of extreme inequalities (Doerrenberg & Peichl, 2014). Ultimately, given the multitude of theoretical factors that affect the effect of government spending on income inequality, the solutions to this question remain empirical matters.

Although there is widespread interest in government effects on income inequality, the findings remain largely inconclusive. This is mainly due to differences in inequality sources and measures, control variables included, and in the estimation methods used. Anderson et al. (2017) conduct a meta-regression analysis by looking at over 900 estimates that have been drawn from 84 separate studies that examine one or more measures of government spending, utilizing one or more measures of income inequality. They find that higher government spending moderately decreases income inequality. Furthermore, they add that there seems to be a publication bias, because negative coefficients (that indicate that more government

[2] Section 4 further elaborates on endogeneity and reverse causality problems.

involvement leads to lower levels of income inequality) are underreported in the literature. This finding further highlights the scientific relevance of this paper's research question.

Although research on income inequality and government exists, to my knowledge few papers account for the endogeneity problem and claim to estimate a *causal* effect of government intervention or size on inequality. Aristei and Perugini (2014) study the effect of government reform and transition patterns on income inequality in 27 countries, using a General Method of Moments (GMM) model. They find that balanced and coordinated government transitions have contained inequality better than transitions that focused solely on privatization and trade liberalization. Guzi, Kahanec, and Kureková (2018) look at data from 30 European countries between 2004 and 2015 and use the number of political parties in the ruling coalition as an instrument to estimate the effect of government size on inequality. They find that a one-percent increase in government expenditure decreases the Gini index by 1 percent. Doerrenberg and Peichl (2014) address the underlying problem of endogeneity in their research that studies OECD countries from 1981 to 2005.[3] They use a fixed-effects model and an instrumental variable approach in their empirical framework, and find that a one-percent increase in government spending decreases inequality by 0.3 percent, and that tax progressivity has no effect on income inequality (Doerrenberg and Peichl, 2014). Furthermore, they conclude that their results might be driven by tax progressivity triggering stronger second-round behavioral responses that increase pre-fiscal income inequality and thereby offset the first-round effects of redistribution. Unlike much of the literature, Doerrenberg and Peichl (2014) address the endogeneity issue and clarify possible shortcomings of their design.

2.5 Contribution to the Literature

This paper contributes to the literature that addresses the issue of reverse causality in the research question by using a design similar to that of Doerrenberg and Peichl (2014). However, while Doerrenberg and Peichl only use OECD countries in their analysis to justify the consistency and homogeneity of data sources, I believe that their results therefore risk being specific to OECD and relatively highly developed countries. Thus, I look at the largest number of countries possible by using more, newer, and high-quality data while controlling for possible confounding variables, as further discussed in the Data and Methodology sections.

3 Data

This section describes the dataset used in this paper. An overview of all the employed variables can be found in the descriptive statistics in Table A1 in the Appendix. The measure and the source for each variable

[3] This study follows the approach taken by Doerrenberg and Peichl (2014) but uses data collected over a longer time span and on a wider sample of countries. See Section 2.5.

are discussed below, starting with income inequality, followed by government spending and the control variables.

3.1 Income Inequality

As briefly introduced in the literature review, researchers faced many options to measure and document income inequality. A data source widely and repeatedly used in income inequality-related literature is the Luxembourg Income Study (LIS) that began in 1983 and spans four decades. The LIS collects surveyed household-level harmonized microdata on about 50 high-and middle-income countries and is intended for cross-national research (Gornick, 2014). Similarly, the Penn World Table focuses heavily on purchasing-power parities; it also is frequently used to make income comparisons between countries and to draw conclusions on purchasing-power adjusted income inequality within and between countries (Dowrick & Akmal, 2005). Another widely used source is the World Income Inequality Database (WIID) that with over 20,000 data points provides the largest coverage of data. The WIID reports inequality series and data quality from many different sources, sometimes giving several estimates per country and year (UNU-WIDER, 2021).

Even though both the LIS and WIID databases are widely used in the literature, they are not suitable for answering the research question of this paper. The LIS database critically assesses the quality of data and includes only observations that are comparable across countries (Ravallion, 2015). This, however, limits the data coverage to about fifty countries at the time of writing, making the sample size too small. The WIID includes data on over 200 countries, but the country observations are comparable not with each other nor over time (Gradín, 2021). In this paper, I use the Standardized World Income Inequality Database (SWIID) by Fredrick Solt (2021) in the version 9.2. SWIID covers 198 countries, provides data collected from 1960 to 2020, and maintains a high level of data quality and comparability by standardizing the data according to the LIS. Solt not only includes data from hundreds of different published sources (such as OECD, UN, Eurostat, World Bank, and country-specific databases) but also estimates a relationship between these datapoints and the LIS datapoints. Moreover, missing values in the LIS are predicted by using the estimated relationship between the datasets.

To assess inequality, I use the disposable income inequality Gini coefficient; it is the most widely used inequality measure and therefore frequently provides the widest available data coverage. Furthermore, unlike the Palma Ratio or other decile ratios that cover specific parts of the income distribution, the Gini coefficient covers the entire income distribution. The Gini coefficient measures the area under the Lorenz curve and is expressed on a 0-1 scale, where 0 indicates perfect equality and 1 indicates perfect inequality. In this paper, as common in the relevant literature, the Gini coefficient is presented on a 0-100 scale.

3.2 Independent Variables of Interest

The two independent variables of interest used in this paper are *government size* and *transfers and subsidies*. These two variables are retrieved from the Economic Freedom of the World (EFW) database published by the Fraser Institute (Economic Freedom Rankings, 1970-2019). This database includes five major areas that determine the degree of economic freedom in a country, with the collected data including 162 countries and spanning the time period from 1970 to 2019. Each major area is constructed by using multiple components. For the purpose of this paper, I focus only on the first major area: *government size*. However, as *transfers and subsidies* is one of the components used to construct *government size*, it is included as an independent variable in this paper.

3.2.1 Government Size

Government size, the first major Area of the EFW database, indicates to what extent the government intervenes in economic market outcomes. This indicator is constructed by using five components that come from different sources: government consumption, transfers and subsidies, government enterprises and investment, top marginal tax rate, and state ownership of assets. Each of these components is rated on a 0-10 scale that follows the actual distribution of the raw data, and a lower rating is given to countries with high government involvement. The ratings are then aggregated to construct the *government size* indicator, where equal weighing is given to the individual ratings of the five components. The resulting rating of *government size* is also presented on a 0-10 scale and can be compared over time and across countries. For the purpose of this paper, I reverse the ratings in such a way that countries with higher government involvement receive a higher rating on a scale of 0-100. This allows for an easier interpretation of the results in this paper because the Gini-coefficient is also expressed on a 0-100 scale. Table 1 shows the components of the *government size* indicators indicates their sources, and provides a short description for each component. The Component *transfers and subsidies* is itself used as an independent variable (see following section).

Table 1. Description of the Components of Government Size Indicator

Component	Source	Description
Government consumption	World Bank	General government consumption and spending as a percentage of total consumption; the variable is then rated, compared to other countries, and measured at a 0-100 scale
Transfers and subsidies[4]	IMF	General government transfers and subsidies as a share of GDP, ranked and measured on a 0-100 scale

[4] Used also as an independent variable; see section 3.2.2

Government enterprises and investment	IMF	Government investment as a share of total investment, ranked in bins on a 0-10 scale
Top marginal tax rate	PricewaterhouseCoopers	Based on two sub-components[5]
State ownership of assets	V-Dem Institute	Based on ratings from the Varieties of Democracy database.[6]

3.2.2 Transfers and Subsidies

Among the components of the *government size* indicator, I use *transfers and subsidies* as a separate explanatory variable in this paper because transfers and subsidies present a large proportion of the government expense in many countries (71 percent in the US in 2020 according to the World Bank).

As described in Table 1, this component reflects general government transfers and subsidies as a share of the GDP. Then, as described in Section 3.2.1, the component is rated on a 0-10 scale that mirrors the actual distribution of raw data. Specifically, the rating is equal to: $(V_{max} - V_i)/(V_{max} - V_{min})$ multiplied by 10. V_i is equal to the country's actual general government transfers and subsidies as a share of GDP, and V_{max} and V_{min} are set at 40 and 6 respectively, according to the data obtained in 1990.[7] In this way, the closer the transfer sector in a country moves to the country with the largest transfer sector, the closer the rating approximates zero. Similar to *government size*, I mirror the data such that more transfers and subsidies receive a higher rating and utilize a scale of 0-100.

3.3 Control Variables

Four control variables which are likely to affect both income inequality as well as *government size* and *transfers and subsidies* are included. Similar to Doerrenberg and Peichl (2014), GDP per capita and unemployment are used. Furthermore, Acemoglu et al. (2005) discuss theoretical reasons why democracy is expected to affect a governments' redistribution choice in efforts to reduce income inequality Therefore, two control variables that are reflective of democracy and rights and legislations are used.The first variable is *representative government*, labeled as *democracy* in my dataset, which indicates the level of competition and inclusivity in popular elections of legislative and for directly or indirectly elected executives. This

[5] Based on two sub-components: *top marginal income tax rate* and *top marginal income and payroll tax rates*; the final rating for the *top marginal tax rate* is based on the matrix in Table 2 Section B of the Appendix in this paper. Retrieved from Economic Freedom Rankings (1970-2019, https://www.fraserinstitute.org/sites/default/files/economic-freedom-of-the-world-2019-appendix.pdf)

[6] According to Varieties of Democracy (2022, pg. 2), the rating "gauges the degree to which the state owns and controls capital (including land) in the industrial, agricultural, and service sectors. It does not measure the extent of government revenue and expenditure as a share of total output; indeed, it is quite common for states with expansive fiscal policies to exercise little direct control (and virtually no ownership) over the economy."

[7] The authors of the EFW user guide do not explain the reasoning behind specifically choosing 1990 as a base year.

variable is derived from the Global State of Democracy Indices. The second variable, *fundamental rights*, reflects the liberal and egalitarian democratic theories and indicates citizens' individual liberties and access to resources. Both control variables are based on sub-attributes that are aggregated into a contestation index by using a Bayesian factor analysis (BFA). Whereas in the literature both control variables are rated on a 0-1 scale, for easier interpretation, I transform the scale by multiplying it by 100. I make use of the Penn World Tables to control for the *expenditure-side real GDP per capita* (measured at current PPPs in 2017 US dollar prices). The *unemployment rate* is taken from the International Labour Organization (2020).

For more details and insight on the data included in the sample, see Table A1 in the Appendix; Table A2 shows the correlation between the variables used in our sample.

3.4 Income Inequality Trends

To compensate for the above-mentioned lack of consensus on the direction of income inequality trends in the literature (due to the use of different inequality sources and measures), this sub-section describes some statistics on the Gini-coefficient of the sample that is used in this paper and presents some trends in income inequality.

Table A1 (see Appendix) indicates that the average value of the Gini coefficient in the sample is about 38, and shows some other relevant statistics. Table A3 (below) lists the five countries with the lowest and highest mean income inequality in the sample. Most interestingly, Namibia shows higher average income inequality than South Africa. This contradicts the literature that has deemed South Africa as the most unequal country over the last few decades.

In the dataset, some years have received more income inequality observations than others. Thus, attempts to look at the inequality trend by using the entire dataset would make findings inconclusive. Therefore, and for brevity, I have selected countries that show income inequality observations over many years, including a country from every region of the world. I am including China, even though it has fewer observations than the other countries included, because it has the highest within-country increase in the Gini coefficient. The resulting trends are shown in Figure 1:

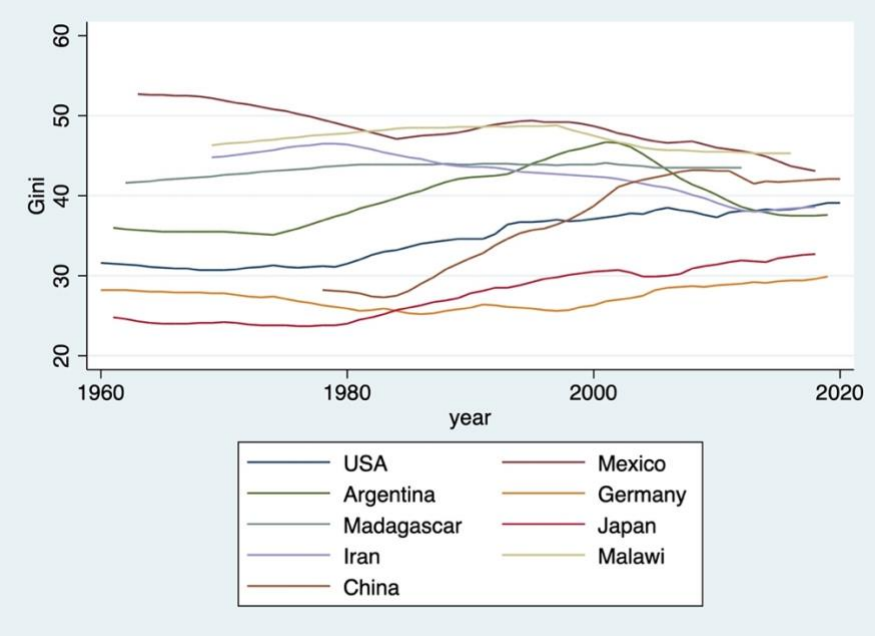

Figure 1: Income inequality trends for selected countries

Figure 1 indicates that the notion that inequality has increased since the 1980s, as prevalent in the literature, seems to be true for most countries examined here. In the US, the Gini coefficient roughly increases from roughly 30 in 1980 to nearly 40 in 2020. Interestingly, Japan shows a trend that is lower and parallel to that of the US. In Germany, income inequality seems to remain relatively unchanged. The Gini coefficient decreases slightly in the late 1970s, but increases slightly in the early 2000s. Furthermore, income inequality seems to decrease in the late 1990s in Malawi, but remains relatively constant in Madagascar. In the dataset used, China has the highest within-country increase in inequality and one of the highest increases in GDP per capita. However, Mexico and Iran show a significant decrease in the Gini coefficient, while also having one of the highest within-country increases in GDP per capita[8]. This confirms that only looking at the GDP while explaining income inequality is insufficient.

4 Methodology

To measure the effect of government consumption on income inequality, two main methodologies are used. First, I conduct a country-specific fixed-effects regression, then I implement an instrumental-variables model similar to that of Doerrenberg and Peichl (2014).

[8] The details regarding GDP per capita trends are not presented in this paper because they are not the main focus and their inclusion goes beyond the scope of this study. Interested readers can check these trends at the SWIID.

4.1 Fixed Effects Model

First, a Hausmann test has been conducted to select whether the fixed effects model or the random effects model better fits the data. The Hausmann test examines whether the covariance between the regressor variables and individual effects is zero, and thus hints at whether the unobserved heterogeneity between countries is random or systematic. In other words, it tests whether the variation across countries is random and uncorrelated with the regressors, or whether there are systematic unobserved differences between countries that lead to different inequalities. The p-value of the Hausman test is smaller than 0.05 (see Table B1 in the appendix), rejecting the null hypothesis that the individual variation between countries is random and indicating that random effects is the preferred method. Thus, the fixed-effects model was chosen as the preferred method for this research.

Using the fixed effects model also makes intuitive sense because it can be argued that unobserved time-invariant, country-specific characteristics can affect income inequality. Such characteristics could be specific cultural norms and views regarding a socially acceptable level of inequality. For example, the caste system in India deems inequalities socially acceptable and tolerable (Thorat & Newman, 2007), whereas in Nordic countries high inequalities are much less tolerated or socially accepted. Such a cultural difference is unobserved and can be considered to be time-invariant because such norms require a larger timeframe than the one considered in this paper to be susceptible to large variation.

The relevant equation for the fixed effects model is as following (Equation 1):

$$Gini_{i,t} = \beta_1 Gov_{i,t-1} + \beta_2 c_{i,t-1} + \gamma_t + \mu_i + \varepsilon_{i,t} \quad (1)$$

where $Gini_{i,t}$ is the disposable income inequality in country *i* at time *t* measured by the disposable income Gini coefficient; $Gov_{i,t-1}$ is the lagged independent variable of interest, namely either *government size* or *transfers and subsidies*; $c_{i,t-1}$ is a vector of the multiple control variables; γ_t is the time fixed effect; μ_i is the country fixed effect; and $\varepsilon_{i,t}$ is the error term. β_1 is the coefficient of interest, and β_2 is a vector of the control variable coefficients.

In an attempt to tackle the underlying problem of endogeneity, mentioned in Section 2, the model as in Equation (1) takes several steps to overcome biases. First, four control variables (*democracy* and *fundamental rights*, see Data Section) that affect income inequality and are also correlated with government spending are introduced. These controls aim to alleviate some of the omitted-variable bias from the results. Nevertheless, caveats remain whether the error term ε is independent of all confounding variables. Because the Hausman test indicates that the fixed-effects model is preferred and it makes intuitive sense to assume systematic differences in inequality, country-fixed effects are added to the regression. Thus, only within-country variation is exploited in this model, and if there is any systematic difference in the measurement of

inequality between countries, it is also accounted for. Additionally, if the reverse causality within a country is systematic, then it is controlled for with the country-fixed effects. Time-fixed effects are also added to the regression, to control for common global trends and certain shocks that might affect income inequality, such as the 2008 financial crisis or, more recently, the coronavirus pandemic. Lastly, to further reduce reverse causality bias, government consumption and the controls are lagged by one year in the regression. This is done because I expect the policies in year $t-1$ to have an effect on income inequality in year t. With such additions, the endogeneity problem is somewhat reduced.

However, even with the adjustments that are made to the model by adding control variables, fixed effects, lagged variables, endogeneity, and reverse causality remain issues of caution. It can be expected that even after accounting for fixed effects, a random positive shock to the demeaned idiosyncratic error term $\varepsilon_{i,t}$ in Equation 1, increasing income inequality, is likely to trigger a response from the government to attempt reducing income inequality. Thus, an instrumental-variable model is estimated to exploit variation that is exogenous to the idiosyncratic error term $\varepsilon_{i,t}$, after conditioning on a set of control variables. The instrumental variables model aims to present a less biased estimate for the effect of government intervention on income inequality.

4.2 Instrumental Variable Model

The second specification model used in this paper is a two-stage least-squares model (2SLS) with an instrumental variable. Not surprisingly, finding an instrumental variable is a difficult task because ideally, the instrument would have to be randomly assigned to some observations in the dataset, creating a quasi-experimental environment where a causal effect can be plausibly identified. However, the government intervention variables, namely *government size* and *transfers and subsidies*, are unlikely to be chosen at random by countries and potentially correlated with income inequality. Thus, these variables are endogenous to the model. Therefore, creative efforts have to be made to search for an instrument that mimics an exogenous effect on government policies that is uncorrelated with income inequality. Similar to the methodological design of Doerrenberg and Peichl (2014), I use the GDP growth rate to extrapolate *government size* and *transfers and subsidies* and then use the extrapolated values as an instrument. More specifically, the instrumental variable (IV) takes the initial values of *government size* and *transfers and subsidies* for each country at the earliest observation (1960 for most countries), and then grows with the growth rate of the GDP per capita. The instrumental variables are labelled *extrapolated government size* and *extrapolated transfers and subsidies*.

The relevant first stage equation reads (Equation 2):

$$\overline{Gov}_{i,t} = \alpha_1 Ext_{i,t} + \alpha_2 c_{i,t} + \gamma_t + \mu_i + \epsilon_{i,t} \qquad (2)$$

where $\overline{Gov}_{i,t}$ is either predicted values of *government size* or *transfers and subsidies; $Ext_{i,t}$* is one of the instrumental variables, namely *extrapolated government size* or *extrapolated transfers and subsidies*; $c_{i,t}$ is the vector of control variables; γ_t and μ_i are the time- and country-fixed effects, respectively; and $\epsilon_{i,t}$ is the error term.

The second stage equation is (Equation 3):

$$Gini_{i,t} = \beta_3 \overline{Gov}_{i,t} + \beta_4 c_{i,t} + \gamma_t + \mu_i + \varepsilon_{i,t} \qquad (3)$$

where β_3 is now the coefficient of interest, and all other coefficients and variables are the same as in Equations (1) and (2).

For the IV method to be plausible, a number of assumptions have to be satisfied. First, the IV is based on extrapolated figures after they have been conditioned on control, time, and country-fixed variables, and is thus in a sense exogenous. Of course, it is plausible to assume that a correlation might exist between the GDP growth rate used for extrapolating the IV and income inequality. However, since the GDP per capita is added, among other variables, to the control variables in both stages, it becomes more plausible to assume that the exclusion assumption holds and that the *extrapolated government spending* is uncorrelated with *income inequality*, meaning that $Cov(Ext_{i,t}, \varepsilon_{i,t}) = 0$. Second, the data shows a high correlation between the observed actual government spending and the extrapolated government spending, giving reason to assume that the relevance assumption holds, and showing that $Cov(Ext_{i,t}, x_{i,t}) \neq 0$.

5 Results

This section is divided into three parts. Section 5.1 explores the basic relationship between income inequality and the variables of interest in our sample and then control for fixed effects. Section 5.2 discusses the fixed-effects model results, and Section 5.3 discusses the results of the instrumental variables model.

5.1 Preliminary Results

To get an intuition of the relationship between income inequality and the government intervention variables *government size* and *transfers and subsidies*, I first look at their correlation. I furthermore utilize the maximum number of observations possible to make a statement about the relationship between income inequality and these variables. Figure B1 in the Appendix shows a scatter plot of the Gini coefficient, with *government size* on the left and *transfers and subsidies* on the right graphic. The variables represent the average value over time by country. While these scatterplots hint at a potentially negative relationship, especially for *transfers and subsidies*, not much can be derived from them to answer the research question.

To get a step closer to an answer, Figure B2 in the Appendix shows two plots with demeaned variables. Therefore, the correlations in a sense control for country- and time-fixed effects. The plots show a negative

correlation between the demeaned Gini coefficient and both demeaned variables of interest. For *government size*, the correlation is -0.030, and for *transfers and subsidies* it is -0.037. Both correlations are statistically significant, with a high t-value.

5.2 Fixed Effects Model

Table 2 shows the results for the fixed effects model.

Table 2. Fixed effects model regression results

	(1)	(2)	(3)	(4)
Variables	Gini	Gini	Gini	Gini
Gov't size	-0.221***	-0.476***	-0.458***	-0.521***
	(0.045)	(0.083)	(0.083)	(0.102)
ln GDP per capita	-.11	-1.004***	-.991***	-1.466***
	(.156)	(.305)	(.305)	(.345)
Rights		-.071***	-.096***	-.113***
		(.016)	(.021)	(.024)
Democracy			.018**	.011
			(.009)	(.01)
Unemployment				.133***
				(.023)
_cons	36.829***	47.387***	48***	51.747***
	(1.361)	(2.822)	(2.835)	(3.477)
Observations	2828	1159	1159	913
R-squared	.112	.212	.215	.33
Transfers and subsidies	-.101***	-.081***	-.079***	-.048**
	(.013)	(.02)	(.02)	(.022)
ln GDP per capita	-.234	-.599**	-.654***	-1.241***
	(.149)	(.233)	(.232)	(.264)
Rights		-.025*	-.077***	-.076***
		(.014)	(.019)	(.021)
Democracy			.032***	.029***
			(.009)	(.01)
Unemployment				.132***
				(.022)
cons	40.32***	45.071***	46.974***	49.85***
	(1.317)	(2.118)	(2.168)	(2.537)
Observations	2567	1130	1130	918
R-squared	.117	.193	.204	.302

Notes: The dependent variable is the Gini coefficient on a 0-100 scale. The government intervention variables are also on a 0-100 scale. The method of estimation is fixed-effects OLS. Regressions are based on equation 1. All independent variables are lagged by 1 year. Country and time fixed effects are included but not displayed. The standard errors in parenthesis and are country clustered.
*** p<.01, ** p<.05, * p<.10

Each column in the table adds an additional control variable to the model. The results seem relatively robust to the control variables added. The findings hint that governments indeed play an important part in reducing

income inequality. *Government size* seems to play a more significant role in reducing income inequality than *transfers and subsidies*. Although the estimates of the two variables of interest do not allow for an elasticity interpretation, it is still possible to compare the results in terms of magnitude and size between the two variables of interest because both are measured and ranked on the same scale. Roughly speaking, the results show that a 1-unit increase in *government size* or *transfers and subsidies* leads to a 0.5 or 0.08 decrease in the Gini coefficient, respectively. Furthermore, the coefficient estimates for the variables of interest are mostly significant and have enough statistical explanatory power to reject the null hypothesis that the coefficients are equal to zero. The results thus might indicate that transfers and subsidies alone trigger more detrimental behavioral labor responses that affect pre-fiscal income inequality than such measures combined with other government intervention.

The coefficients of the control variables mostly significant and point in the expected directions. The GDP per capita has roughly a coefficient of 1. Because the natural logarithm of the GDP is taken, the interpreted conclusion is that a one-percent increase in the GDP per capita leads to a 0.01 reduction in the Gini coefficient. *Rights* has a negative coefficient, and higher *unemployment* seems to increase income inequality. Surprisingly, *democracy* seems to slightly increase inequality, but the estimate is statistically insignificant from zero.

5.3 Instrumental Variable Model

Table 3 shows the first-stage results for the government intervention coefficients in the instrumental variable model. Tables C1 and C2 in Section C in the Appendix show the full models, including the first-stage regressions.

Table 3. Instrumental variable regression results

	(1)	(2)	(3)	(4)
Variables	Gini	Gini	Gini	Gini
Gov't size	-.036***	-.056***	-.056***	-.06***
	(.006)	(.011)	(.011)	(.013)
ln GDP per capita	.119	-.075	-.101	-.514**
	(.128)	(.217)	(.216)	(.252)
Rights		-.041***	-.081***	-.087***
		(.013)	(.019)	(.021)
Democracy			.025***	.017*
			(.009)	(.01)
Unemployment				.142***
				(.022)
_cons	43.823***	33.671***	34.656***	36.04***
	(1.163)	(2.047)	(2.073)	(2.607)
Observations	2955	1225	1225	959
R-squared	.967	.957	.957	.961

Transfers and subsidies	-.092***	-.063***	-.061***	-.027
	(.013)	(.02)	(.02)	(.021)
ln GDP per capita	-.228	-.58***	-.636***	-1.212***
	(.144)	(.224)	(.223)	(.251)
Rights		-.023*	-.075***	-.076***
		(.013)	(.019)	(.02)
Democracy			.033***	.029***
			(.008)	(.009)
Unemployment				.129***
				(.021)
_cons	49.237***	41.845***	43.199***	46.014***
	(1.244)	(2.054)	(2.071)	(2.476)
Observations	2567	1130	1130	918
R-squared	.137	.157	.159	.261

Notes: The dependent variable is the Gini coefficient on a 0-100 scale. The government intervention variables are also on a 0-100 scale. Regressions are based on equation 3. Control variables are included in the first-stage regression (not displayed), and country and time fixed effects are included in both stages of the model (not displayed). The standard errors in parenthesis and are country clustered. *** p<.01, ** p<.05, * p<.10

For *government size*, the coefficient becomes less negative in this setting when compared to the previous model, as it fluctuates around roughly -0.05, depending on the controls added. The coefficients all remain significant however. For *transfers and subsidies*, the coefficient remains relatively close to the estimate in the fixed-effects model and is roughly -0.07, but it becomes not significantly different from zero when all the control variables are added.

The results again show that *government size* and *transfers and subsidies* both seem to have inequality-reducing effects. It seems that *transfer and subsidies* have a more negative coefficient in this model than *government size* when coefficients are significant. However, the coefficient of *transfers and subsidies* in column 4 might indicate that significant coefficients suffer from negative omitted variable bias and that the effect in reality is closer to zero. The effect of *government size*, however, seems to be relatively robust to the control variables added. Thus, it is difficult to conclude that *transfers and subsidies* reduce inequality more than *government size*. The results for the control variables are similar to the results for the fixed-effects model.

6 Discussion and Conclusion

This paper uses a panel of data from roughly 200 countries, collected over the years 1960 to 2020, to examine the effect of government intervention on disposable income inequality. Section 3 of this paper examines countries from various regions globally and verifies the notion, prevalent in the literature, that income inequality has increased in many countries, especially since the 1980s. This finding justifies the widely held debates in recent decades and verifies the political importance of addressing the increasing income inequality in many societies.

Ideally, a quasi-experimental setup is required to estimate the *causal* effect of government intervention on income inequality, where different redistributive measures are randomly assigned to different countries. However, not surprisingly and similar to most country-level studies, such a design is nearly impossible to achieve. In my design, I identify potential sources of endogeneity and take several steps to tackle it. I use the indices *government size* and *transfers and subsidies* as a proxy for government intervention to estimate the effect on the disposable income Gini coefficient, and I implement fixed-effects and instrumental variable models for my estimation.

In the fixed effects model, I control for time- and country-fixed effects, and assume a lagged response in the Gini coefficient to government intervention. This controls for any reverse causality mechanism but only if it is systematic, such that the level of inequality might affect government intervention in a systematic way. However, there is reason to believe that the reverse causality might not be systematic. For example, it could be that income inequality in year $t-1$ affects government intervention choices in year t in a non-systematic way.

This potential non-systematic phenomenon makes it necessary to also control for lagged values of income inequality. The most commonly used way of dealing with such a problem is to control for the lagged dependent variable in a Generalized Method of Moments (GMM) model, as suggested by Arellano and Bover (1995). However, to use this method, the 'weak exogeneity' assumption must be met that allows for independent variables to be correlated with past and current values of the error term, but not with future values of it. In this study's setting, this would mean that the GMM model is valid only if expected future values of income inequality do not affect current government intervention. Assuming weak exogeneity is difficult because it is logical to assume that governments might want to combat an anticipated shock in inequality with current policies. Therefore, implementing a GMM model would not be appropriate, and other estimation methods must be explored.

In the second, the instrumental variable model, I extrapolate government intervention values by using the growth rate of the GDP as an instrument. The validity of the instrumental variable model needs to be approached intuitively. The model assumes that the instrument affects income inequality only through the independent variable of interest, after adding control variables and controlling for country- and time-fixed effects. Because the instrument used in this paper is extrapolated by using the growth rate of the GDP, it is not directly related to income inequality. Of course, it is logical to assume that the GDP has some effect on income inequality, but it is controlled for in both stages of the model. Thus, the instrument exploits some exogenous variation, and the endogeneity problem is to some extent tackled.

The results of the paper hint that government intervention does indeed lower income inequality. Across both identification methods, and regardless of the control variables added, the coefficients of *government*

size are *transfers and subsidies* are all negative and are mostly statistically significant. The coefficients can be interpreted as the effect of a 1 unit increase on a 0-100 ranking scale in the variable of interest on the Gini coefficient (also on a 0-100 scale). Roughly speaking, the coefficients of *government size* are -0.5 and -0.05 for the fixed effects model and the instrumental variable model respectively. For *transfers and subsidies*, the coefficients are roughly between -0.10 and -0.05 in both models, but they are sometimes insignificantly different from zero.

The results are mixed, which on the one hand could indicate that there remains some doubt as to whether the models address endogeneity sufficiently. On the other hand, the results could also suggest that government size has a more significant effect in its efforts to reduce income inequality than transfers and subsidies: while the coefficients of *transfers and subsidies* seem to be slightly more negative than the coefficients of *government size* in the instrumental variable model, the former are sometimes insignificant. In that case, our results would follow Stack's (1978) Keynesian intuition that the government's role should be to facilitate full employment and economic growth in order to achieve a more equal income distribution, rather than directly redistributing income through transfers and subsidies. The results suggest that cash-transfer programs trigger stronger adverse second-round effects and distort economic agents more than the effect of the overall role of the government. However, the results could also indicate that transfers and subsidies are targeted inefficiently and mainly captured by the middle class for political economy purposes, as argued by Milanovic (1994).

Research on income inequality heavily influences policy makers because societal economic inequality carries increasingly important political implications. Therefore, the research question explored in this paper requires further attention. I encourage research to take into account all government redistributive activities when assessing the effect of one (or multiple) redistributive policies because such policies are often complementary. Furthermore, I urge future researchers to further address the issue of *causal* identification.

Appendix

Section A – Data and statistics

Table A1. Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Gini						
	overall	38.384	8.695	17.1	66.4	N=5228
	between		8.243	23.367	65.796	n=167
	within		1.905	28.691	48.469	T-bar=31.305
Government size						
	overall	33.0748	12.101	4.900	88.5	N=3881
	between		10.156	10.948	59.105.052	n=161
	within		8.860	8.860	77.635	T-bar=24.106
Transfers and subsidies						
	overall	22.830	20.807	0	100	N=3237
	between		19.228	.456	71.686	n=153
	within		6.934	-22.00071	72.814	T-bar=21.157
GDP per capita						
	overall	13286.22	19572.83	242.201	3.04E+05	N=10399
	between		16859.01	741.247	1.44E+05	n=183
	within		10817.51	-6.43E+04	1.73E+05	T-bar=56.825
Rights						
	overall	57.502	18.602	16.479	92.888	N=7231
	between		16.977	25.402	91.434	n=67
	within		7.641	19.841	79.112	T-bar=41.537
Democracy						
	overall	51.487	29.212	0	94.55	N=7240
	between		24.327	0	86.921	n=67
	within		15.952	-18.907	91.441	T-bar=41.537
Unemployment						
	overall	8.008	5.802	0.05	38.8	N=5207
	between		5.863	0.409	30.456	n=178
	within		3.167	-8.273	28.092	T-bar=22.854

Table A2. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Gini	1.000						
(2) Government size	-0.455	1.000					
(3) Transfers and subsidies	-0.687	0.605	1.000				
(4) GDP per capita	-0.455	0.373	0.500	1.000			
(5) Rights	-0.555	0.199	0.598	0.544	1.000		
(6) Democracy	-0.178	-0.108	0.366	0.235	0.744	1.000	
(7) Unemployment	0.111	-0.012	0.080	-0.223	-0.019	-0.029	1.000

Table A3. List of Highest and Lowest Inequality Countries

Lowest inequality		Highest inequality	
Country	Gini	Country	Gini
Finland	23.280	Namibia	65.796
Denmark	23.789	South Africa	61.191
Slovakia	23.866	Botswana	57.910
Slovenia	24.104	Comoros	54.864
Sweden	24.202	Zambia	54.079

Section B – Preliminary results

Table B1. Hausman Specification Test

	Coef.
Chi-square test value	23.017
P-value	.002

Notes: the null hypothesis is that random effects is the preferred model

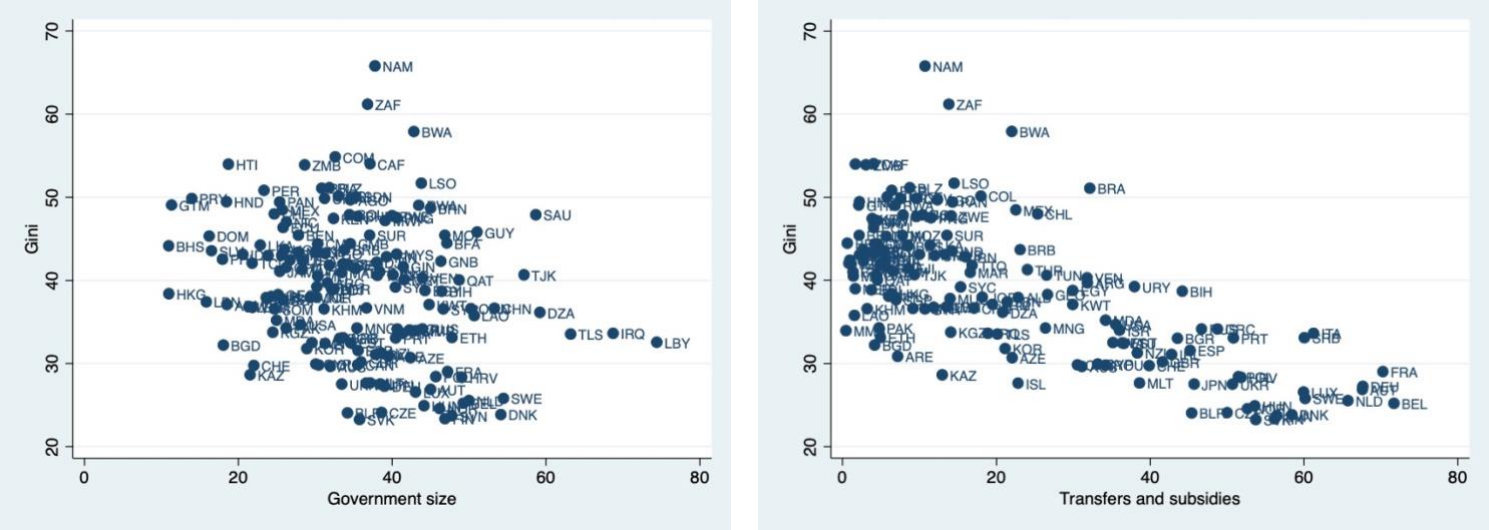

Figure B1. Scatter Plot of Gini vs *Government Size* (left) and *Transfers and Subsidies* (right)[9]

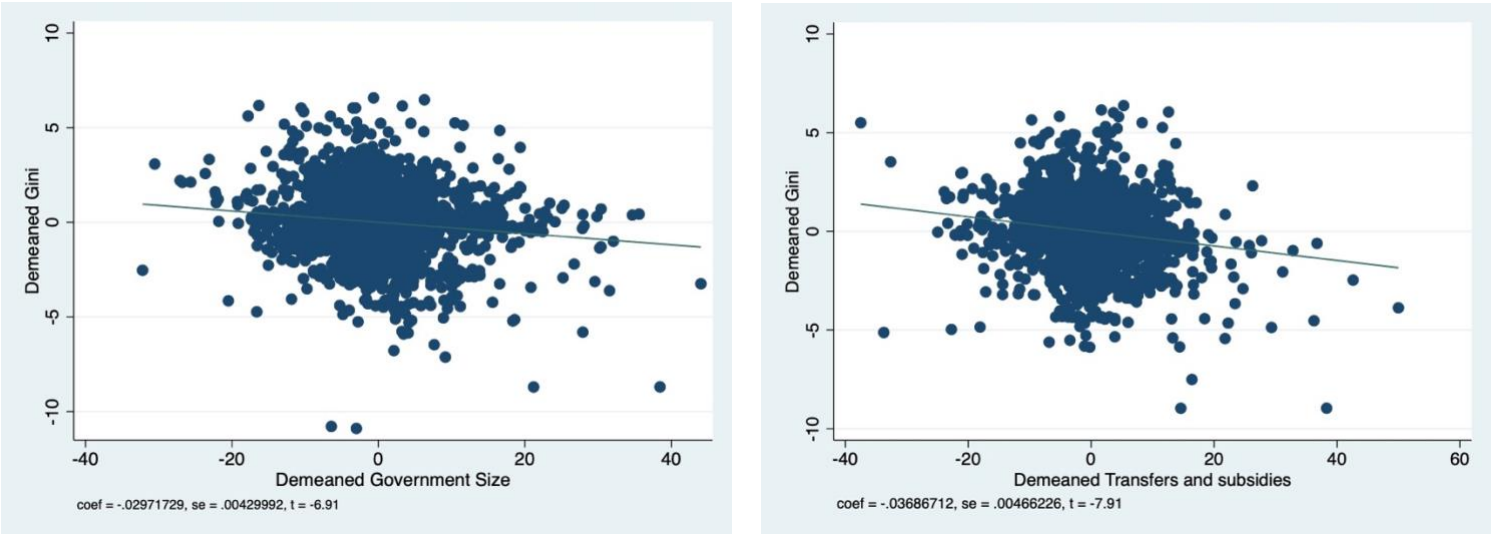

Figure B2. Added Variable Plot of Gini vs *Government Size* (left) and *Transfers and Subsidies* (right)[10]

[9] Average values over time of *Gini*, *Government size*, and *Transfers and subsidies* are used.
[10] A correlation plot of the residuals after accounting for country and time fixed effects. Other control variables are not accounted for.

Section C – Instrumental Variables Results

Table C1. Effect of Government Size on Income Inequality IV Results (showing first-stage results)

	(1)	(2)	(3)	(4)
	Gini	Gini	Gini	Gini
Gov't size	-.036***	-.056***	-.056***	-.06***
	(.006)	(.011)	(.011)	(.013)
ln GDP per capita	.119	-.075	-.101	-.514**
	(.128)	(.217)	(.216)	(.252)
Rights		-.041***	-.081***	-.087***
		(.013)	(.019)	(.021)
Democracy			.025***	.017*
			(.009)	(.01)
Unemployment				.142***
				(.022)
_cons	43.823***	33.671***	34.656***	36.04***
	(1.163)	(2.047)	(2.073)	(2.607)
Observations	2955	1225	1225	959
R-squared	.967	.957	.957	.961

First stage results	(1)	(2)	(3)	(4)
			Government size	
Extrapolated gov't size	.565***	.548***	.549***	.545***
	(.008)	(.013)	(.013)	(.016)
ln GDP per capita	-1.822***	-3.998***	-4.027***	-5.472***
	(.314)	(.526)	(.527)	(.623)
Rights		.053*	.027	.073
		(.029)	(.04)	(.046)
Democracy			.018	.013
			(.019)	(.023)
Unemployment				-.024
				(.049)
_cons	39.445***	57.197***	58.11***	70.118***
	(2.707)	(4.617)	(4.713)	(5.71)
Observations	3881	1483	1483	1062
R-squared	.661	.657	.657	.64

Notes: The dependent variable is the Gini coefficient on a 0-100 scale. *Government size* is on a 0-100 scale. Upper panel is based on equation (2), and lower panel is based on equation (3). Country and time fixed effects are included in both stages but are not displayed. The standard errors in parenthesis and are country clustered. *** p<.01, ** p<.05, * p<.10

Table C2. Effect of Transfers and Subsidies on Income Inequality IV Results (showing first-stage results)

	(1)	(2)	(3)	(4)
	Gini	Gini	Gini	Gini
Transfers and subsidies	-.092***	-.063***	-.061***	-.027
	(.013)	(.02)	(.02)	(.021)
ln GDP per capita	-.228	-.58***	-.636***	-1.212***
	(.144)	(.224)	(.223)	(.251)
Rights		-.023*	-.075***	-.076***
		(.013)	(.019)	(.02)
Democracy			.033***	.029***
			(.008)	(.009)
Unemployment				.129***
				(.021)
_cons	49.237***	41.845***	43.199***	46.014***
	(1.244)	(2.054)	(2.071)	(2.476)
Observations	2567	1130	1130	918
R-squared	.137	.157	.159	.261
First stage results	(1)	(2)	(3)	(4)
		Transfers and subsidies		
Extrapolated transfers and	.949***	.917***	.917***	.904***
subsidies	(.004)	(.007)	(.007)	(.008)
ln GDP per capita	-.571***	-1.052***	-1.057***	-1.556***
	(.043)	(.075)	(.075)	(.099)
Rights		-.018***	-.022***	-.025***
		(.005)	(.006)	(.008)
Democracy			.003	.003
			(.003)	(.004)
Unemployment				.008
				(.008)
_cons	4.663***	10.679***	10.837***	15.845***
	(.365)	(.67)	(.693)	(.934)
Observations	3237	1317	1317	1010
R-squared	.947	.937	.937	.944

Notes: The dependent variable is the Gini coefficient on a 0-100 scale. *Government size* is on a 0-100 scale. Upper panel is based on equation (2), and lower panel is based on equation (3). Country and time fixed effects are included in both stages but are not displayed. The standard errors in parenthesis and are country clustered. *** p<.01, ** p<.05, * p<.10

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