10. FROM FISCAL POLICY TO INCOME INEQUALITY IN ADVANCED ECONOMIES: DOES INSTITUTIONAL QUALITY HINDER?

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Abstract

Governments use fiscal policy to correct market failures and reallocate national income, so fiscal policy can narrow income inequality in society. Does institutional quality matter for the fiscal policy – income inequality relationship in advanced economies? For the answer, the paper investigates the impacts of fiscal policy, institutional quality and their interaction on income inequality for a balanced panel dataset of 30 advanced economies from 2002 to 2020. It applies the system-GMM Arellano-Bond estimators for estimation. Then, it uses the PMG estimator to test the robustness. The results show that fiscal policy and institutional quality narrow income inequality, but their interaction widens. It seems counter-intuitive. In addition, economic growth and unemployment increase income inequality. The findings suggest some implications for improving institutional quality and using fiscal policy to reduce income inequality in the advanced economies.

Keywords: fiscal policy, income inequality, institutional quality, advanced economies, system GMM estimator, PMG estimator.
JEL Classification: D63, E62, E64

1. Introduction

Global income inequality is a pressing issue in the era of increasing globalization, as it has the potential to create social instability. To address this, the United Nations proposed the Millennium Development Goals (MDGs), which included narrowing the income gap between countries as one of the eight objectives. Fiscal policy must be a crucial instrument in the economy as it helps governments overcome economic cyclicality. Governments actively increase spending or decrease tax (or both) for an economic recession with high unemployment (an expansionary policy). They reduce spending or increase tax (or both) for a fast-growing economy with high inflation (a contractionary policy). In particular, they can use public expenditure and tax revenue to allocate national resources, which corrects market

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failures and reallocates national income. Hence, fiscal policy can significantly contribute to a decrease in income inequality. Despite its active role in the fight against income and wealth inequality, the impact of fiscal policy on inequality remains controversial. Several studies have investigated it since the birth of the Gini index in 1992. This paper aims to address a research gap in the literature by exploring the role of institutional quality/governance in fiscal policy - income inequality nexus in advanced economies, which has yet to be studied.

Like developing economies, advanced economies also have the problem of economic inequality in society. The income gap in these economies is increasing between the richest and the poorest groups. In particular, income inequality becomes more severe if an economic crisis or epidemic occurs. For instance, the European debt crisis that occurred in the latter part of 2009 highlighted the impact on low and low-middle income individuals, particularly in Portugal, Ireland, Italy, Greece, and Spain. This resulted in social instability during that period in these economies. However, unlike developing nations, advanced economies possess a greater level of economic development, higher incomes, and superior living standards. As such, they have more resources, particularly fiscal instruments, to address issues of income inequality within society. Notably, these economies have multi-party mechanisms with free and fair elections, so the regulations and policies (institutional quality) partly reflect the will and desire of the people through representativeness by parties. Therefore, the research question is whether institutional quality contributes to the relationship between fiscal policy and income inequality in the advanced economies.

To summarize, fiscal policy plays a crucial role in decreasing income inequality, and the quality of institutions can play a significant part in the relationship between fiscal policy and income inequality in advanced economies. With this in mind, this study investigates the impact of fiscal policy, institutional quality, and their interaction on income inequality for a group of 30 advanced economies from 2002 to 2020. The research employs both the system-GMM and PMG estimators to determine and verify the robustness of estimates.

The following structure is presented in the paper. In Section 1, the introduction proposes the theoretical framework and motivation. Section 2 provides an overview of income inequality and fiscal policy in advanced economies. In Section 3, the literature review highlights the impact of fiscal policy on income inequality, while Section 4 describes the methodology and research data. Section 5 reports the estimated results, and Section 6 concludes the paper.

2. Overviews on the Fiscal Policy and Income Inequality in the Advanced Economies

2.1 Fiscal Policy in the Advanced Economies

A report by OECD (2021) notes that in 2019, OECD economies had average tax revenue of 33.8% of GDP, stemming from increases in revenues from value-added taxes, income taxes, and contributions of social security (both personal and corporate income taxes). Notably, taxes on services and goods captured 32.7% of total tax revenues. Personal taxes amounted to 23.5%% of total revenues, and social security contributions accounted for 25.7%. They were the main source of tax revenues.

Meanwhile, Ortiz-Ospina and Roser (2016) observed that there was a gap in public spending between world regions. Governments in advanced economies, especially governments in Europe, managed and controlled a much larger share of GDP than those in developing economies. Public spending accounted for almost 50% of the GDP in France and nearly 6%

in Nigeria. Besides, governments in advanced economies spent more resources than those in developing economies, both as per capita and a share of GDP. These economies have higher levels of social spending than developing economies. More importantly, advanced countries use a large share of GDP specifically for social transfers. Public procurement is a procedure through which most governments buy goods, services and works from companies. Governments in advanced economies purchase the private sector's goods. In Greece, public procurement accounts for 20% of public spending, but its size seems significant for the economy with 10% of GDP. In the Netherlands, for instance, public procurement captures almost 45% of total government expenditure, corresponding to 20% of GDP.

2.2 Income Inequality in the Advanced Economies

An official report by DESA (2020) reveals that several economies that experience high-income gaps had a decrease in income inequality, and many countries and regions with low levels of income inequality in 1990 suffered rises in the income gap. For instance, many Eastern European countries, Germany and Nordic countries saw increases in income inequality. Furthermore, some large middle-income economies have experienced increases in income inequality since 1990. In particular, income inequality in China rose in urban and rural areas.

Notably, the income shares by the 1% top rose in 59 out of 100 economies. In 2015, the 1% richest earned more than 20% of all income in 18 economies, including the United States, the United Arab Emirates, Turkey, Thailand, the Russian Federation, India, Chile and Brazil. Although income inequality in Brazil has declined, the income shares of the 1% richest before transfers and taxes rose to 28.3% in 2015 from 26.2% in 2001.

3. Theoretical Framework and Literature Review

3.1 Theoretical Framework

The theoretical view on the influence of fiscal policy on wealth and income inequality comes from the increasingly important role of governments in the economy suggested by the Keynesian school. Keynesian economists emphasize that governments should use fiscal policy to overcome economic cyclicality and correct market failures. Governments can use spending and tax to reallocate the national income, narrowing income inequality in society. Notably, Alesina and Ardagna (1998) argue that public spending decreases inequality, mainly through social welfare policies such as healthcare, education, nets of social safety, and employment schemes. Meanwhile, the traditional politico-economic view suggests that governments use distortionary taxation to reallocate the national income for high inequality (Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Persson and Tabellini, 2000). However, this direct taxation harms economic growth due to its negative incentives on human and physical capital accumulation. By contrast, the new politico-economic view rejects the hypothesis of the negative contribution of distortionary taxation to economic growth. It supports the positive effect of redistributive spending on growth.

Meanwhile, the theoretical framework on the effect of institutional/governance quality on wealth and income inequality is developed by Josifidis (2017) under the assumptions that the redistribution of income and consequent inequality of disposable income (income inequalities after transfers and taxes) are contingent on the effect of market income inequality (income inequality before transfers and taxes) on the processes in which distinct

social groups institutionalize their interests. In a democratic institution (where the majority vote plays a decisive role against the minority), the decline in income distribution can be intervened by the removal of elite privileges and redistribution, pro-poor policies. Regarding electoral democracy, notably, the absence of institutional fluctuation with redistributive effects is often explained by a rise in income inequality that allows the minority, through political and economic power, to institutionalize their interests in practice, despite the rational interests of the majority. Acemoglu and Robinson (2005) and Acemoglu *et al*. (2015) note that although democracy determines the de jure power distribution in society, income inequality and policy outcomes are conditional not only on the *de jure* but the *de facto* power distribution as well. Consequently, the redistributive desire of the majority will not necessarily result in greater income redistribution.

Notably, this paper discovers that institutional quality can contribute significantly to the fiscal policy – income inequality relationship in advanced economies. Li and Filer (2007) notice that advanced economies are those with rule-based governance (good institutional quality) that have enough appropriate resources to deal with the poverty and the income gap in society. Since the majority vote determines the ruling party, governments in these economies are always willing to listen to the voices of the people. Consequently, institutional improvement will set up appropriate regulations and policies to handle and reduce income inequality. Meanwhile, Ortiz-Ospina and Roser (2016) indicate that advanced economies have higher levels of social spending and spend a large share of the national gross income, especially on social transfers. Indeed, advanced economies focus on low-income individuals and the poor through social transfers to support them throughout economic development, narrowing the income gap between high-income and low-income individuals. Besides, a report by OECD (2021) shows that advanced economies rely more on revenue from social security contributions and personal income taxes. Governments in advanced economies focus on the social security contributions of the wealthy individuals in society and heavily tax high-income individuals. As a result, fiscal policy decreases income inequality. However, in advanced economies with democratic institutions, parliaments always promulgate and amend laws to limit the ability of governments to abuse power. In particular, the ruling parties always tend to increase spending and reduce taxes to get the people's hearts during elections, leading to an increasing budget deficit. Thus, some laws issued by parliaments in these economies focus on controlling and managing strictly public spending and tax revenue to avoid a public debt crisis and social instability. It can lead to a decline in public spending and a rise in tax revenue. Therefore, the interaction between institutional quality and fiscal policy enhances income inequality.

3.2 Literature Review

In recent research, the impact of fiscal policy on wealth and income inequality has gained attention, particularly when compared to other topics related to income inequality. The ability of governments to reduce income inequality is highlighted by globalization and digitization as one of the eight Millennium Development Goals (MDGs). While some studies suggest that public spending widens income inequality in developing economies, it can narrow it in advanced economies. However, it is worth noting that most studies in this topic have found that tax revenue tends to reduce income inequality.

Wong (2016), Wong (2017), and Cevik and Correa-Caro (2020) note that public spending widens income inequality. Wong (2016) applies the panel-corrected standard errors estimator for a sample of 16 economies in Asia and the Pacific from 1960 to 2012 and finds that public spending on welfare increases income inequality, but spending on health

decreases it. Similarly, Wong (2017) uses the Prais–Winsten AR(1) process for a group of 16 Asian economies and a group of 18 Latin American economies between 1996 and 2009. He indicates that public spending in Latin America enhances income inequality, but spending in Asia reduces it. Recently, Cevik and Correa-Caro (2020) employ the IV-GMM estimator and the IV estimator for China and 33 developing countries over the period 1980 – 2013 and note public spending in China widens income inequality. They conclude that governments should re-design fiscal policy to receive their higher redistributive impact in the long term. By contrast, Kollmeyer (2015) and Apergis (2021) indicate that public spending narrows income inequality. Kollmeyer (2015) uses the random-effects model for a sample of 16 Western economies from 1970 to 2010. More recently, Apergis (2021) applies a two-stage least squares estimator for a group of 21 developed economies from 1971 to 2017. Furthermore, Apergis (2021) notes that tax revenue increases income inequality while budget deficit reduces it in these economies. By contrast, Taghizadeh-Hesary *et al*. (2020) indicate tax revenue decreases Japan's income inequality using the VECM model from 2002Q1 to 2017Q3.

Unlike the above studies, Clifton *et al*. (2020) and Gunasinghe *et al*. (2020) both discover that fiscal policy (public spending and tax revenue) narrows income inequality. Clifton *et al*. (2020) employ the fixed effects model and the bias-corrected LSDVC estimator for a group of 17 Latin American economies during the period 1990 – 2014. They note that the redistributive contribution of fiscal policy in these economies is motivated by changes in fiscal policy linked with the new political cycle and economic expansion in this region in the early period of the 21st century. Meanwhile, Gunasinghe *et al.* (2020) use a simultaneous equations model for a sample of 19 developed economies from 1995 to 2015. They suggest that governments in these economies use redistributive spending financed by direct taxes to narrow income inequality.

Regarding the effect of institutional/governance quality on income and wealth inequality, the work by Andres & Ramlogan-Dobson (2011) argues that public officials in countries with high corruption can change the social expenditure composition to benefit high-income individuals at the price of low-income individuals, increasing income inequality. Several studies have explored the relationship between institutional improvement and income inequality. Blancheton & Chhorn (2021), Josifidis (2017), Kunawotor (2020), Law & Soon (2020), and Nadia & Teheni (2014) all find that institutional improvement can reduce income inequality. However, the methods and data used in these studies vary. For example, Nadia and Teheni (2014) utilize non-parametric correlation tests to analyze the relationship between variables across 39 countries spanning from 1996 to 2009, whereas Josifidis (2017) employs the Fixed Effects Vector Decomposition (FEVD) method to examine 21 OECD economies between 1990 and 2010. In the same vein, Law & Soon (2020) employ the two-step system-GMM estimator to analyze 65 advanced and developing economies, whereas Kunawotor (2020) utilizes the two-step difference-GMM estimator to study 40 African economies during the period of 1990 to 2017. Recently, Blancheton and Chhorn (2021) utilize the FMOLS and DOLS estimators to analyze data from 8 Asian economies spanning 1988 to 2014. Their findings indicate that public spending has a narrowing effect on income inequality. However, there are some contradictory findings. According to a study conducted by Perera and Lee (2013), the quality of institutions and governance in nine developing Asian economies between 1985 and 2009 is found to increase inequality. The researchers use the one-step system-GMM estimator to reach this conclusion. They recommend that efforts to improve institutions in developing economies in East and South Asia should prioritize addressing issues related to income distribution and poverty. In contrast, Asamoah (2021)

has found that institutional/governance quality has different effects on income and wealth inequality across 24 advanced and 52 developing economies during the period between 1996 and 2017, using the dynamic panel threshold model. While institutional improvement leads to reduced inequality in developed economies, it widens the gap in developing ones. Moreover, Asamoah has observed an inverted U-shaped relationship between economic growth and income and wealth inequality, with the impact transitioning from developing to advanced economies.

Regarding the determinants of income inequality, Deyshappriya (2017), Berisha et al. (2020), Asogwa et al. (2021), and Hailemariam et al. (2021) examine the factors affecting income and wealth inequality. In a study conducted by Deyshappriya (2017), a panel dataset of 33 Asian economies spanning from 1990 to 2013 is analyzed using the one-step difference-GMM estimator. The results of the study indicate that education, labor force, and development assistance are factors that decrease income inequality. However, political risk, trade, unemployment, and inflation are found to increase income inequality. Notably, Deyshappriya observed a non-linear relationship between economic growth and inequality in these economies. Meanwhile, Berisha et al. (2020) apply the PMG estimator and the common correlated effects estimator for the BRICS economies between 2001 and 2015 and discover that interest rates, economic growth, and inflation widen inequality. The results reveal that inequality was exacerbated by interest rates, economic growth, and inflation. In a recent study, Asogwa et al. (2021) employ the GMM (pooled OLS and fixed effects) estimators to analyze a group of 28 African economies from 2001 to 2016. Their findings indicate that education and unemployment contribute to an increase in income inequality, whereas labor force, inflation, and economic growth have the opposite effect. In the same vein, Hailemariam et al. (2021) use the panel vector auto-regression method to analyze a panel dataset of 17 advanced countries spanning the years 1870 to 2016. The estimated results indicate that public spending, financial development, interest rates, and education have a diminishing effect on inequality, while economic growth exacerbates it.

After reviewing the literature, it has been observed that no research (i) has investigated the impact of institutional quality on the relationship between fiscal policy and income inequality, and (ii) uses PMG estimator and system GMM estimators that can address endogenous phenomena and serial autocorrelation in empirical models. Consequently, this paper aims to make a significant contribution to the literature by focusing on these two aspects.

4. Methodology and Research Data

4.1 Methodology

Following the literature review, the paper describes the empirical model as follows:

$$GIN_{it} = \gamma_0 + \gamma_1 GIN_{it-1} + \gamma_2 FIS_{it} + \gamma_3 GO_{it} + \gamma_4 (FIS \times GO)_{it} + X_{it}\gamma' + \sigma_i + \tau_{it} \quad (1)$$

where: *t* and *i* refer to time and country, respectively. GIN_{it} refers to the Gini index, which serves as a measure of income inequality. It is a numerical value that can range from 0 to 100, where 0 indicates absolute equality (all individuals have the same income) and 100 represents the highest degree of income inequality. GIN_{it-1} denotes the initial level. FIS_{it} is fiscal policy (government revenue/public spending); GO_{it} is one of the six governance indicator (Political stability, Rule of law, Control of corruption, Voice & accountability, Regulatory quality, Government effectiveness); $(FIS \times GO)_{it}$ is the interaction between fiscal policy and institutional quality. X_{it} contains economic growth, education, and unemployment

(control variable); σ_i is a country-specific, time-invariant, unobserved effect and τ_{it} is an observed error term; γ_0, γ_1, γ_2, and γ' are estimated parameters. In line with the research conducted by Cevik & Correa-Caro (2020), Clifton et al. (2020), Gunasinghe et al. (2020), and Wong (2017), we have incorporated certain control variables, such as education, economic growth, and unemployment, into our empirical equations.

Equation (1) presents several significant challenges for estimation. The first challenge is that variables such as government revenue, public spending, economic growth, and unemployment may be endogenous, which means they could be correlated with σ_i and contribute to the endogenous phenomenon. Another point to consider is the presence of unobserved factors, such as culture, geography, customs, and anthropology (referred to as fixed effects), which may be associated with the independent variables. These fixed effects are present in σ_i. Another factor contributing to high autocorrelation is the presence of GIN_{it-1}. Finally, panel data consist of a short length of observation (L = 19) for a substantial number of economies (M = 30). These problems may introduce bias in the OLS regression. However, the random-effects model (REM) and fixed-effects model (FEM) are not well-equipped to address issues related to serial autocorrelation and endogenous phenomena. Meanwhile, the IV-2SLS estimator requires appropriate instruments that are independent of the empirical model's variables. To overcome these challenges, we follow Judson & Owen (1999) and employ the system-GMM estimator and the PMG estimator to estimate and verify the robustness of estimates.

The general method of moments (GMM) was first proposed by Holtz-Eakin et al. (1988) and later developed into two types of GMM estimators by Arellano and Bond (1991): the difference and the system. However, in the difference GMM estimator, the past values of persistent regressors in empirical models do not provide enough information to account for their changes, making their lags weak instrumental variables. As a result, the system-GMM (S-GMM) estimator outperforms the difference-GMM (D-GMM) estimator, as highlighted by Arellano and Bover (1995).

The two-step S-GMM may offer greater efficiency than the one-step S-GMM for estimation. According to Roodman (2009), the use of the two-step S-GMM in small research samples, such as ours, poses a problem. As the time dimension increases, the proliferation of instrumental variables rises quadratically, leading to a scenario where the number of instruments exceeds the number of panel units. To address this issue, one possible solution is to follow the rule of thumb to ensure that the number of panel units is greater than or equal to the number of instruments, as suggested by Roodman (2009). In the S-GMM, the validity of the instruments is tested using Arellano-Bond, Sargan, and Hansen statistics. While the Hansen and Sargan tests aim to detect endogenous phenomena, the Arellano-Bond test AR(2) examines the serial autocorrelation of errors in the first difference.

In order to verify the robustness of the S-GMM estimates, the study employs the PMG estimator developed by Pesaran et al. (1999). The PMG-based model is presented as follows:

$$\Delta Y_{it} = \psi X_{it-1} + \sum_{j=1}^{p} \pi_{ij} \Delta Z_{it-j} + \sigma_{it} + \tau_{it} \text{ where } X_{it-1} = Y_{it-1} - \lambda Z_{it-1} \quad (2)$$

where Y represents the Gini index, which serves as a measure for income inequality; At any given period t, X_{it-1} denotes the difference from the long-term equilibrium for group i, while ψ represents the coefficient for error-correction. The long-run coefficients are captured by the vector λ. For every variable in Z_{it-1}, they indicate the long-run elasticity of inequality. At the same time, the vector π represents the short-run reactions of the Z variables, while σ_i

denotes a constant effect and τ_{it} stands for an error term. To assess the validity of the PMG estimates, the study utilizes the magnitude and significance level of the speed of adjustment ψ, which is negative and less than 1.

4.2 Research Data

Data are the GINI index, public spending, government revenue, GDP per capita, primary school enrollment, unemployment. The study extracts them from World Bank and International Monetary Fund databases. The research sample contains 30 advanced economies[2] from 2002 to 2020.

The study presents the descriptive statistics and definition of the dataset and the matrix of correlation coefficients among variables in the Appendix (Table A, Table B, Table C, and Table D). The results in Table C show that government revenue, public spending, and economic growth are negatively associated with income inequality, and education and unemployment are positively associated with it. The value of the correlation coefficient between government revenue and public spending is very high (greater than 0.8), so the paper uses government revenue and public spending separately in the empirical model to remove the co-linearity between them. In the same vein, the results in Table D report that values of the correlation coefficient among six governance indicators are very high, so the paper employs them separately.

5. Estimated Results and Discussion

5.1 The S-GMM Estimates

Table 1 and Table 2 display the two-step S-GMM estimates, while Table 3 and Table 4 demonstrate the one-step S-GMM estimates. The influence of government revenue on income inequality is depicted in Table 1 and Table 3, whereas Table 2 and Table 4 illustrate the effect of public spending on inequality. In all estimation procedures, the paper detects that government revenue/public spending is endogenous. Thus, it utilizes government revenue/public spending as an instrumented regressor in gmm procedure, while education, income inequality, unemployment, and economic growth serve as instrumental variables in iv procedure. The estimated results in all tables indicate that fiscal policy (government revenue/public spending) and institutional quality reduce income inequality, but the interaction term increases it. Therefore, the main result is that fiscal policy narrows income inequality, and this negative effect is hindered by institutional quality. Furthermore, economic growth and unemployment enhance income inequality. These estimates are consistent for six governance indicators.

Notably, we also consider whether the different periods (pre- and post-global financial crisis 2008 - 2010) contribute to the role of institutional quality in the nexus between fiscal policy and income inequality. The estimated results for the pre-global financial crisis period (2002 – 2007) are shown in Appendix[3] as Table E (government revenue, two-step S-GMM), Table F (public spending, two-step S-GMM), Table I (government revenue, one-step S-GMM), and

[2] *Austria, Belgium, Canada, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Italy, Israel, Ireland, South Korea, Luxembourg, Lithuania, Latvia, Malta, Norway, Netherlands, Portugal, Switzerland, Slovak Republic, Spain, Slovenia, Sweden, the United Kingdom, the United States.*

[3] *Appendix is available online.*

Table J (public spending, one-step S-GMM). Meanwhile, the estimated results for the post-global financial crisis period (2011 – 2020) are reported in in Appendix as Table G (government revenue, two-step S-GMM), Table H (public spending, two-step S-GMM), Table K (government revenue, one-step S-GMM), and Table L (public spending, one-step S-GMM). All these results confirm that the role of institutional quality in the fiscal policy – income inequality nexus in the pre- and post-global financial crisis periods is not different from the whole research period (2002 – 2020).

It seems counter-intuitive that the interaction widens income inequality although fiscal policy and institutional quality narrow. First, advanced economies are countries with rule-based governance that have enough appropriate resources and solutions to tackle the income gap in society (Li and Filer, 2007). Because the majority vote decides the party's rule, governments in these economies are always willing to listen to the voices of the people. Consequently, improvement in institutional quality will establish appropriate regulations and policies to reduce income inequality. On the one side, OECD (2021) notes that advanced economies heavily tax high-income individuals and receive the social security contributions of the wealthy individuals in society, narrowing the income difference between low-income and high-income individuals. On the other side, Ortiz-Ospina and Roser (2016) report that advanced economies spend high levels of social transfer for low-income individuals and the poor in economic development and growth, narrowing income inequality between high-income and low-income individuals. Hence, the fiscal policy reduces income inequality.

However, in democratic countries like advanced economies, parliaments often formulate and amend laws to limit governments' power. In particular, the ruling parties often increase spending and decrease taxes to get the people's hearts in elections, which increases the budget deficit. Thus, some laws issued by parliaments in these economies control and manage tax revenue and public spending strictly to avoid a public debt crisis and social instability. For example, the European debt crisis in the second half of 2009 with high public debt in Portugal, Greece, Italy, Ireland, and Spain (developed economies) led to economic and political instability in these economies. The number of poor and homeless in these economies increased rapidly during this crisis period. Most severely affected people were the poor and low-skilled. To quickly get out of this crisis, these economies must accept the austerity solutions proposed by the IMF to receive bailouts. Accordingly, regulations and policies (institutional quality) must be adjusted to cut government expenditure for retirees and jobless people, thereby focusing on reducing budget deficits and controlling and managing government debt. In particular, all these regulations and policies must get a consensus among political parties (political stability), representing people's voices. In short, regulations and policies (institutional quality) that are issued and implemented to control public debt may reduce the fiscal deficit. It leads to a decline in government spending and a rise in government revenue, which leads to a contraction in fiscal policy. Because of this, the poor are severely affected by the cuts in public spending, while the rich may not be affected at all, widening income inequality. As a result, the interaction between fiscal policy and institutional quality enhances income inequality. The findings suggest that laws issued by parliaments in advanced economies should be designed, formulated, and enforced appropriately to have a sound fiscal policy. It helps governments receive more social security contributions from wealthy individuals and tax heavily high-income individuals. Then, they spend more public spending on social transfers to support low-income individuals. Furthermore, a sound fiscal policy will reduce budget deficits and prevent future debt crises.

More importantly, governments need to spend much on health and education to support the poor to improve their knowledge and skills, narrowing the income gap between high-income

and low-income individuals. Income inequality is one of the inherent social natures in human development, meaning that we cannot eliminate, but can reduce income inequality. In particular, equality and efficiency are two opposite sides of the same coin, so once acting on one side, it affects the other side and vice versa. Governments should recognize it as the tradeoff between equality and efficiency throughout economic development. Increasing equality (or decreasing inequality) leads to decreasing efficiency and vice versa. When they choose efficiency, it will lead to widening income inequality and enhancing social instability. When they choose equality, it leads to heavy taxation on the rich and a decline in investment and employment, which increases social instability. It implies that governments should determine a point at which equity and efficiency exist relatively for society to function well. Using political solutions to eliminate income inequality in society can lead to bad outcomes for economic development. Zimbabwe and Venezuela used to be two typical economies with a high level of economic development in Africa and Latin America. However, political leaders chose violent political solutions instead of economic solutions. As a result, the economy collapsed, political and social instability increased, and people left the country. In short, it is more important to have consensus among parties (representing people's voice) in determining and choosing a relative balance between efficiency and equity to ensure social stability during economic development. Governments should control and manage government revenue and public spending because a rising fiscal deficit can lead to a public debt crisis and social instability. In particular, governments in developed economies should note that policies and regulations (institutional quality) must be carefully considered in terms of their effectiveness in enforcement. Institutional quality includes political stability (consensus among political parties representing the people's voice), control of corruption, rule of law, government effectiveness (control of appropriate government revenues and spending), the rule of law, regulatory quality, voice & accountability (social equity with priority given to the poor and low-income people, regulations and policies are publicly and transparently implemented). In particular, once the economic crisis occurs, most poor and low-income people are the first and most severely affected. Its most obvious consequence is an increase in the income gap between the rich and the poor, widening income inequality.

In economic development, the economic outcomes may mainly benefit the rich, while the poor do not receive much. The Kuznets (1955) curve argues that industrializing economies experience an increase and subsequent decrease in wealth and income inequality. Apergis (2021), Hailemariam *et al.* (2021), Berisha *et al*. (2020), and Demir *et al*. (2020) support this result. This finding indicates a challenge for governments in the appropriate allocation of the outcomes in economic development. Likewise, the burden of a high unemployment rate frequently lands on the poor, who are economically disadvantaged, and lacking the requisite expertise and qualifications to secure high-paying employment opportunities, thus exacerbating the income disparity within society. As such, this discovery suggests that advanced economies' governments ought to focus more on supporting the impoverished in accessing education and healthcare, which can lead to high-income occupations. Asogwa et al. (2021) and Deyshappriya (2017) have further explored this result.

Table 1. Government Revenue, Institutional Quality and Income Inequality: Two-step S-GMM Estimates (Whole period: 2002 – 2020)

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (-1)	0.892***	0.906***	0.856***	0.950***	0.912***	0.898***
	(0.022)	(0.023)	(0.024)	(0.021)	(0.022)	(0.026)
Government revenue	-0.178***	-0.279***	-0.122***	-0.411**	-0.260***	-0.393***
	(0.053)	(0.099)	(0.033)	(0.182)	(0.090)	(0.114)
Institutional quality	-3.832***	-7.602***	-3.635***	-11.956**	-7.018***	-12.11***
	(1.188)	(2.901)	(1.110)	(5.199)	(2.531)	(3.416)
Revenue* Inst. quality	0.087***	0.160***	0.081***	0.273**	0.151***	0.285***
	(0.029)	(0.063)	(0.028)	(0.118)	(0.057)	(0.082)
Economic growth	0.008***	0.011***	0.006***	0.007**	0.011***	0.011***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.003)	(0.002)
Education	0.014	0.026*	0.025	0.106	0.015	0.067**
	(0.013)	(0.014)	(0.014)	(0.054)	(0.014)	(0.028)
Unemployment	0.073***	0.054***	0.068***	0.052*	0.057***	0.110***
	(0.021)	(0.013)	(0.018)	(0.031)	(0.018)	(0.026)
Instrument	22	23	23	24	23	22
Country/Observation	30/540	30/540	30/540	30/540	30/540	30/540
AR(2) test	0.261	0.294	0.208	0.143	0.275	0.236
Sargan test	0.776	0.574	0.939	0.309	0.574	0.126
Hansen test	0.867	0.563	0.749	0.182	0.395	0.485

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 2. Public Spending, Institutional Quality and Income Inequality: Two-step S-GMM Estimates (Whole period: 2002 – 2020)

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (-1)	0.922*** (0.019)	0.931*** (0.021)	0.877*** (0.023)	0.936*** (0.021)	0.928*** (0.020)	0.928*** (0.022)
Public spending	-0.106*** (0.039)	-0.215*** (0.071)	-0.093*** (0.036)	-0.239*** (0.086)	-0.198*** (0.062)	-0.252*** (0.096)
Institutional quality	-2.712** (1.110)	-6.486*** (2.303)	-3.670** (1.584)	-7.394*** (2.745)	-5.918*** (1.930)	-8.334** (3.073)
Spending*Inst. quality	0.058** (0.024)	0.133*** (0.049)	0.075** (0.036)	0.157*** (0.059)	0.121*** (0.042)	0.181** (0.072)
Economic growth	0.005*** (0.001)	0.008*** (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Education	0.011 (0.014)	0.031 (0.019)	0.030 (0.018)	0.063** (0.030)	0.029 (0.019)	0.052 (0.032)
Unemployment	0.055*** (0.015)	0.054*** (0.013)	0.067*** (0.020)	0.054*** (0.016)	0.050*** (0.015)	0.077*** (0.021)
Instrument	23	24	22	23	22	24
Country/Observation	30/540	30/540	30/540	30/510	30/540	30/540
AR(2) test	0.223	0.203	0.229	0.178	0.219	0.218
Sargan test	0.130	0.285	0.290	0.123	0.153	0.118
Hansen test	0.195	0.472	0.371	0.326	0.125	0.192

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 3. Government Revenue, Institutional Quality and Income Inequality: One-step S-GMM Estimates (Whole period: 2002 – 2020)

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (-1)	0.894*** (0.012)	0.915*** (0.013)	0.849*** (0.017)	0.934*** (0.089)	0.900*** (0.012)	0.892*** (0.012)
Government revenue	-0.136*** (0.045)	-0.330*** (0.097)	-0.101*** (0.039)	-0.381*** (0.089)	-0.166** (0.070)	-0.279*** (0.078)
Institutional quality	-2.589** (1.087)	-8.664*** (2.721)	-2.944** (1.377)	-10.49*** (2.654)	-3.959** (1.965)	-8.327*** (2.411)
Revenue*Inst. quality	0.059** (0.025)	0.191*** (0.061)	0.061* (0.034)	0.246*** (0.061)	0.085** (0.043)	0.188*** (0.057)
Economic growth	0.006*** (0.001)	0.009*** (0.002)	0.005*** (0.001)	0.007*** (0.001)	0.007*** (0.002)	0.009*** (0.001)
Education	0.014 (0.008)	0.063 (0.051)	0.024 (0.010)	0.090*** (0.021)	0.018 (0.009)	0.046*** (0.014)
Unemployment	0.066*** (0.018)	0.063*** (0.016)	0.061*** (0.020)	0.081*** (0.017)	0.054*** (0.016)	0.088*** (0.021)
Instrument	22	23	23	24	23	22
Country/Observation	30/540	30/510	30/510	30/540	30/540	30/540
AR(2) test	0.193	0.518	0.274	0.169	0.211	0.229
Sargan test	0.776	0.310	0.439	0.309	0.574	0.126

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 4. Public Spending, Institutional Quality and Income Inequality: One-step S-GMM Estimates (Whole period: 2002 – 2020)

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (-1)	0.918***	0.928***	0.869***	0.931***	0.923***	0.921***
	(0.012)	(0.012)	(0.015)	(0.012)	(0.011)	(0.014)
Public spending	-0.078**	-0.191***	-0.095***	-0.194***	-0.149***	-0.191***
	(0.034)	(0.071)	(0.033)	(0.057)	(0.060)	(0.067)
Institutional quality	-1.913**	-5.800***	-3.761***	-5.913***	-4.358**	-6.464***
	(0.947)	(2.251)	(1.363)	(1.874)	(1.904)	(2.133)
Spending*Inst. quality	0.041**	0.119***	0.076***	0.129***	0.091**	0.141***
	(0.020)	(0.047)	(0.032)	(0.040)	(0.040)	(0.052)
Economic growth	0.004**	0.007***	0.005***	0.005***	0.006***	0.005***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Education	0.011	0.029	0.022**	0.051	0.024	0.043**
	(0.010)	(0.022)	(0.010)	(0.055)	(0.022)	(0.020)
Unemployment	0.054***	0.056***	0.072***	0.063***	0.053***	0.068***
	(0.018)	(0.017)	(0.021)	(0.016)	(0.017)	(0.020)
Instrument	23	24	22	23	22	24
Country/Observation	30/540	30/540	30/510	30/510	30/540	30/540
AR(2) test	0.172	0.150	0.286	0.233	0.166	0.159
Sargan test	0.130	0.285	0.232	0.123	0.153	0.118

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

5.2 Robustness Check

To test the robustness of the S-GMM estimates, the paper utilizes the PMG estimator for Equation (2), with economic growth as the only control variable. The PMG estimator necessitates the presence of co-integration between the regressors and the dependent variable. Thus, the paper conducts an analysis of the stationarity of all variables in the empirical model to confirm that they exhibit the same order of co-integration. Furthermore,

the paper carries out panel co-integration tests using the methodology suggested by Westerlund (2007).

According to the data presented in Table 4, the variables of income inequality, public spending, government revenue, and economic growth exhibit stationarity at a significance level below 10%. This suggests that there is a zero-order I(0) co-integration between them. Table 5 reveals that, based on the Westerlund tests, three out of four tests reject the null hypothesis of no co-integration. This suggests that income inequality is co-integrated with government revenue, public spending, and economic growth.

According to the S-GMM estimates presented in Table 6(government revenue) and Table 7 (public spending), the paper demonstrates that fiscal policy and institutional quality both contribute to reducing income inequality. However, their interaction widens the income gap. Moreover, income inequality is exacerbated by economic growth. The PMG estimates presented at the bottom of Tables 6 and 7 indicate a high level of reliability, as evidenced by the significance level and speed of adjustment values.

Table 4. Fisher Type Unit Root Tests

Variables	Augmented Dickey-Fuller test		Phillips-Perron test	
	Prob > chi2		Prob > chi2	
	Without trend	With trend	Without trend	With trend
Income inequality	52.894	42.426	69.221	104.949***
Government revenue	49.957	63.662	73.876	75.057**
Public spending	51.810	29.413	67.225	34.921**
Institutional quality 1	73.156	56.127	224.666***	157.362***
Institutional quality 2	96.673***	65.915	120.871***	105.612***
Institutional quality 3	95.006***	66.252	224.916***	157.084***
Institutional quality 4	61.690	67.764	77.742**	77.599**
Institutional quality 5	57.655	57.367	87.633***	83.252**
Institutional quality 6	121.610***	85.124**	114.410***	103.406***
Economic growth	83.006**	46.863	62.778	27.851

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 5. Westerlund Panel Co-integration Tests

Normalized variable: GINI index (Income inequality)

Covariates	G_t	G_α	P_t	P_α
Government revenue	-2.116**	-7.782	-11.130***	-7.073***
Public spending	-2.139**	-8.848**	-10.923***	-7.175***
Institutional quality 1	-2.080**	-7.928	11.238***	-7.526***
Institutional quality 2	-2.315***	-9.377**	-12.332***	-9.584***
Institutional quality 3	-2.371***	-9.326**	-13.408***	-8.422***
Institutional quality 4	-2.069**	-7.988	-10.887***	-7.243***
Institutional quality 5	-2.418***	-8.498*	-11.852***	-7.952***
Institutional quality 6	-4.342***	-8.818**	-10.568***	-5.906**
Economic growth	-2.624***	-8.234	-12.766***	-7.907***

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 6. Government Revenue, Institutional Quality and Income Inequality: PMG Estimates

Long run co-integrating vectors

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Government revenue	-0.579***	-0.552***	-0.030	-0.657***	-0.638***	-0.944***
	(0.174)	(0.144)	(0.050)	(0.133)	(0.141)	(0.223)
Institutional quality	-6.232***	-13.73***	-5.036**	-15.61***	-12.78***	-25.11***
	(1.571)	(3.608)	(2.193)	(3.169)	(3.253)	(6.661)
Revenue*Inst. quality	0.159***	0.583**	0.291*	0.208	0.302***	0.073
	(0.040)	(0.244)	(0.167)	(0.145)	(0.084)	(0.318)
Economic growth	0.007	0.015**	0.007	0.017***	0.004	0.015*
	(0.007)	(0.007)	(0.008)	(0.005)	(0.010)	(0.008)

Error correction	-0.521***	-0.496***	-0.506***	-0.519***	-0.401***	-0.478***
Observation	540	540	540	540	540	540
Log likelihood	-356.073	-383.389	-369.401	-381.483	-399.784	-383.679

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

Table 7. Public Spending, Institutional Quality and Income Inequality: PMG Estimates

Long run co-integrating vectors

Dependent variable: GINI index (income inequality)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Public spending	-0.544*** (0.064)	-0.607*** (0.071)	-0.171*** (0.016)	-0.108*** (0.041)	-0.562*** (0.113)	-0.169** (0.085)
Institutional quality	-5.312 (3.699)	-13.59*** (1.974)	-2.942*** (0.677)	-3.279*** (1.055)	-5.372** (2.643)	-4.072 (2.740)
Spending*Inst. quality	0.224*** (0.042)	0.317*** (0.044)	0.198*** (0.041)	0.063** (0.027)	0.216*** (0.061)	0.074 (0.065)
Economic growth	0.006 (0.006)	0.025*** (0.006)	0.001 (0.011)	0.004 (0.007)	-0.013 (0.010)	0.014 (0.015)
Error correction	-0.366***	-0.285***	-0.345***	-0.575***	-0.290***	
Observation	540	540	540	540	540	540
Log likelihood	-384.177	-401.726	-360.160	-375.799	-412.204	-381.171

*Note: ***, **,* denote significance level at 1%, 5%, 10%, respectively.*

6. Conclusions

Fiscal policy keeps a crucial role in running the economy while global income inequality is becoming a severe challenge. In particular, governments in advanced economies can use

appropriate fiscal policy to tackle the income gap in society. Given these facts, the paper investigates the impacts of fiscal policy, institutional quality and their interaction on income inequality for a balanced panel dataset of 30 advanced economies between 2002 and 2020. It employs the S-GMM and the PMG estimator for estimation and robustness checks. The estimated results indicate that fiscal policy reduces income inequality, and this negative impact is impeded by institutional quality. Furthermore, economic growth and unemployment enhance income inequality.

These findings imply that advanced economies should design, formulate and enforce laws to set up a sound fiscal policy to deal with the problem of the income difference between high-income and low-income individuals. Governments in these economies can keep receiving more social security contributions from wealthy individuals and taxing heavily high-income individuals, then use it to support the poor through social transfers. Furthermore, a sound fiscal policy will reduce budget deficits and prevent future debt crises. Future research should investigate a comparative analysis of the contribution of institutional quality to the fiscal policy – income inequality relationship by sector/industry between advanced and developing economies.

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