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The Fiscal Policy - Inequality Nexus in Developing and Advanced Economies: Difference-Based Policy Insights

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Abstract

Fiscal policy plays a critical role in the economy, helping governments to manage economic cyclicality and correct market failures. It also plays a significant role in reallocating national income, which can have an impact on income inequality in society. However, the effects of fiscal policy on income inequality may differ between developed and developing countries. To investigate it, the paper applies the system GMM and PMG estimators to empirically study the influence of fiscal instruments on inequality for a sample of 30 advanced economies and 34 developing economies from 2002 through 2020. The results show some interesting findings. Firstly, fiscal instruments tend to reduce inequality in advanced countries but increase it in developing countries. Secondly, economic growth can lead to greater inequality in developed countries, while it reduces inequality in developing economies. Finally, unemployment in advanced economies and education in developing economies tend to enhance income inequality. These findings offer valuable policy lessons for governments seeking to use fiscal policy to address income inequality in society.

1. Introduction

Income inequality is emerging as a severe challenge in advanced and developing economies under increasing globalization because it can lead to social instability. Reducing the income gap in society across countries becomes one of the eight MDGs proposed by the United Nations. Governments in advanced economies have the proper resources to achieve this goal. By contrast, in developing economies, governments lack appropriate resources and solutions to deal with it.

Fiscal policy is the most important instrument of governments in running the economy, especially in overcoming its economic cyclicality. The governments actively increase government expenditure or decrease tax or both for an economic recession (a fiscal expansion). They are willing to cut public expenditure or increase taxes or both for a very fast-growing economy (a fiscal contraction). In practice, fiscal policy shows its significant role in economic development and growth. For

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instance, governments can allocate national resources through public spending and tax to correct market failures and reallocate national income. Therefore, fiscal policy can significantly contribute to narrowing income inequality in society. Notably, government expenditures have a crucial position throughout economic development. It is essential for developing infrastructure, including water, electricity, and roads. It provides services of education and health for an economy more effectively and efficiently than the market can do (Hall, 2010). By reallocating money to low-income individuals, it can handle income inequality created by the market. Three-quarters of the global effort to fight against climate change will stem from public spending. More importantly, Hall (2010) argues that the burden of taxation seems less fair as most economies turn to regressive taxes like VAT (value-added tax), which hit low-income individuals more heavily, and because companies pay less and less, even though a share of national income is increasing.

Fiscal policy is widely acknowledged as a crucial tool in addressing income inequality, but its impact on inequality is a subject of ongoing debate among economists and policymakers. While several studies have investigated the relationship between fiscal policy and inequality, there is a lack of empirical evidence on the divergent effects of fiscal instruments on inequality between developing and developed economies. This study aims to address this gap in the literature.

The role of governments in addressing income inequality has become increasingly important, and fiscal policy has different effects on inequality in advanced and developing economies. To investigate this issue, we examine the influence of fiscal instruments on income inequality in a sample of 30 advanced economies and 34 developing economies between 2002 and 2020. We employ the system-GMM and PMG estimators to estimate the effects of fiscal instruments on inequality and check the robustness of our results.

Our paper is structured as follows. Section 1 provides an introduction, and Section 2 gives an overview of global fiscal policy and economic inequality. In Section 3, we present the theoretical background and literature review on the fiscal policy-inequality nexus. Section 4 outlines our methodology and research data. We report our results and discussion in Section 5, and Section 6 offers our conclusions and policy recommendations.

2. Overviews on the Global Fiscal Policy and Income Inequality

2.1 Global Fiscal Policy

In 2019, OECD (2021) recorded an average tax revenue of 33.8% of GDP, with value-added taxes, social security contributions, and income taxes (both personal and corporate) on the rise. Taxes on services and goods constituted 32.7% of these revenues, while personal income taxes made up 23.5%, and social security contributions contributed 25.7% to the total.

In contrast, Latin America & the Caribbean saw an average tax revenue of 22.9% of GDP, heavily reliant on taxes on services and goods, accounting for 49.8% of their tax income, with VAT being the primary source at 27.7%. Public revenues from income and profits amounted to 27%, while social security contributions were 17.1% of tax revenues (OECD, 2021a).

Africa had an average tax revenue of 16.5% of GDP, with taxes on services and goods constituting 51.9% of tax revenues, mainly driven by a 29.7% VAT contribution. Taxes on profits and income captured 38.7%, and social security contributions plus personal income taxes amounted to 24.7% of revenues (OECD, 2021b).

Asia & the Pacific recorded an average tax revenue of 21% of GDP, falling between Africa and Latin America & the Caribbean on the scale. Taxes on services and goods accounted for 49.8%, while personal income taxes contributed 17.0%. Social security contributions played a minor role at 6.6% (OECD, 2021c).

Furthermore, a gap in public expenditure exists among world regions, with advanced economies, particularly European countries, allocating a higher percentage of GDP to government expenditure. In contrast, developing economies like Nigeria only dedicated around 6% of GDP. Advanced economies also invested more in social spending and transfers, while African economies allocated less GDP to social transfers. Moreover, advanced economies leaned heavily on private sectors for services and goods, with public procurement representing a significant portion of public expenditure and GDP in countries like Greece and the Netherlands.

2.2 Global Income Inequality

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

Although Africa and Latin America are still the regions having the highest economic inequality, income inequality has decreased in 17 out of the 19 Latin American economies. Disparities in income kept rising in South Africa during the post-apartheid period despite the expansion of social protection and sustained economic growth. High wage gaps, strong polarization in the labor force, and persistently high unemployment were the causes leading to high-income inequality in this country in 2015. Income inequality in most economies of Latin America & the Caribbean increased during the 1990s due to a decade of widening wage gaps and strong economic instability. However, it has decreased since 2000. Since 2010, it has risen in Mexico, Brazil, and Argentina.

Most economies in Asia enjoyed high-income inequality in the 1990s. In particular, the income gap in China increased in the 1990s and early 2000s and has decreased since 2008 because this country effectively implements policies to deal with income inequality and poverty, and regional income inequalities have decreased.

Notably, the share of income by the top 1% of the population 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 share of the richest 1% before transfers and taxes rose to 28.3% in 2015 from 26.2% in 2001.

3. Literature Review

3.1 Fiscal Policy and Inequality

The recent interest on the fiscal policy and inequality nexus is rooted in the neo-Keynesian approach to economic policy, which emphasizes the increasing role of governments in the economy. Keynesian economists argue that fiscal policy instruments are essential for managing economic cyclicality and correcting market failures. Governments can use public spending and taxation to redistribute national income and narrow income inequality in society. Alesina & Ardagna (1998) contend that government spending reduces economic inequality by providing basic social welfare policies such as education, healthcare, social safety nets, and public employee plans.

In contrast, the traditional political economy view stresses that governments use distortionary taxation to redistribute national income in the event of high inequality (Persson & Tabellini, 1994; Alesina & Rodrik, 1994; Persson & Tabellini, 2000). However, this direct taxation can be detrimental to the economy due to its adverse effects on incentives for the continuous accumulation of physical and human capital. By contrast, the new version of the political economy view rejects the hypothesis of a negative impact of distortionary taxation on growth and supports a positive link between redistributive spending and economic growth.

Overall, these theoretical perspectives provide a basis for understanding the complex relationship between fiscal policy and inequality. While government spending can reduce economic inequality through social welfare policies, the use of direct taxation for redistribution may have negative economic effects. Policymakers must balance these competing factors to design effective fiscal policies that promote economic growth and reduce income inequality.

Regarding institutional quality, Perera & Lee (2013) argue that institutional quality has a significant impact on income inequality. Poor institutional quality, such as high corruption, can result in public officials changing public expenditure composition in ways benefit the wealthy and harm the poor, thus exacerbating income inequality (Andres & Ramlogan-Dobson, 2011). Notably, through the process of democratization, which involves extending political power to less affluent segments of society, there emerges a stronger tendency to implement pro-poor policies that are intrinsically connected to fair redistribution. This, in turn, results in a decrease in inequality (Acemoglu et al., 2015). Interestingly, the effect of fiscal policy on income inequality differs between developed and developing countries. Specifically, fiscal policy tends to reduce inequality in advanced countries but increases it in developing countries. This discrepancy can be attributed to differences in socio-economic characteristics between the two groups.

One significant difference is in the level and nature of social spending. Advanced economies allocate a higher proportion of national income to social protection than developing countries, with a particular focus on social transfers (Ortiz-Ospina & Roser, 2016). In contrast, developing countries in Asia, the Pacific,

sub-Saharan Africa, and Latin America allocate less funding to social protection, with social transfers playing a less significant role.

Another difference lies in the revenue sources of governments. Developing economies in sub-Saharan Africa, Latin America, and Asia-Pacific rely more on revenue from taxes on goods and services and corporate income taxes, while advanced economies generate more revenue from personal income taxes and social security contributions (OECD, 2021). This suggests that governments in developing economies do not prioritize collecting taxes from high-income individuals and instead rely on equal taxation for all. In contrast, governments in advanced economies focus on taxing the wealthy and heavily rely on social security contributions from high-income individuals.

Regarding public spending, advanced economies focus on social transfers and other measures aimed at supporting low-income individuals and reducing income disparities between the rich and poor. Developing economies, on the other hand, tend to allocate more public spending to infrastructure and only partially invest in health and education, which benefit all members of society equally.

In conclusion, the differences in social spending and taxation policies between advanced and developing economies can help explain the divergent effects of fiscal policy on income inequality.

3.2 Literature Review

According to Coady & Gupta (2012), over the past few decades, income inequality has risen in many advanced and developing economies due to various factors such as globalization and technological advancements. Advanced economies have successfully reduced income inequality through fiscal policies, primarily through progressive income taxation and expenditure programs. However, in developing economies, to enhance the distributive impact of fiscal policies, there is a need to improve their capacity to generate tax revenues and allocate those resources more efficiently and equitably. Meanwhile, compared with other topics linked with income inequality, research on the nexus between fiscal policy and economic inequality has recently been studied. Increasing globalization highlights the role of governments in narrowing income inequality as one of the eight SDGs suggested by the United Nations. Some studies indicate that public spending widens income inequality in developing countries and narrows it in advanced countries. Notably, most related studies note that tax revenue reduces income inequality.

Wong (2016), Wong (2017), and Cevik & Correa-Caro (2020) note that public spending widens income inequality. Wong (2016) applies the panel-corrected standard errors estimator for a dataset of 16 countries in Asia & the Pacific from 1960 to 2012 and finds that public spending on welfare increases income inequality but public spending on health decreases it. Similarly, Wong (2017) uses a Prais–Winsten process for a group of 16 Asian economies and a group of 18 Latin American economies between 1996 and 2009 and indicates that public spending in Latin America enhances income inequality but public spending in Asia reduces it. Recently, Cevik & 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 a greater redistributive impact in the long term. By contrast, Kollmeyer (2015) and Apergis (2021) indicate that public spending narrows income inequality. Kollmeyer (2015) uses a random-effects model for a dataset of 16 Western economies from 1970 through 2010. More recently, Apergis (2021) applies a two-stage PLS method 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 inequality in Japan using the VECM model from 2002Q1 to 2017Q3.

Unlike the above studies, Hayes & Medina Vidal (2015), Clifton et al. (2020), Gunasinghe et al. (2020a), and Nguyen (2023) discover that fiscal policy (public spending and tax revenue) narrows income inequality. Hayes & Medina Vidal (2015) note that government spending in cash assistance and unemployment compensation, coupled with income generated from corporate taxes, have been identified as effective measures in diminishing inequality at the state level by applying Dynamic Fixed Effects Panel Error-Correction for 50 U.S. states between 1976 and 2006. In the same vein, Clifton et al. (2020) employ a fixed effects model and a bias-corrected LSDVC estimator for a group of 17 Latin American economies from 1990 to 2014. They note that the redistributive impact of fiscal instruments in these economies is motivated by changes in fiscal policy linked with a new version of the political cycle and economic expansion in this region in the early 21st century. Meanwhile, Gunasinghe et al. (2020a) use a simultaneous equations model for 19 developed economies from 1995 to 2015. They suggest that governments in these economies should use redistributive spending financed by direct taxes to narrow inequality. Recently, Nguyen (2023) note that fiscal policy reduce income inequality for 30 developed countries between 2002 and 2020 using system GMM and PMG estimators. However, Gunasinghe et al. (2020b) and Aye & Odhiambo (2022) provide different findings. Gunasinghe et al. (2020b) use a small structural vector autoregressive (SVAR) model and a structural vector error correction (SVEC) model for a dataset of Australia from 1965 to 2014 and discover that lowering direct taxation receipts leads to an increase in per capita real GDP without exacerbating income inequality. Conversely, a decrease in government expenditure was found to have a notable impact on increasing income inequality, while reductions in indirect taxation receipts were associated with a decrease in income inequality. Similarly, Aye & Odhiambo (2022) utilize the system GMM estimator to analyze a dataset from 2010 to 2018, comprising 64 middle-income countries. Their findings reveal a noteworthy inverse relationship between taxes levied on income, profits, and capital gains, indicating a substantial reduction in wealth inequality. In contrast, government expenditures exert no discernible impact on wealth inequality.

Regarding the contribution of institutional quality to economic inequality, Andres & Ramlogan-Dobson (2011) argue that public officials in countries with high corruption could change social expenditure composition that is good for the rich and bad for the poor, increasing income inequality. Most studies like Blancheton & Chhorn (2021), Law & Soon (2020), Josifidis (2017), Kunawotor (2020), Nadia & Teheni (2014) note that institutional reforms decrease economic inequality. Nadia & Teheni (2014) use non-parametric tests for a dataset of 39 economies between 1996 through 2009, while Josifidis (2017) applies a FEVD method for a group of 21

OECD economies from 1990 to 2010. Meanwhile, Law & Soon (2020) employ the two-step system GMM estimator for a dataset of 65 countries (develped and developing), and Kunawotor (2020) uses the two-step difference GMM estimator for a sample of 40 African developing countries during the period 1990 and 2017. Lately, Blancheton & Chhorn (2021) use FMOLS and the DOLS for a dataset of 8 developing countries in Asia during between 1988 and 2014. These researchers confirm that government expenditure reduce inequality. However, Perera & Lee (2013) discover that governance/institutional quality boosts economic inequality in 9 countries in Asia during the period 1985 - 2009 using the one-step system GMM estimator. These researchers emphasize that institutional reforms should address poverty and income distribution in East & South Asian developing countries. In particular, Asamoah (2021) note that the difference in institutional quality between 52 developing and 24 developed countries leads to its opposite impact on inequality by applying the threshold panel dynamic model. Furthermore, he discovers an inverted U-shaped nexus between growth and inequality from developing to advanced countries.

Regarding determinants of economic inequality, Deyshappriya (2017), Berisha et al. (2020), Asogwa et al. (2021), and Hailemariam et al. (2021) examine the factors affecting economic inequality. Deyshappriya (2017) applies the one-step difference GMM estimator for a sample of 33 Asian economies between 1990 and 2013 and notes that labor force, education, and ODA reduce income inequality and political risk, trade openness, unemployment, and inflation increase it. In particular, he indicates an inverted U-shaped nexus between growth and inequality in these countries. Berisha et al. (2020) apply the PMG and CCE estimator for a dataset of BRICS countries from 2001 to 2015 and find that real interest rates, inflation, and economic growth enhance inequality. Lately, Asogwa et al. (2021) use the fixed effects model and pooled OLS regression for a dataset of 28 African developing countries between 2001 and 2016 and discover that unemployment and education boost inequality and inflation, economic growth, and labor force reduce it. In the same vein, Hailemariam et al. (2021) employ the panel VAR for a sample of 17 developed countries during the period 1870 - 2016 and confirm that education, interest rate, financial development, and public expenditure decrease inequality and economic growth increases it.

Our literature review has revealed a gap in the existing research, as no studies have yet assessed the distinct impacts of fiscal policy on income inequality in developed and developing countries, nor have they provided empirical evidence to support such assessments. Furthermore, we have found no studies that have applied both two-step system GMM and PMG estimators, which are essential for addressing serial autocorrelation and endogenous phenomena in empirical models. As such, our paper represents a novel contribution to the literature by addressing these gaps in knowledge.

4. Methodology and Research Data

4.1 Methodology

Following the literature review, we use the empirical equation as follows:

$$GIN_{it} = \gamma_0 + \gamma_1 GIN_{it-1} + \gamma_2 FIS_{it} + X_{it}\gamma' + \mu_i + \tau_{it} \quad (1)$$

where subscript t denotes a country index and i is a time index. GIN_{it} is the Gini index, a proxy for income inequality with its value from 0 to 100 where 0 indicates the lowest equality and 100 notes the highest inequality; GIN_{it-1} is the initial level of income inequality; FIS_{it} is fiscal policy (government revenue/public spending). X_{it} includes economic growth, education, and unemployment (control variables); μ_i is a time-invariant, country-specific, unobserved effect and τ_{it} is an observed error term; γ_0, γ_1, γ_2, and γ' are estimated coefficients. From related studies like Deyshappriya (2017), Wong (2017), Berisha et al. (2020), Cevik & Correa-Caro (2020), Clifton et al. (2020), Gunasinghe et al. (2020a), Asogwa et al. (2021), and Hailemariam et al. (2021), we use education, economic growth, and unemployment as control regressors in estimation equations.

The paper uses Eq. (1) to test the influence of fiscal instruments on income inequality for a dataset of 30 developed countries and a dataset of 34 developing countries. Some severe econometric issues come from regressing Eq. (1). Government revenue, economic growth, public spending, and unemployment could be endogenous regressors. These regressors could correlate with μ_i, leading to the endogenous problem. Besides, some fixed effects that exist in μ_i could correlate with the regressors. Furthermore, GIN_{it-1} could lead to serial correlation in empirical equations. Finally, the dataset contains a large number of countries (M = 34) and a relatively short observation length (H = 19). These issues could make the OLS regression biased. Traditional panel regressions like FEM and REM cannot handle serial autocorrelation and endogenous phenomena. Meanwhile, the IV-2SLS estimator should accompany by some appropriate instruments outside of empirical models. Following Judson & Owen (1999), the paper applies the two-step system GMM and PMG estimators to estimate and check the robustness.

GMM was originally proposed by Holtz-Eakin et al. (1988), and later developed by Arellano & Bond (1991). There are two types of GMM: the system and the difference. The past values of persistent variables do not provide information about their changes in the future, causing their lags to become weak instruments in the difference GMM estimator. Therefore, the system GMM estimator (SGMM) is better than the difference GMM estimator (Arellano & Bover, 1995).

In practice, the two-step SGMM is more asymptotically efficient than the one-step SGMM. Nonetheless, utilizing the two-step SGMM with limited research samples presents an issue, as highlighted by Roodman (2009). Accordingly, the instrument proliferation increases quadratically once the time dimension rises. This problem makes the number of instruments much larger than the number of countries. The solution is to apply the rule of thumb to keep them less than the number of panel units (Roodman, 2009). Arellano-Bond tests, Sargan tests, and Hansen tests are used to check the validity of instrumental regressors. The Arellano-Bond test AR(2) detects serial correlation of errors in the first difference, and the Hansen and Sargan tests discover endogenous phenomena.

The paper uses the PMG estimator developed by Pesaran et al. (1999) to check the robustness of the two-step SGMM estimates. The PMG-based VECM model is shown as follows:

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

where Y is the Gini index, a proxy for income inequality; X_{it-1} is the deviation from long-run equilibrium at any period for group i, and ψ is the speed of adjustment or the error-correction coefficient. The vector λ captures the long-run coefficients. They express the long-run elasticity of income inequality in corresponding with each variable in Z_{it-1}. Meanwhile, the vector π captures the short-run responses of the Z variables. μ_i is a fixed effect and τ_{it} is an error term. The adjustment speed ψ (smaller than 1, negative) is used to check the validity of the PMG estimates.

4.2 Data

Data are the Gini index, government expenditure, public revenue, real GDP per capita (constant 2015 US$), primary school enrollment, and unemployment. The study extracts them from World Bank WDI and IMF WEO databases. The research sample contains 30 advanced economies[2] and 34 developing economies[3] between 2002 and 2020. The categorization of countries is based on the IMF approach. In this paper, the dependent variable (the Gini index) is used as before-tax and before-social redistribution/net income. It quantifies the degree to which the dispersion of income (or occasionally, spending) among individuals or households within an economy differs from a state of complete equality in distribution.

The study presents the definition and descriptive statistics of data and the matrix of correlation coefficients between variables in the Appendix (Table A, Table B, Table C, Table D, and Table E). The results in Table D (advanced economies) show that government revenue, public spending, and economic growth are negatively linked with inequality, and education and unemployment are positively associated with it. Similarly, the results in Table E (developing economies) indicate that government revenue, public spending, and unemployment are negatively linked with income inequality, and education and economic growth are positively connected with it. Notably, the value of the correlation coefficient between government revenue and public spending is very high (larger than 0.8), so the paper uses government revenue and public spending separately in empirical equations to rule out the linearity among them.

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

[3] Argentina, Armenia, Brazil, Bulgaria, Bolivia, Belarus, Colombia, China, Chile, Georgia, Ecuador, El Salvador, Dominican Republic, Croatia, Costa Rica, Hungary, Kyrgyz Republic, Indonesia, Honduras, Kazakhstan, Malaysia, Vietnam, Mexico, Thailand, Moldova, Ukraine, Pakistan, Turkey, Peru, Romania, Paraguay, Poland, Panama, and Russian Federation.

5. Estimated Results and Discussion

5.1 The SGMM Estimates

The two-step SGMM estimates are given in Table 1 and the one-step SGMM estimates are presented in Table 2. In estimation procedures, the paper detects that government revenue/public spending is endogenous. Therefore, it uses government revenue/public spending as an instrumented regressor in gmm style and other variables (economic growth, education, unemployment, and income inequality) as instrumental regressors in iv style.

The results in all tables indicate that government revenue/public spending reduces inequality in developed countries and increases it in developing countries. However, economic growth increases income inequality in developed countries and decreases it in developing countries. Moreover, unemployment in advanced economies and education in developing economies enhance income inequality.

What leads to the fact that fiscal instruments reduce inequality in developed countries and increase it in developing countries? We look at two distinct features in fiscal policy between advanced and developing economies: (i) As compared with developing economies, advanced economies spend more on social protection (Ortiz-Ospina & Roser, 2016). These economies have higher levels of social spending and use a large ratio of the national income on social transfers. Developing economies, by contrast, have much lower levels of social transfers that play a less crucial role. (ii) Government revenue in developing economies (Asia & the Pacific, Latin America & the Caribbean, and Africa) comes from taxes on services & goods and corporate income taxes, while that in advanced economies comes from social security contributions and personal income taxes. Therefore, in the view of taxation, it notes that advanced economies receive the social security contributions of the wealthy individuals in society, which narrows the income gap between the rich and the poor. By contrast, developing economies do not heavily tax high-income individuals and collect taxes equally on all individuals. On the other hand, given public spending, advanced economies spend high levels of social transfer for low-income individuals and the poor in economic development and growth, narrowing income inequality between the rich and the poor. By contrast, developing economies use high levels of public spending on infrastructure development, and partly on education and healthcare that are equally benefited by all citizens in society.

This finding shows that governments in developing economies need to adjust fiscal policy appropriately to receive the social security contributions of the wealthy individuals in society and tax heavily high-income individuals and spend more public spending on social transfers like advanced economies. More importantly, governments in these economies should increase public expenditure on health and education to support the poor to improve their knowledge and skills, narrowing the income gap between the poor and the rich. Income inequality is one of the inherent social natures in human development, meaning that we cannot eliminate income inequality but can reduce it. In particular, equality and efficiency are two opposite sides of the same coin, so when 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 increasing social instability. In contrast, when they choose equality, it leads to heavy taxation on the rich, a decline in investment and employment, and an increase in unemployment, increasing social instability. It implies that governments need to choose a point at which equity and efficiency relatively exist for society to function well.

Economic growth reduces inequality in developing economies but increases it in developed ones, as shown in Figure 1 in the Appendix. In developing countries, inequality generally decreases as income per capita rises during economic development. However, in developed countries, it rises as they achieve higher levels of development. This finding contradicts Kuznets' hypothesis of an inverted U-shaped curve, where inequality was expected to first increase and then decrease with rising per capita income (Kuznets, 1955). The foundational Solow growth model serves as the framework for explaining these patterns. According to this model, lower economic development is associated with lower education levels, while economic growth leads to a transition from low to moderate development levels. During this transition, we can expect a simultaneous decrease in the growth rate, an increase in educational attainment, and a reduction in inequality. These interconnected trends are summarized in Table 1 for developing countries.

Moving from moderate to high-income economies is anticipated to lead to slower growth rates, higher education levels (as indicated by the Solow growth model), and an increase in income inequality. Interestingly, this pattern closely aligns with the results in Table 1 for developed countries. Notably, the impact of education seems somewhat muted in these findings, especially when using the primary education indicator instead of the tertiary education indicator. Asogwa et al. (2021) and Wong (2017) find that growth in Latin American countries reduces inequality, while Hailemariam et al. (2021), Apergis (2021), and Berisha et al. (2020) observe that growth in 21 advanced countries actually increases inequality.

Governments in developing countries provide basic education for free. All students do not have to pay the fee for studying at public schools. However, rich households are willing to pay fees for their students to attend private schools with high quality. The students of these wealthy households may receive better skills and knowledge than students of average ones. Because of this, wealthy students can get jobs with high salaries and more promotions, which boosts the income gap. Therefore, education increases inequality in developing countries. This result has been shown in Kaulihowa & Adjasi (2018), Demir et al. (2020), and Asogwa et al. (2021). However, the rise in inequality in education is not necessarily bad for the economy and society. In addition to the effects of different education quality, education leads, in general, to higher income and poverty reduction. While this is a very important and positive feature of economic development, it may also be characterized by a rise in inequality.

Unemployment is a common occurrence among the poor, who often lack the necessary knowledge and skills to secure well-paying jobs, leading to increased income disparity. This finding has been corroborated by Asogwa et al. (2021) and Deyshappriya (2017). To address this issue, governments in developed countries should provide support for the poor to access education and healthcare services,

which can help improve their knowledge and skills, thereby increasing their chances of securing good jobs with high salaries.

Table 1 Fiscal Policy and Income Inequality: Two-step SGMM
Dependent Variable: Income Inequality (Gini index)

Variables	*Government revenue*		*Public spending*	
	Developed countries	*Developing countries*	*Developed countries*	*Developing countries*
Inequality (-1)	0.852*** (0.033)	0.954*** (0.019)	0.902*** (0.023)	0.953*** (0.012)
Fiscal variable	-0.083*** (0.028)	0.072** (0.031)	-0.035*** (0.012)	0.047** (0.020)
Economic growth	0.006*** (0.001)	-0.002** (0.001)	0.002*** (0.000)	-0.002** (0.001)
Education	0.011 (0.010)	0.023** (0.009)	0.013 (0.011)	0.023*** (0.008)
Unemployment	0.067*** (0.020)	-0.040 (0.024)	0.052*** (0.014)	-0.033 (0.028)
Instrument	22	24	22	25
Country/Observation	30/540	34/578	30/540	34/578
AR(2) test	0.251	0.406	0.174	0.426
Sargan test	0.871	0.869	0.569	0.296
Hansen test	0.806	0.885	0.881	0.346

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

Table 2 Fiscal Policy and Income Inequality: One-step SGMM
Dependent Variable: Income Inequality (Gini index)

Variables	*Government revenue*		*Public spending*	
	Developed countries	*Developing countries*	*Developed countries*	*Developing countries*
Inequality (-1)	0.867*** (0.024)	0.959*** (0.016)	0.889*** (0.019)	0.954*** (0.014)
Fiscal variable	-0.069*** (0.025)	0.073** (0.035)	-0.052*** (0.021)	0.051** (0.025)
Economic growth	0.005*** (0.001)	-0.002* (0.001)	0.003*** (0.001)	-0.002* (0.001)
Education	0.011 (0.007)	0.019*** (0.007)	0.015 (0.007)	0.022*** (0.007)
Unemployment	0.056*** (0.016)	-0.052 (0.025)	0.065*** (0.020)	-0.031 (0.020)
Instrument	21	23	21	24
Country/Observation	30/540	34/578	30/540	34/578
AR(2) test	0.209	0.173	0.158	0.196
Sargan test	0.912	0.951	0.898	0.408

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

5.2 Robustness Check

The study applies the PMG model in Equation (2) to check the robustness. PMG requires the existence of co-integration in empirical equations. First, the paper checks the stationary of regressors to guarantee that they have a similar integration order. Then, it conducts the co-integration tests developed by Westerlund (2007).

The results of stationary tests in Table F, Table G, and Table H (Appendix) note income inequality, government revenue, public spending, economic growth, unemployment, and education are stationary at significance levels lower than 10%. It implies that all regressors have zero order of integration I(0). The Westerlund tests in Table I and Table J (Appendix) report that at least three in four tests reject the null hypothesis. It confirms that public spending, government revenue, economic growth, unemployment, and education co-integrate with income inequality.

The results for both advanced and developing economies by the PMG estimator are presented in Table 5. Similar to the SGMM estimates, government revenue/public spending decreases inequality in advanced economies but increases it in developing economies. These findings note that fiscal policy narrows income inequality in advanced economies but widens in developing countries. However, economic growth boosts income inequality in developed countries and reduces it in developing countries. Besides, unemployment in advanced economies and education in developing economies enhance income inequality.

Table 3 Fiscal Policy and Income Inequality: PMG Long Run Co-Integrating Vectors Dependent Variable: Income Inequality (Gini Index)

Variables	*Government revenue*		*Public spending*	
	Developed countries	***Developing countries***	***Developed countries***	***Developing countries***
Fiscal variable	-0.071*** (0.028)	0.183*** (0.052)	-0.068*** (0.023)	0.003*** (0.001)
Economic growth	0.026*** (0.009)	-0.028*** (0.006)	0.017*** (0.006)	-0.010** (0.005)
Education	-0.255 (0.040)	0.112*** (0.021)	-0.217 (0.043)	0.099*** (0.020)
Unemployment	0.154*** (0.025)	-0.007 (0.057)	0.199*** (0.050)	-0.143 (0.040)
Error correction	-0.463***	-0.438***	-0.493***	-0.404***
Observation	540	612	540	612
Log likelihood	-355.377	-714.622	-383.201	-751.767

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

6. Conclusions and Policy Lessons

Fiscal policy has a crucial position in the economy in developed and developing economies, and income inequality is emerging as a severe problem. In particular, governments could use appropriate fiscal policy to handle the income gap in society. Given these facts, the paper examines the influence of fiscal instruments on inequality for a sample of 30 developed countries and a group of 34 developing countries from 2002 to 2020. It uses SGMM and PMG to estimate and check the robustness. The results show that fiscal instruments reduce inequality in advanced

countries and increase it in developing countries. Meanwhile, economic growth increases inequality in developed countries and decreases it in developing countries. Besides, unemployment in advanced economies and education in developing economies enhance income inequality.

These findings in the study imply that governments in developing economies should adjust fiscal policy appropriately to deal with income disparity between the rich and poor in society. They should increase the revenue from receiving the social security contributions of the wealthy individuals and taxing heavily high-income individuals, then use it to support the poor through social transfers. Future research should investigate the government revenue – income inequality relationship as well as the public spending – income inequality relationship by sector.

APPENDIX

Table A Data Description

Variable	*Definition*	*Type*	*Source*
Income inequality (GIN)	"Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution."	value	World Bank
Government revenue (REV)	"Revenue consists of taxes, social contributions, grants receivable, and other revenue."	%	IMF
Public spending (SPE)	"Total expenditure consists of total expense and the net acquisition of nonfinancial assets."	%	IMF
Economic growth (GDP)	"GDP per capita (constant 2015 US$) is gross domestic product divided by midyear population."	log	World Bank
Education (EDU)	"Gross primary school enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown."	%	World Bank
Unemployment (UNE)	"Unemployment refers to the share of the labor force that is without work but available for and seeking employment."	%	World Bank

Table B Descriptive Statistics for 30 Advanced Economies

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Income inequality (GIN)	570	31.612	4.252	23.6	42.5
Government revenue (REV)	570	41.454	8.014	19.291	58.987
Public spending (SPE)	570	43.396	8.115	16.462	64.906
Economic growth (GDP)	570	40492.5	21573.03	8008.474	111968.4
Education (EDU)	570	102.189	4.177	95.648	126.575
Unemployment (UNE)	570	7.648	4.134	2.01	27.466

Table C Descriptive Statistics for 34 Developing Economies

Variable	Obs	Mean	Std. Dev.	Min	Max
Income inequality (GIN)	646	40.5167	8.688	24	59.5
Government revenue (REV)	646	27.206	8.937	12.365	49.103
Public spending (SPE)	646	29.665	9.555	12.821	60.009
Economic growth (GDP)	646	6662.29	4065.923	676.269	16661
Education (EDU)	646	103.812	9.020	70.894	146.827
Unemployment (UNE)	646	6.906	4.039	0.398	20.71

Table D The Matrix of Correlation Coefficients for 30 Advanced Economies

	GIN	*REV*	*SPE*	*GDP*	*EDU*	*UNE*
GIN	1					
REV	-0.463***	1				
SPE	-0.308***	0.848***	1			
GDP	-0.134***	0.366***	0.205***	1		
EDU	0.173***	-0.016	0.059	-0.001	1	
UNE	0.270***	0.006	0.226***	-0.418***	0.024	1

Notes: ***, ** and *denote significance at 1 percent, 5 percent and 10 percent levels respectively

Table E The Matrix of Correlation Coefficients for 34 Developing Economies

	GIN	*REV*	*SPE*	*GDP*	*EDU*	*UNE*
GIN	1					
REV	-0.390***	1				
SPE	-0.391***	0.946***	1			
GDP	0.119***	0.310***	0.288***	1		
EDU	0.505***	-0.111***	-0.129***	0.187***	1	
UNE	-0.126***	0.266***	0.286***	0.205***	0.111***	1

Notes: ***, ** and *denote significance at 1 percent, 5 percent and 10 percent levels respectively

Table F Fisher Unit Root Test: 2002 – 2020 (30 Advanced Economies)

Variables	*Augmented Dickey-Fuller test*		*Phillips-Perron test*	
	Prob > chi2		*Prob > chi2*	
	Without trend	*With trend*	*Without trend*	*With trend*
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**
Economic growth	83.006**	46.863	62.778	27.851
Education	74.315	127.513***	48.405	49.452
Unemployment	80.274**	50.305	62.491	39.629

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

Table G Fisher Unit Root Test: 2002 – 2020 (34 Developing Economies)

Variables	*Augmented Dickey-Fuller test*		*Phillips-Perron test*	
	Prob > chi2		*Prob > chi2*	
	Without trend	*With trend*	*Without trend*	*With trend*
Inequality	47.345	121.670***	104.424***	224.891***
Government revenue	73.721	62.284	125.360***	57.194
Public spending	74.574	67.929	103.656***	102.040***
Economic growth	89.301**	46.413	158.443***	99.259***
Education	69.787	87.478**	122.886***	121.460***
Unemployment	79.560	60.627	107.384***	44.471

Notes: *** *denotes a 1% significance level,* ** *5% significance level, and* * *10% significance level.*

Table H IPS Unit Root Tests: 2002 – 2020

Variables	*Advanced economies*		*Developing economies*	
	Without trend	*With trend*	*Without trend*	*With trend*
Inequality	-1.191**	-2.765***	-1.596**	-2.232***
Government revenue	-2.124**	-3.280***	-2.232**	-5.642***
Public spending	-2.071***	-2.071***	-2.499***	-1.417**
Economic growth	-1.239**	-2.325***	-1.884**	2.955***
Education	-3.400***	-2.617***	-1.426***	-1.987**
Unemployment	-4.200***	-2.307***	-3.392**	-3.336**

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

Table I Westerlund Panel Co-Integration Tests: 2002 – 2020 (30 Advanced Economies) Normalized Variable: 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***
Economic growth	-2.624***	-8.234	-12.766***	-7.907***
Education	-2.363***	-8.117	-9.778**	-5.624*
Unemployment	-2.875***	-15.096***	-9.694**	-6.115**

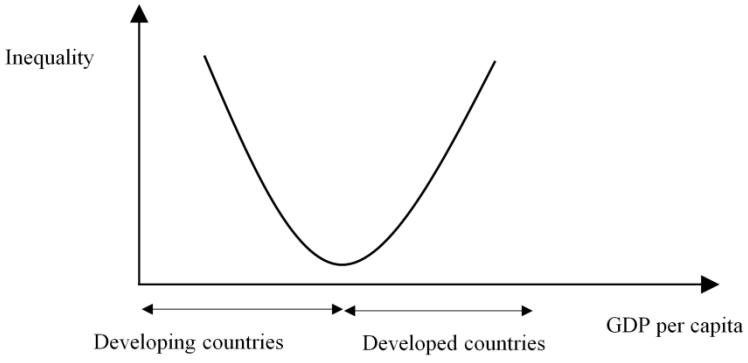
Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

Table J Westerlund Panel Co-Integration Tests: 2002 – 2020 (34 Developing Economies) Normalized Variable: Inequality

Covariates	G_t	G_α	P_t	P_α
Government revenue	-3.441***	-7.196	-13.753***	-8.842***
Public spending	-2.779***	-7.541	-19.652***	-11.787***
Economic growth	-2.740***	-10.555***	-13.892***	-9.531***
Education	-3.842***	-10.991***	-17.896***	-10.299***
Unemployment	-2.774***	-9.005**	-14.281***	-7.051***

Notes: *** denotes a 1% significance level, ** 5% significance level, and * 10% significance level.

Figure 1 The U-Shaped Curve of Income - Economic Inequality



REFERENCES

Acemoglu D, Naidu S, Restrepo P, Robinson JA (2015): Democracy, redistribution, and inequality. In *Handbook of income distribution* (Vol. 2, pp. 1885-1966): Elsevier.

Alesina A, Rodrik D (1994): Distributive politics and economic growth. *The Quarterly Journal of Economics*, *109*(2):465-490.

Alesina A, Ardagna S (1998): Tales of fiscal adjustment. *Economic Policy*, *13*(27):488-545.

Andres AR, Ramlogan-Dobson C (2011): Is corruption really bad for inequality? Evidence from Latin America. *Journal of Development Studies*, *47*(7):959-976.

Apergis N (2021): The role of fiscal policy in the link between income inequality and banking crises. *Applied Economics Letters*, *28*(15):1283-1287.

Arellano M, Bond S (1991): Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2):277-297.

Arellano M, Bover O (1995): Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1):29-51.

Asamoah LA (2021): Institutional Quality and Income Inequality in Developing Countries:A Dynamic Panel Threshold Analysis. *Progress in Development Studies*, 14649934211016715.

Asogwa FO, Onyeke QO, Kuma PM, Arazue WO, Nkalu CN (2021): Do macroeconomic indicators determine income inequality in selected African countries? *Journal of Public Affairs*, e2560.

Aye GC, Odhiambo NM (2022): Dynamic effect of fiscal policy on wealth inequality: Evidence from middle-income countries. *Cogent Economics & Finance*, *10*(1):2119705.

Benabou R (2000): Unequal societies: Income distribution and the social contract. *American Economic Review*, *90*(1):96-129.

Berisha E, Gupta R, Meszaros J (2020): The impact of macroeconomic factors on income inequality: Evidence from the BRICS. *Economic Modelling*, *91*, 559-567.

Blancheton B, Chhorn D (2021): Government Intervention, Institutional Quality, and Income Inequality: Evidence from Asia & the Pacific, 1988–2014. *Asian Development Review*, *38*(1), 176-206.

Cevik S, Correa-Caro C (2020): Growing (un) equal: fiscal policy and income inequality in China and BRIC+. *Journal of the Asia Pacific Economy*, *25*(4), 634-653.

Clifton J, Díaz-Fuentes D, Revuelta J (2020): Falling Inequality in Latin America: The Role of Fiscal Policy. *Journal of Latin American Studies*, *52*(2), 317-341.

Coady MD, Gupta MS (2012): *Income inequality and fiscal policy*. International Monetary Fund.

Demir A, Pesqué-Cela V, Altunbas Y, Murinde V (2020): Fintech, financial inclusion and income inequality: a quantile regression approach. *The European Journal of Finance*, 1-22.

DESA U (2020): World social report 2020: Inequality in a rapidly changing world. *New York, NY: Department of Economic and Social Affairs, United Nations*.

Deyshappriya NP (2017): *Impact of Macroeconomic Factors on Income Inequality and Income Distribution in Asian Countries*. ADBI Working Paper 696. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/impactmacroeconomic-factors-income-inequality-distribution.

Galbraith JK (2007): Global inequality and global macroeconomics. *Journal of Policy modeling*, *29*(4):587-607.

Gunasinghe C, Selvanathan EA, Naranpanawa A, Forster J (2020a): Rising Income Inequality in OECD Countries: Does Fiscal Policy Sacrifice Economic Growth in Achieving Equity? *The European Journal of Development Research*, 1-37.

Gunasinghe C, Selvanathan EA, Naranpanawa A, Forster J (2020b): The impact of fiscal shocks on real GDP and income inequality: What do Australian data say? *Journal of Policy Modeling*, *42*(2):250-270.

Hailemariam A, Sakutukwa T, Dzhumashev R (2021): Long-term determinants of income inequality: evidence from panel data over 1870–2016. *Empirical Economics*, *61*(4):1935-1958.

Hayes TJ, Medina Vidal DX (2015): Fiscal policy and economic inequality in the US states: Taxing and spending from 1976 to 2006. *Political Research Quarterly*, *68*(2):392-407.

Holtz-Eakin D, Newey W, Rosen HS (1988): Estimating vector autoregressions with panel data. *Econometrica: Journal of the Econometric Society*, 1371-1395.

Josifidis K, Supić N, Beker-Pucar E (2017): Institutional quality and income inequality in the advanced countries. *Panoeconomicus*, *64*(2):169-188.

Judson RA, Owen AL (1999): Estimating dynamic panel data models: a guide for macroeconomists. *Economics Letters*, *65*(1):9-15.

Kaulihowa T, Adjasi C (2018): FDI and income inequality in Africa. *Oxford Development Studies*, *46*(2):250-265.

Kollmeyer C (2015): Globalization and income inequality: How public sector spending moderates this relationship in affluent countries. *International Journal of Comparative Sociology*, *56*(1):3-28.

Kunawotor ME, Bokpin GA, Barnor C (2020): Drivers of income inequality in Africa: Does institutional quality matter? *African Development Review*, *32*(4), 718-729.

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

Law CH, Soon SV (2020): The impact of inflation on income inequality: The role of institutional quality. *Applied Economics Letters*, *27*(21):1735-1738.

Nadia ZBH, Teheni ZEG (2014): Finance, governance and inequality: A non parametric approach. *International Strategic Management Review*, *2*(1):31-38.

Nguyen VB (2023): From Fiscal policy to Income inequality in Advanced economies Does Institutional quality matter. *Journal for Economic Forecasting*, (1):165-184.

OECD (2021): The Global Revenue Statistics Database. https://www.oecd.org/tax/tax-policy/about-global-revenue-statistics-database.pdf [Accessed online 27 November 2021].

OECD (2021a): Revenue Statistics in Latin America & the Caribbean 2021. https://www.oecd.org/tax/tax-policy/brochure-revenue-statistics-latin-america-and-caribbean.pdf [Accessed online 29 November 2021].

OECD (2021b): Revenue Statistics in Africa 2020. https://www.oecd.org/tax/tax-policy/brochure-revenue-statistics-africa.pdf [Accessed online 29 November 2021].

OECD (2021c): *Revenue Statistics in Asia & the Pacific 2021*. https://www.oecd.org/tax/tax-policy/revenue-statistics-in-asia-and-the-pacific-5902c320-en.htm [Accessed online 29 November 2021].

Ortiz-Ospina E, Roser M (2016): *Government Spending*. Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/government-spending [Online Resource].

Perera LDH, Lee GH (2013): Have economic growth and institutional quality contributed to poverty and inequality reduction in Asia? *Journal of Asian Economics*, *27*:71-86.

Persson T, Tabellini G (1994): ls lnequality Harmful for Growth. *American Economic Review*, *84*(3):600-621.

Persson T, Tabellini G (2002): *Political economics: explaining economic policy*. MIT press.

Pesaran MH, Shin Y, Smith RP (1999): Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, *94*(446):621-634.

Roodman D (2009): How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, *9*(1):86-136.

Westerlund J (2007): Testing for error correction in panel data. *Oxford Bulletin of Economics and statistics*, *69*(6):709-748.

Wong MYH (2016): Globalization, spending and income inequality in Asia Pacific. *Journal of Comparative Asian Development*, *15*(1):1-18.

Wong MY (2017): Public spending, corruption, and income inequality: A comparative analysis of Asia and Latin America. *International Political Science Review*, *38*(3):298-315.