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The Role of Macroeconomic Policies on Income Inequality in Developing Countries

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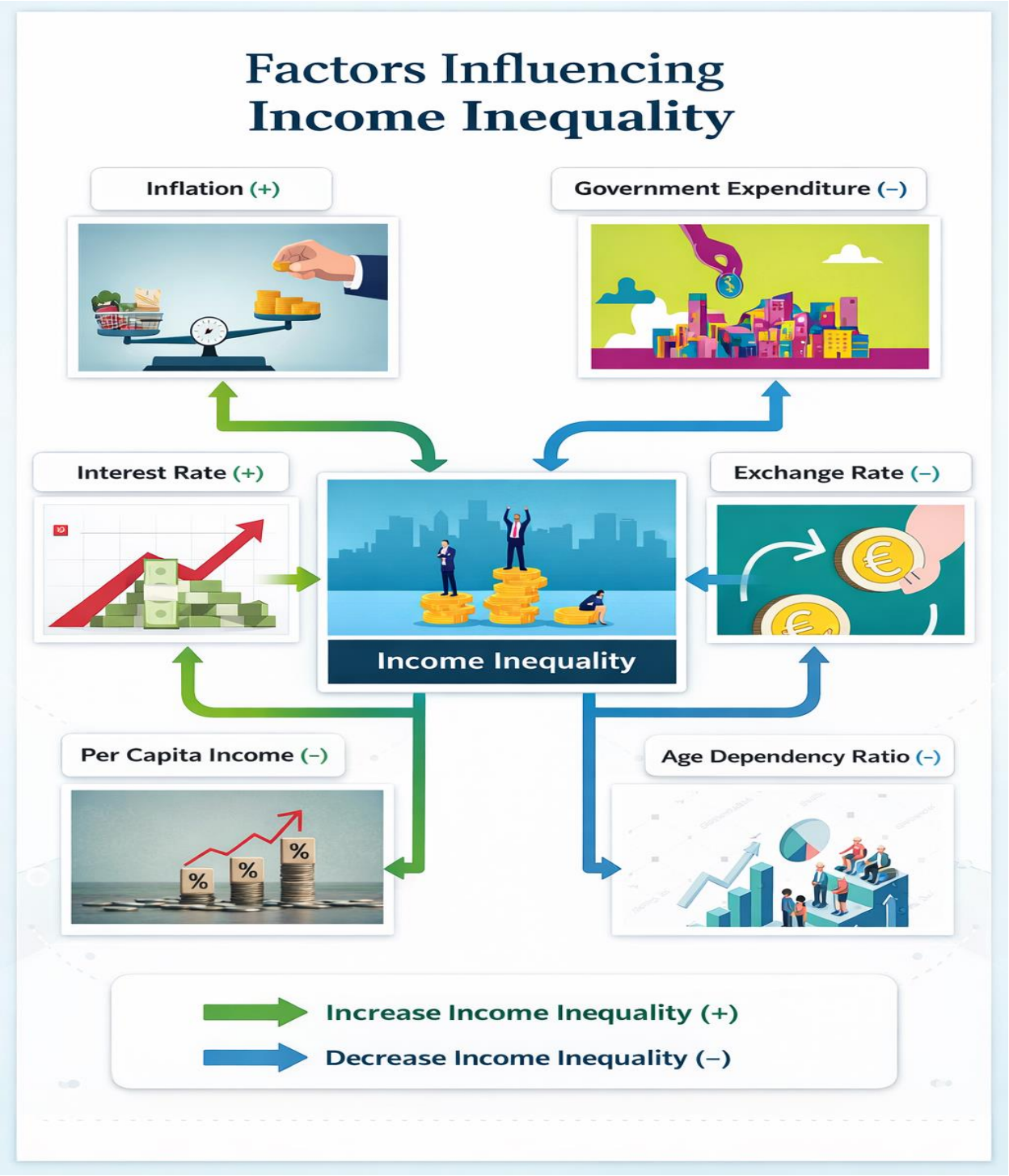
Abstract: *Income inequality (INQ) is a major issue to overcome in order to meet SDG 10 (reduced inequalities), especially in developing countries where fiscal and monetary policy can have opposite distributional impact. Past research focused on the effects of fiscal or monetary policy on inequality, but little research has considered the joint effects of the two policies. The focus of this study is to examine the combined impact of government expenditure, real interest rate, exchange rate, per capita income, age dependency ratio and inflation on income inequality over 55 developing countries for the period 2000–2021. The empirical results, based on a two-step System Generalized Method of Moments (GMM) and panel quantile regression, show that income inequality is negatively related to government expenditure, exchange rate appreciation, per capita income and age dependency ratio. The results show that the real interest rates and inflation have positive coefficients but these effects are not statistically significant in the baseline model. The results also reveal heterogeneous policy effects as the impact of these macroeconomic variables depends on different levels of inequality, as suggested by quantile regression. The results offer a more comprehensive picture of the effect of macroeconomic policies on income distribution. Policy implications indicate that there is a need to increase targeted public expenditure, exchange rate management and demographic factors to help reduce the level of inequality in developing countries.*

Graphical Abstract



Introduction

The escalating income inequality INQ both within and among nation's stands as a defining challenge within the agenda of the sustainable development goals. The proliferation of income differences has become a focal point of extensive scholarly investigation and policy discourse in recent decades. While traditionally associated with low-income countries, it is noteworthy that affluent nations experiencing robust economic progress have concurrently observed a broadening income gap amongst their residents (Coady & Dizioli 2018; Nolan et al. 2019). The World Inequality Report 2022 unveils a stark reality wherein the most affluent ten percent of the worldwide population currently commands a

significant share, amounting to fifty two percent of the world's total income. In stark contrast, the bottom half of the worldwide population estimated as the poorest, collectively possesses a disproportionately modest share, comprising merely 8.5% of the total worldwide income (Chancel et al. 2022) implicit in this pervasive concern is the recognition that INQ exerts profound consequences across various societal dimensions. The ramifications extend to areas such as crime rates, social structure, political stability, poverty levels and social impartiality (Jenkins, 2017; Law & Soon, 2020) conversely, scholars have intimated that the attainment of poverty reduction objectives is contingent upon a simultaneous reduction in the gap between the affluent and the underprivileged. This perspective posits that despite marked economic progress, meaningful advancements in poverty alleviation remain elusive unless accompanied by a commensurate reduction in INQ (Shimeles & Nabassaga 2018; Datt & Murgai 2020).

Fiscal policy has predictably been regarded as a potent tool for persuading various aspects of the economy, including aggregate demand the distribution of income and wealth and the overall capability of the economy to produce goods and services. Fiscal policy is generally recognized as a crucial policy tool for shaping income distribution through mechanisms such as taxation and spending, fiscal policies have a direct effect on the wellbeing of individuals within households. This influence is exerted through monetary transactions involving taxes and transfers as well as the provision of in kind social welfares. In particular, fiscal measures encompass not only the financial aspects of taxes and transfers but also extend to the provision of essential social services, like free education and healthcare (Gupta, 2018). Well targeted public investment can enhance income distribution by granting more equality to healthcare and education and transferring possession of the factors of production (Cevik & Caro, 2020) Nevertheless, some scholars contend that fiscal policy may be limited in its effectiveness in addressing INQ, citing its constraints, particularly in cases where the tax-to GDP ratio is relatively low (kunawoter et al. 2022) when tax-to-GDP ratio is limited, the consequence is a constrained allocation of resources to essential social sectors like education and healthcare, which are vital for the well-being of marginalized populations. Additionally, when fiscal policy predominantly relies on indirect taxes, the resulting impact on INQ can be severe. Indirect taxes by their nature tend to place a disproportionate burden on individuals with lower incomes, thereby exacerbating disparities (Apergis, 2021). Some studies like (Salotti & Trecroci 2018; Caminada et al. 2019; Cevik & Correa 2020; Brinca et al. 2021) have delved into the redistributive outcomes of fiscal policy yielding inconclusive findings. The complexity of fiscal systems, variations in policy implementations and diverse economic contexts contribute to the nuanced and inconclusive nature of these findings.

Monetary policy is conventionally perceived as having a neutral stance concerning income and wealth distributions, primarily driven by central banks' mandates focused on maintaining price stability and fostering overall economic equilibrium. However, a burgeoning body of research has endeavored to systematically document the effect of monetary policy shock on INQ indicating that contractionary monetary policy measures have played a contributory role in the escalation of INQ (Coibion et al. 2017; Mumtaz & Theophilopoulou 2017; Furceri et al. 2018). Empirical findings suggest that when central banks implement contractionary policies, characterized by measures such as higher interest rates or reduced monetary supply, the resultant impacts on various economic variables can disproportionately affect different income groups. Some other studies like (Ledoit 2011; Villarreal 2014; Davtyan 2016; Dolado et al. 2021) observed that a contractionary monetary policy reduced INQ. Other studies consistently show that an expansionary monetary policy be apt to exacerbate INQ with a notable impact on wealth distribution (Saiki & Frost 2014; Domanski et al. 2016 ; Berisha et al. 2018) Indeed, empirical

studies consistently demonstrate a direct effect of expansionary monetary policy on assets prices direct effect of expansionary monetary policy on assets prices highlights its role as another potential driver of inequality. The effect of such policies particularly in influencing the valuation of financial assets, contributes to the dynamics of wealth inequality ((Bordo & Landon- Lane 2013; Domanski et al. 2016).

Stable and competitive policies regarding the real exchange rate are instrumental in fostering economic development. The focus on exchange rate targeting has gained prominence, especially in numerous developing middle-income countries where governments frequently opt for maintaining a low exchange rate while implementing anti-inflationary measures. This involves setting the rate of the domestic currency at a lower level relative to foreign currencies. The objective is to attract capital inflows into the country, necessitating the imposition of high interest rates to appeal to foreign investors. Despite declining debt-to-GDP ratios and rapidly falling inflation rates in these countries, interest rates, particularly in the short term, have been deliberately kept high both nominally and in real terms (Michetti & Tropeano, 2008) study conducted by (Jeanneney & Hua, 2001) examine the impact of exchange-rate fluctuations on the inequality in per-capita income across metropolises & villages in China. Their findings suggested that the effects were influenced by the advantages of increasing product prices resulting from currency depreciation. Notably, these benefits were more pronounced among urban residents compared to their rural counterparts. (Min et al. 2015) conducted study exploring the association b/w INQ exchange rates. Their findings propose a potential link, indicating that increase in a country INQ could be associated with the depreciation of domestic currency.

Based on the significant role of monetary & fiscal policies in shaping INQ in emerging countries this study goals to empirically test the following hypotheses:

Ho: Fiscal policy has no significant effect on INQ.

H_1: Fiscal policy has a significant effect on reducing INQ.

Ho: Monetary policy has no significant effect on INQ.

H_1: Tight monetary policy has a significant effect on raising INQ.

This study adds to the current literature by scrutinizing the impact of both fiscal & monetary policies on INQ, addressing various key research gaps. First, previous studies have largely analyzed the effects of fiscal & monetary policies separately, without considering their combined influence. This study advances the literature by providing a wide-ranging analysis of how these two policy instruments interact to shape income distribution, offering a more holistic perspective on policy effectiveness. Second, the prevailing research has focused on developed economies and single country, this study extends the discussion to developing countries. Given the structural and economic differences between these regions, the findings offer valuable insights tailored to the unique challenges and policy needs of developing nations, thus broadening the applicability of INQ research. Third, this study enhances the understanding of INQ determinants by incorporating key economic variables often overlooked in prior research. By integrating factors such as the exchange rate, per-capita income, age dependency ratio and inflation this study provides an additional nuanced inquiry of the economic forces driving income disparities. This expanded approach strengthens the empirical foundation for policymaking aimed at reducing inequality. Finally, this study makes a significant contribution by offering a more integrated, regionally inclusive, and variable-enriched analysis of INQ, filling critical gaps in the literature and informing more effective policy interventions.

Literature Review

Theoretical review

The basis of Keynesian economics are government expenditure on public welfare programs is essential for managing economic fluctuations and reducing INQ. These strategies help stabilize aggregate demand, promote full employment and address income disparities (Vo et al., 2019). John Maynard Keynes, in his seminal work during the Great Depression emphasized the significance of aggregate demand in driving economic activity and advocated for government intervention through expansionary fiscal policies to stabilize economies, achieve full employment, control inflation, and reduce inequality (Alamanda, 2020; Seabela et al., 2024). (Fishburn & Willig, 1984) expanded on Dalton's principle of allocation for income redistribution, showing that publicly beneficial transfers combined with inverse transfers at higher income levels, generate positive social outcomes. Lerman and Yitzhaki (1995) introduced a method to decompose variations in the Gini-coefficient into components that contracted income gaps and reorganize income levels. Applying this method to U.S. taxes and transfers in they revealed that fiscal policies can effectively reduce inequality by closing income gaps and restructuring income distributions (Seabela et al., 2024).

According to Khan and Khan (2023), the overall distributional impact of monetary policy is shaped by various channels through which it can influence income inequality. Coibion et al. (2017) identify five theoretical mechanisms in this regard: the income composition channel, financial segmentation channel, portfolio channel, redistributive savings channel, and earnings heterogeneity channel. According to the first three, an expansionary monetary policy tends to exacerbate income inequality, whereas the latter two suggest it can help reduce inequality. The behavior of these channels can vary considerably depending on whether the policy is conventional or unconventional. As noted by Davtyan (2018), both forms of monetary policy can significantly influence these transmission mechanisms. Nakajima (2015) further consolidated the five mechanisms into two primary distributive channels: the "inflation channel" and the "income channel. Ijaz (2020) reported that the exchange rate channel and the cost channel play a key role in transmitting monetary policy effects to inflation.

Based on the theoretical review, Figure 1 shows the transmission channel of fiscal policy, monetary policy, and income inequality. The monetary policy affects the INQ through the four channels, while expansionary fiscal policy affects the INQ through the four channels. First, the employment channel operates when increased public spending, particularly on infrastructure and public works, creates jobs for low- and middle-skilled workers, raising their earnings. Second, the income channel works through higher wages, tax cuts, or direct transfers that boost the disposable income of lower-income households more than that of higher-income groups. Third, the human capital channel is strengthened when the government invests in education, training, and healthcare, improving the skills and productivity of disadvantaged populations. Fourth, the public services provision channel functions when spending on healthcare, education, housing, and transport reduces out-of-pocket costs for low-income families.

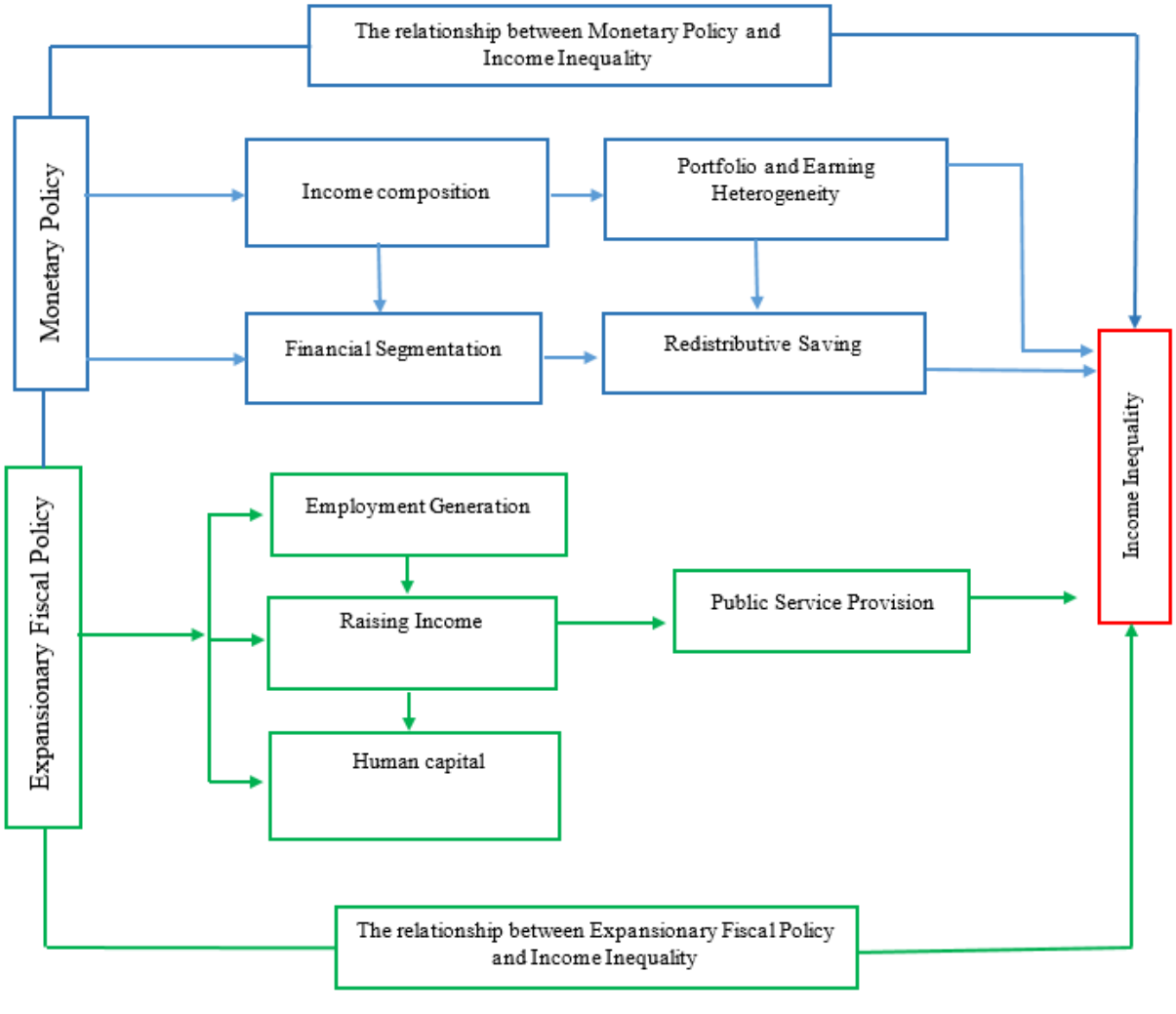


Figure 1: the transmission channel of fiscal policy, monetary policy and income inequality

Fiscal policy and Income inequality nexus

Arimo and Abiodun (2020) explored the interrelationships between fiscal policy (FS), economic growth, and INQ across 26 Sub-Saharan African (SSA) nations during the period 1995–2016. The countries were grouped into three income categories: low-income, lower-middle-income, and upper-middle-income. Employing a multivariate Granger causality framework, the authors found no significant causal links among the three variables for low- and lower-middle-income countries, indicating weak policy synchronization. Conversely, in upper-middle-income nations, a one-way causality was observed from economic growth to INQ. Additionally, a panel error correction model was utilized to analyze both long-term and short-term causal dynamics. Meanwhile, Malla and Pathranarakul (2022) examined how FS and institutional quality affect INQ across developed and developing economies between 2000 and 2019. Using the system GMM approach. Their findings revealed a persistent pattern of INQ, as reflected by the significant impact of the lagged inequality term. The study showed that in low-income countries, progressive income taxation played a meaningful role in reducing inequality, a pattern not observed in high-income nations. In contrast, consumption-based taxes had minimal influence on inequality globally. Muinelo-Gallo & Roca -Sagales (2014) examines the effects of FS on economic growth and INQ in Uruguay using data from 1981-2010. the degree of interdependence between these two characteristics and whether economic growth influences and is influenced by this connection. Empirical findings from Vector Autoregression (VAR) models show that public spending has significant long-term Keynesian

effects and that the nation's spending pattern contributes to rising INQ among disposable households. Public investment is the only fiscal policy that defies this trend. However, it also finds that an increase in current and social security expenditures leads to an increase in INQ, while a raise in public investment reduces it. The study also compares the evolution of net INQ in Uruguay using different inequality measures and finds that the effects of fiscal policies on INQ are significant. It shows that public investment in infrastructures reduces long-term INQ, while higher current spending and social security expenditure increase INQ. Furthermore, the study assesses the impact of fiscal policy on income distribution across different income quintiles. It finds that the low and middle-income groups are negatively affected by social security expenditure and current public spending, while the richer income group accumulates the benefits. Cevik and Caro (2020) investigated income inequality trends in China and other emerging economies between 1980 and 2013, focusing on the redistributive role of fiscal policy. Utilizing instrumental variable techniques, the study confirmed the existence of a Kuznets curve—an inverted U-shaped relationship between economic growth and inequality—in both China and the broader BRIC+ group. In China's case, the analysis revealed contrasting effects of fiscal tools: government spending was found to widen income disparities, whereas taxation contributed to reducing them. Although China's fiscal mechanisms demonstrated a relatively stronger redistributive impact compared to its BRIC+, the overall effect remained inadequate to neutralize the influence of other key inequality drivers.

Monetary policy and income inequality nexus

Israel and Latsos (2020) assess how expansionary monetary policy shapes INQ in Japan using data from the Japan Household Panel Survey (JHPS). Their panel data analysis distinguishes between the impacts of traditional and unconventional monetary interventions across different socio-economic segments. Leveraging detailed individual-level data—including variables like age, education, gender, and labor income—the authors run regression models to evaluate the effects of monetary policy on disparities such as the gender, education, and age wage gaps. By controlling for demographic and educational factors, they isolate the distributional consequences of monetary easing. Samarina and Nguyen (2019) examine the distributive consequences of monetary policy across ten eurozone countries between 1999 and 2014. Their study disentangles the effects through macroeconomic channels such as wages and employment and financial channels, including asset prices and investment returns. Their findings suggest that expansionary monetary policy tends to reduce income inequality in the euro area, especially within peripheral economies. This equalizing effect is primarily driven by improvements in wages and employment. However, gains from asset markets part of the financial channel—appear to dampen these positive effects, suggesting that monetary policy's overall impact on inequality can be mixed depending on the dominant channel at play. Parlaktuna and Napari (2019) focus on Ghana to explore how monetary policy affects income inequality in emerging African economies. Analyzing quarterly data from 2002 to 2013, they apply Impulse Response Functions (IRFs) using the Local Projections method to trace the short-term effects of monetary shocks. The study finds that tighter (contractionary) monetary policy slightly increases income inequality in Ghana, implying that policy tightening may disproportionately impact lower-income segments through reduced economic activity or employment. Jeanneney and Hua (2001) investigate the role of the real exchange rate in shaping income inequality between urban and rural areas in China. Utilizing panel data from 28 provinces, the authors focus on how shifts in exchange rate policy affect regional income gaps. Given China's policy of sustained currency depreciation since the 1980s, the study uses annual urban and rural income data to examine the dynamics of geographic inequality. Results show that income disparities evolve differently

in inland versus coastal provinces, suggesting that currency depreciation may have exacerbated urban bias more in the interior regions than in coastal ones. The study is structured into two parts: one outlining the history of China's exchange rate regimes and the other analyzing urban-rural income ratios across regions over time.

Determinants of income inequality

INQ remains a persistent issue across economies, driven by a complex interplay of economic, institutional, and spatial factors. Several studies have explored the determinants of INQ, identifying key drivers such as finantialization, globalization, labor market dynamics, natural resources, and demographic trends. (Tridico, 2018) examined the factors contributing to rising INQ in OECD countries from 1990 to 2013. The study hypothesizes that finantialization, labor market flexibility, the weakening of trade unions, and the retrenchment of the welfare state have significantly contributed to increasing inequality. The empirical findings support these claims, demonstrating that these structural changes have exacerbated income disparities in high-income economies. Furceri and Ostry (2019) further expanded on the determinants of inequality by addressing model uncertainty and employing a weighted-average least squares (WALS) approach. Their results highlight the multiplicity of factors affecting INQ, including economic development, demographic changes, unemployment, and globalization. A key finding is the asymmetric effects of trade and financial globalization—while trade integration tends to reduce inequality, financial globalization is associated with higher income disparities. Additionally, financial deregulation and technological changes are identified as major drivers of inequality, particularly in advanced economies. Ponce et al. (2023) introduced a spatial perspective to the determinants of INQ, analyzing 78 countries from 1995 to 2017. The study employs spatial panel econometric models to assess the influence of natural resource rents, international trade, and democracy on INQ. Findings indicate that democratic institutions mitigate income disparities, while resource rents can either exacerbate or reduce inequality depending on governance quality. The study also confirms spatial dependence in INQ, where economic disparities in one country spill over into neighboring regions. This research underscores the importance of transparency, fair democratic governance, and economic diversification in reducing INQ. In the context of Indonesia, Rahman et al. (2023) analyze short-term and long-term determinants of INQ using an Error Correction Model (ECM). Their study, covering the period from 1998 to 2021, identifies education levels and urban population growth as key factors influencing inequality. The ratio of the workforce with education beyond high school significantly increases inequality in both the short and long run, while urban population growth has a mitigating effect. Additionally, the agricultural sector does not appear to play a significant role in reducing INQ, highlighting potential policy gaps in addressing rural-urban disparities.

Research Gap

Based on the existing literature, this study aims to address several research gaps. First, previous studies have primarily focused on examining the effects of either fiscal policy or monetary policy on INQ in isolation. However, there is a lack of comprehensive analysis that considers the combined impact of both fiscal and monetary policies on INQ. This study seeks to fill this gap by simultaneously analyzing the influence of both policy measures on income distribution. Second, much of the existing research has concentrated on developed economies, often overlooking the context of developing countries. Given the structural and economic differences between developed and developing nations, the effects of fiscal and monetary policies on INQ may vary. This study aims to bridge this gap by specifically focusing on developing countries, providing insights that are more relevant to their economic conditions. Third, previous studies have often omitted key economic variables that could significantly influence INQ. This

study addresses this limitation by incorporating several important factors, including the exchange rate, per capita income, age dependency ratio, and inflation. By including these variables, the analysis offers a more comprehensive understanding of the determinants of INQ, which has been largely overlooked in prior research.

Methodology

Model specifications

The model to factor variables and to address potential issue of endogeneity the model is as

$$lnINQ_{it} = \beta_0 + \beta_1 lnINQ_{it} - 1 + \beta_2 lnGE_{it} + \beta_3 lnIR_{it} + \beta_4 lnER_{it} + \beta_5 lnPCI_{it} + \beta_6 lnADR_{it} + \beta_7 lnINF_{it} + U_{it} \quad (1)$$

From equation (1) lnINQ is the dependent variable representing income inequality and independent variables represented by lnGE, lnIR, lnER, lnPCI, lnADR and lnINF, which is government expenditure, real interest rate, exchange rate, per-capita income, age dependency ratio and inflation respectively, and U_{it} is error term, which incorporates the distinct random effects of each country, the subscript i represents countries while the subscript t represents time. β_0 is intercept while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \beta_6 \; and \; \beta_7$ are slop coefficient of independent variables respectively.

Estimation Strategy

Cross section dependency

There are multiple processes in the estimating technique used for the panel data analysis. First, the data's cross-sectional dependency (CD) needs to be examined. The results of this test guide the usage of further evaluations. As a result, this paper employs the (Pesaran 2021) CD test.

$$\tilde{\rho}_{ij} = \frac{\sum_{t-1}^{T} (\tilde{u}_{it} - \bar{u}_i)(\tilde{u}_{jt} - \bar{u}_j)}{\sqrt{\sum_{t-1}^{T} (\tilde{u}_{it} - \bar{u}_i)^2 \sum_{t-1}^{T} (\tilde{u}_{jt} - \bar{u}_j)^2}} \quad (2)$$

Where $\tilde{u}_i$is the mean of the residuals for unit i over time T, then the CD test statistic is

$$CD = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \tilde{\rho}_{ij} \quad (3)$$

Under the null hypothesis of cross sectional independence, *CD ~ N (0,1)*.

Unit root test

Conventional unit root tests can yield incorrect results because they rely on assumptions about slope homogeneity and model cross-section independence (Pesaran 2007) Both slope heterogeneity and CD are addressed by the CIPS test.

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p} \gamma_{i,j} \Delta y_{i,t-j} + \delta_0 \bar{y}_{t-1} + \sum_{j=0}^{p} \delta_j \Delta y_{t-j} + \epsilon_{i,t} \quad (4)$$

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} t_i (p) \quad (5)$$

Pedroni panel co-integration test

(Pedroni 2004) assess co-integration in panel data with consideration for cross section dependence and heterogeneity based on several residual-based test statistics.

The Modified Phillips-Perron t-statistic is computed as:

$$t_{MPP} = \frac{1}{N} \sum_{i=1}^{N} t_{MPP,i} \quad (6)$$

$where \; t_{MPP,i} \; is \; the$ Modified Phillips Perron t statistic $for \; individual \; unit \; i.$

The Phillips-Perron t-statistic is as:

$$t_{PP} = \frac{1}{N}\sum_{i=1}^{N} t_{PP,i} \qquad (7)$$

$$where\ t_{pp,i}\ is\ the\ \text{Phillips Perron t statistic}\ for\ individual\ unit\ i.$$

The Augmented Dickey fuller t-statistic is as:

$$t_{ADF} = \frac{1}{N}\sum_{i=1}^{N} t_{ADF,i} \qquad (8)$$

$$where\ t_{ADF,i}\ is\ the\ ADF\ statistic\ for\ unit\ i.$$

Method of Moments

The Generalized method of movement GMM is widely used technique where instrumental variable are employed to address endogeneity firstly proposed by (Arellano & Bond 1991) . The GMM estimator is derived by minimizing a quadratic form in the movement conditions of the model.

$$Q_T(\beta) = \left(\frac{1}{T}\sum_{t=1}^{T} Z_t^{'}(y_t - X_t)\right) W_T \left(\frac{1}{T}\sum_{t=1}^{T} Z_t^{'}(y_t - X_t)\right) \qquad (9)$$

Instrumental variable Z_t involve to address potential endogeneity issue and achieve consistent and efficient parameters estimate.

Panel Quantile regression

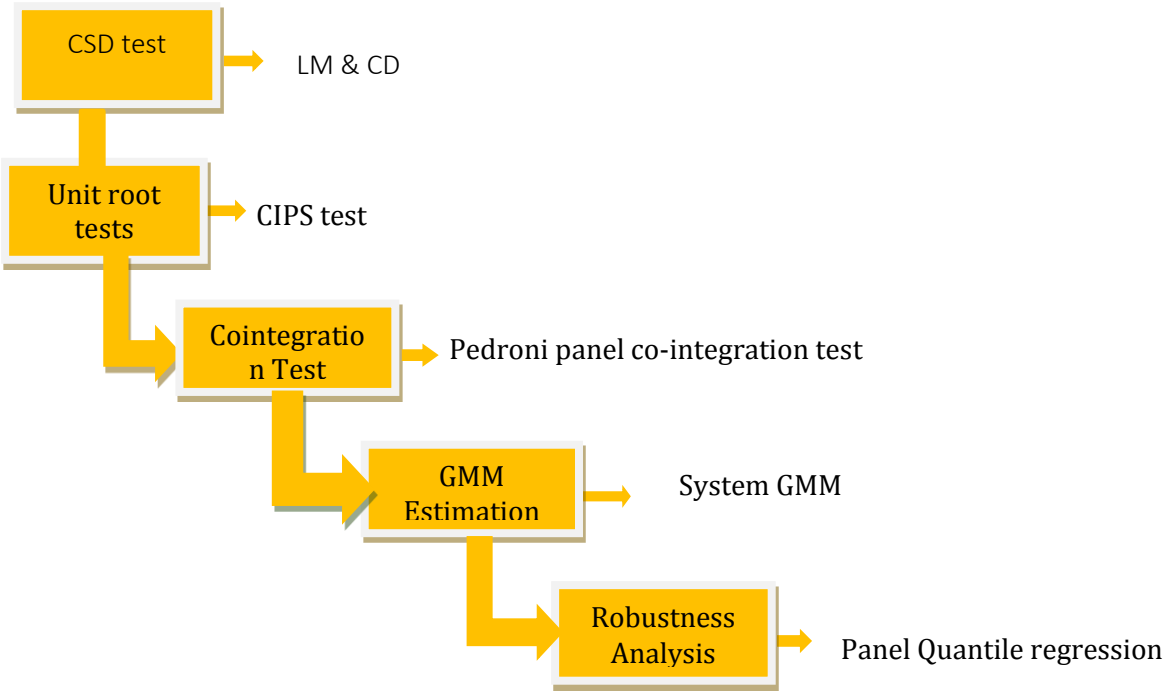
Panel quantile regression is a statistical technique that models conditional quantiles of a dependent variable in panel data, considering individual variability and estimating the variation in the connection between independent variables and the dependent variable. First introduced by (Koenker & Bassett Jr 1978) Quantile regression has stronger robustness when random error term is not normally distributed and also control individual heterogeneity (Zhu *et al.* 2016; Valadkhani *et al.* 2019)

The standard form of quantile regression is as:

$$y_i = x_i^{/}\beta_\theta + \mu_{\theta i} \qquad 0 < \theta < 1 \qquad (10)$$

$$Quant_\theta(y_i|x_i) = x_i\beta_\theta \qquad (11)$$

Where y_i represent dependent variable and x_i presents independent variables. β_θ Presents regression parameter at the θ_{th} quantile point. $\mu_{\theta i}$ Show the random error term and $Quant_\theta(y_i|x_i)$ is the error term in the θ_{th} distribution point of the dependent variable y.



Data source and Description of variable

The study utilized a dataset comprising seven variables, namely income inequality, government expenditure, real interest rate, exchange rate, per-capita income, age dependency ratio and inflation. The income inequalityINQ sourced from standardized world INQ database (SWIID) while other variables were sourced from the World Development Indicators (WDI). The dataset encompassed a total of fifty-five (55) developing countries and spanned the period from 2000 to 2021. A detailed description of the data is provided in Table 1.

Table 1 Data source and Description of variable

Source	Notation	Measurement
SWIID (2023)	LNINQ	Gini index of inequality in equalized household disposable income
WDI (2024)	LNGE	General government final consumption expenditure (constant 2015US$)
WDI (2024)	LNIR	Real interest rate (%)
WDI (2024)	LNER	Official exchange rate (LCU per US$, period average)
WDI (2024)	LNPCI	Per capita income
WDI (2024)	LNADR	Age dependency ratio (% of working-age population)
WDI (2024)	LNINF	Inflation

Source: own calculation

Results and Discussions

Descriptive statistics

Table 2 shows a brief summary of descriptive statistics. The mean value of income inequality, government expenditure, interest rate, exchange rate, per-capita income, age dependency ratio and inflation are 3.74, 22.44, 1.81, 4.00, 8.87, 4.09 and 1.59 respectively. While standard deviation is 0.18, 1.79, 1.02, 2.49, 0.83, 0.26 and 1.02 respectively. The Jarque-Bera statistics confirmed that all variables are not normally distributed.

Table 2 Descriptive statistics

	$LNINQ_{it}$	$lnGE_{it}$	$lnIR_{it}$	$LNER_{it}$	$LNPCI_{it}$	$LNADR_{it}$	$LNINF_{it}$
Mean	3.74	22.44	1.81	4.00	8.87	4.09	1.59
Median	3.75	22.08	1.89	3.77	9.10	4.05	1.65
Maximum	4.18	26.61	3.96	10.65	10.24	4.57	8.46
minimum	3.20	18.66	-5.16	-2.43	6.56	3.62	-2.99
Std. Dev	0.18	1.79	1.02	2.49	0.83	0.26	1.02
Skewness	-0.22	0.44	-1.55	0.39	-0.64	0.31	-0.01
Kurtosis	3.37	2.44	8.96	2.38	2.37	1.96	6.77
Jarque -Bera	16.72	54.76	2277.05	50.72	102.64	74.20	716.05
Sum	4520.347	27152.87	2199.12	4839.64	10728.38	4949.12	1928.67
Sum Sq. Dev	41.04902	3852.247	1249.01	7520.37	837.6713	82.82720	1254.733
Observation	1210	1210	1210	1210	1210	1210	1210

Cross Sectional Dependency and Panel Unit Root Test

Table 3 shows the cross sectional dependency (CD) test and the second generation CIPS unit root test results. The test results for the CD confirm that at the 1% significance level, there is a rejection of the null hypothesis of no cross sectional dependency for all variables, which implies shocks in one country to have an impact on other countries in the panel. The results of the CIPS unit root test indicate that the series of real interest rate (lnIR), exchange rate (lnER) and inflation (lnINF) are stationary at level I(0). Income inequality (lnINQ), government expenditure (lnGE), per-capita income (lnPCI) and age dependency ratio (lnADR) are however, non-stationary at level but become stationary at first difference I(1). From this partial order of integration, the System GMM (Generalized Method of Moments) estimator appears to be the most suited for further analysis.

Table 3 Cross Sectional Dependency and Panel Unit Root Test

Variable	Pesaran Cross Section Dependency test	CIPS at Level		CIPS at First Difference	
		Constant	Trend	Constant	Trend
lnINQ	33.385***	-1.464	-1.782	-2.479***	-2.893***
lnGE	122.749***	-1.686	-1.766	-3.683***	-3.881***

lnIR	16.322***	-2.849***	-3.366***	-4.966***	-4.986***
lnER	73.082***	-2.479***	-2.514***	-3.489***	-3.678***
lnPCI	137.254***	-1.612	-1.750	-3.149***	-3.293***
lnADR	83.413***	-1.591	-1.964	-2.748***	-2.803***
lnINF	18.316***	-3.412***	-3.659***	-5.339***	-5.382***

Note: ***, ** and * denote 1%, 5%, and 10% levels of significance respectively.

Pedroni panel co-integration test result

Table 4 demonstrate that the Pedroni panel co-integration test results. The modified Phillips-Perron t-statistic is significant at 1%, while the augmented Dickey-Fuller t-statistic is significant at 5% and the Phillips-Perron t-statistic is significant at 10%. These results indicate that there is a long-term relationship between the variables.

Table 4 **Pedroni panel co-integration test result**

	Statistic	P-value
Modified Phillips-Perron t	9.1706***	0.0000
Phillips-Perron t	1.5710*	0.0581
Augmented Dickey-Fuller t	2.0732**	0.0191

Note: ***, ** and * denote 1%, 5%, and 10% levels of significance respectively.

Results of Two step system GMM

Table 5 presents the results of the two-step System GMM estimation, examining the empirical relationship between INQ and key macroeconomic variables: government expenditure, real interest rate, exchange rate, per capita income, age dependency ratio, and inflation. To ensure robustness, several diagnostic checks were performed. The absence of first-order and second-order autocorrelation (AR(1) and AR(2)) was verified using the Arellano-Bond test. Additionally, the validity of instruments was confirmed using the Sargan and Hansen tests, which indicated no significant correlation between the instruments and the error term. The results reveal that lagged income inequality (lnINQ) has a strong and statistically significant positive effect on current lnINQ. Specifically, a one-unit increase in lagged lnINQ leads to an increase of 0.839 units in current lnINQ, indicating high persistence over time. Government expenditure exhibits a statistically significant negative impact on income inequality. A 1% increase in government spending is associated with a 0.016% reduction in lnINQ. This finding is in line with Anderson et al. (2017), who conducted a meta-analysis of 84 studies focusing on low- and middle-income countries, concluding that government spending tends to reduce inequality. Similarly, Doumbia and Kinda (2019) found that a 1-percentage-point increase in the expenditure-to-GDP ratio is linked to a 0.8–1% decline in net income inequality. The real interest rate has a positive, albeit statistically insignificant, association with INQ. A 1% rise in the interest rate leads to a 0.023% increase in inequality. This result is supported by Berisha et al. (2020), who found a similar relationship in BRICS countries from 2001–2015, and by Husain et al. (2020) in the context of Indonesia. However, contrasting evidence comes from Hailemariam et al. (2021), who, using data from 1870–2016 for OECD countries, reported a significant negative relationship between interest rates and INQ. Berisha et al. (2018) also found a

negative impact in the U.S. context over the period 1919–2009. The exchange rate is found to significantly and negatively affect income inequality. A 1% increase in the exchange rate reduces INQ by 0.031%, consistent with Min et al. (2015), who found a similar relationship in a study of 69 OECD and non-OECD countries between 1980 and 2007.

Per capita income has a significant negative association with INQ, indicating that higher income levels reduce inequality. A 1% increase in per capita income lowers INQ by 0.029%. However, this contrasts with the findings of Chang et al. (2018), who identified a positive relationship between income and inequality in the United States from 1917 to 2012 using wavelet analysis.

The age dependency ratio also has a significant negative effect on INQ; a 1% rise in the dependency ratio reduces inequality by 0.048%. This might reflect redistributive demographic effects in the sample economies. Lastly, inflation shows a positive but statistically insignificant relationship with income inequality. A 1% increase in inflation corresponds to a 0.013% increase in INQ. This result aligns with previous studies such as Nantob (2015) and Berisha et al. (2020), which also reported a positive link between inflation and inequality. Finally, the results suggest that government spending, exchange rate, per capita income, and age dependency ratio are significantly associated with reductions in income inequality, while real interest rates and inflation are positively linked to inequality, though their effects are statistically weak.

Table 5 Results of Two step system GMM

Variable	Co-efficient	Std. Error	Probability P>|z|
lnINQ (-1)	0.839**	0.387	0.030
lnGE	-0.016*	0.019	0.075
lnIR	0.023	0.040	0.61
lnER	-0.031*	0.059	0.070
lnPCI	-0.029**	0.046	0.010
lnADR	-0.048*	0.122	0.060
lnINF	0.013	0.015	0.545
Constant	1.008	1.489	0.498
No. of observation	1155		
S. Period	2000-2021		
No. of time	22		
No. of countries	55		
AR(1)			0.471
AR(2)			0.596
Sargan test			0.688
Hansen			0.728
Wald chi2	161368.40		
No. of instruments	09		

****** p<.01, ** p<.05, * p<.1***

Diagnostic Test

The model's post-estimation diagnostics are presented in the final six rows of Table 5 For the consistency of the two-step System GMM estimator, it is essential that there be no second-order serial correlation in the first-differenced residuals. This condition was evaluated using the Arellano and Bond

test for autocorrelation. While first-order serial correlation was detected—as expected due to the nature of differencing—the test results showed no evidence of second-order serial correlation. Thus, we fail to reject the null hypothesis of no second-order autocorrelation, confirming the validity of the GMM specification. Additionally, the Sargan and Hansen tests for over-identifying restrictions were conducted to verify the validity of the instruments used. Specifically, the age dependency ratio and inflation were treated as endogenous variables and instrumented accordingly. Both tests returned insignificant p-values, meaning we do not reject the null hypothesis that the instruments are valid. This indicates that the over-identifying restrictions are satisfied and supports the appropriateness of the instruments, with no evidence of over-identification problems in either model.

Robustness Checks

We employed panel quantile regression to check the robustness of GMM. Result shows in table 6 indicate that government expenditure, exchange rate, per-capita income and age dependency ratio have negative effect on INQ while interest rate, and inflation have positive effect on INQ. These findings are align with the GMM results.

Table 6 Panel Quantile Regression Analysis

Variable	Quantiles								
	0.10	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**
lnGE	-0.019*** (0.004)	-0.022*** (0.008)	-0.001 (0.004)	0.002* (0.003)	-0.011*** (0.003)	0.012*** (0.004)	-0.006 (0.004)	-0.002* (0.004)	0.004 (0.006)
lnIR	0.056 (0.006)	0.044 (0.009)	0.035* (0.007)	0.031 (0.005)	0.030* (0.005)	0.032 (0.006)	-0.031 (0.006)	0.023 (0.006)	-0.011 (0.009)
lnER	0.040*** (0.007)	0.003 (0.007)	-0.012** (0.007)	-0.019** (0.005)	-0.017** (0.005)	-0.003 (0.006)	-0.005 (0.006)	-0.008 (0.006)	-024*** (0.009)
lnPCI	-0.085** (0.011)	-0.088** (0.017)	0.046*** (0.012)	0.045*** (0.008)	-0.040** (0.009)	-0.050** (0.101)	-0.065** (0.011)	0.047*** (0.011)	-0.093** (0.016)
lnADR	-0.133** (0.010)	0.144* (0.0015)	-0.109** (0.011)	-0.109*** (0.007)	-0.100*** (0.008)	0.108** (0.009)	-0.112*** (0.010)	-0.090* (0.009)	0.134** (0.014)
lnINF	0.024* (0.006)	0.015 (0.009)	0.010 (0.007)	-0.007 (0.004)	0.001* (0.005)	0.009 (0.006)	-0.009 (0.006)	0.005 (0.006)	0.003 (0.009)
Cons	3.889*** (0.095)	4.030*** (0.140)	3.637*** (0.100)	3.609*** (0.067)	3.431*** (0.075)	3.426*** (0.086)	3.594*** (0.093)	3.767*** (0.090)	3.892*** (0.131)
Ps. R2	0.1646	0.1415	0.1433	0.1558	0.1402	0.1247	0.1182	0.1048	0.1242

****** p<.01, ** p<.05, * p<.1***

Conclusion and policy Recommendations

This study examined the impact of Macroeconomic policies on INQ in developing countries from 2000 to 2021. This study utilized the two step system GMM and Quantile regressions for the robustness analysis. The finding showed that real interest rate and inflation have positive effect on INQ, while the government expenditure, exchange rate, per-capita income, age dependency ratio have negative effect on INQ.

This study has several policy implications for policy makers to reduce the INQ in selected developing countries. First, Central banks should design policies that prioritize low-interest loans for small businesses and low-income households, reducing wealth concentration and fostering inclusive economic growth. second, adopted tightening monetary policy to control inflation, governments should

complement it with social safety nets, such as direct cash transfers, to protect qvulnerable populations from economic shocks. Third, Central banks should set moderate inflation targets to maintain price stability, ensuring that rising costs do not disproportionately burden low-income households. Fourth, Governments can implement wage indexation mechanisms that adjust minimum wages and social benefits in line with inflation, protecting real incomes of low-wage workers. Fifth, Policymakers should provide subsidies for essential goods and services, such as food and healthcare, to shield low-income groups from the adverse effects of inflation.

Six, Increase government expenditure on education, healthcare, and social welfare programs to enhance human capital and provide equal opportunities for lower-income groups. Seven, allocate public funds toward infrastructure projects in underdeveloped areas to create jobs, boost local economies, and improve access to essential services. Eight, Implement and expand conditional cash transfer programs to provide financial support to low-income households, reducing poverty and narrowing income disparities.

This study has several limitations. First, this study focuses exclusively on developing countries, omitting developed economies from the analysis. Since INQ dynamics may differ significantly between these two groups due to variations in economic structures, social policies, and institutional frameworks, future research could extend this study by conducting a comparative analysis between developed and developing countries. Such an approach would help determine whether the effects of fiscal and monetary policies on INQ vary across different economic contexts. Second, the study employs System GMM and Quantile Regression techniques to analyze the relationship between fiscal and monetary policies and INQ. While these methods are widely used and robust, they do not encompass all available econometric techniques. Future research could explore alternative or more advanced methodologies, such as dynamic panel threshold models, Bayesian estimation, or machine learning approaches, to enhance the robustness and reliability of the findings. Third, this study considers a limited set of determinants of INQ, focusing on key economic variables while excluding certain macroeconomic and political factors. Factors such as political stability, governance quality, labor market policies, and technological advancements can also play a crucial role in shaping income distribution. Future studies could expand the scope by incorporating these additional determinants to provide a more comprehensive understanding of the drivers of INQ. By addressing these limitations, future research can refine and expand upon the findings of this study, offering deeper insights into the complex relationship between fiscal and monetary policies and INQ.

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References

Alamanda, A. (2020). The effect of government expenditure on INQ and poverty in Indonesia. Info Artha, 4(1), 1-11.

Anderson, E., Jalles D'Orey, M. A., Duvendack, M., & Esposito, L. (2017). Does government spending

affect income inequality? A meta-regression analysis. *Journal of Economic Surveys, 31(4)*, 961-987.

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

Arellano, M., Bond, S.J.T.r.o.e.s., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. 58, 277-297

Aremo, A. G., & Abiodun, S. T. (2020). Causal nexus among fiscal policy, economic growth and INQ in Sub-Saharan African Countries (1995-2016). *African Journal of Economic Review*, *8*(1), 1-25.

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

Berisha, E., Meszaros, J., & Olson, E. (2018). INQ, equities, household debt, and interest rates: Evidence from a century of data. *Journal of International Money and Finance*, *80*, 1-14.

Bordo, M. D., & Landon-Lane, J. (2013). *Does expansionary monetary policy cause asset price booms; some historical and empirical evidence* (No. w19585). National Bureau of Economic Research.

Brinca, P., Ferreira, M. H., Franco, F., Holter, H. A., & Malafry, L. (2021). Fiscal consolidation programs and INQ. *International Economic Review*, *62*(1), 405-460.

Caminada, K., Goudswaard, K., Wang, C., & Wang, J. (2019). INQ and fiscal redistribution in 31 countries after the crisis. *Comparative Economic Studies*, *61*, 119-148.

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

Chancel, L., Piketty, T., Saez, E., & Zucman, G. (Eds.). (2022). *World inequality report 2022*. Harvard University Press.

Chang, S., Gupta, R., & Miller, S. M. (2018). Causality between per capita real GDP and INQ in the US: Evidence from a wavelet analysis. *Social Indicators Research*, *135*, 269-289.

Coady, D., & Dizioli, A. (2018). INQ and education revisited: persistence, endogeneity and heterogeneity. *Applied Economics*, *50*(25), 2747-2761.

Coibion, O., Gorodnichenko, Y., Kueng, L., & Silvia, J. (2017). Innocent Bystanders? Monetary policy and inequality. *Journal of Monetary Economics*, *88*, 70-89.

Datt, G., Ravallion, M., & Murgai, R. (2020). Poverty and growth in India over six decades. *American Journal of Agricultural Economics*, *102*(1), 4-27.

Davtyan, K. (2016). INQ and monetary policy: An analysis on the long run relation. *AQR–Working Papers, 2016, AQR16/04*.

Davtyan, K. (2018). Unconventional monetary policy and income inequality. Department of Applied Economics, University of Barcelona.[Internet]< raspoloživo na: http://aea. am/files/papers/w1803. pdf>[21. kolovoza 2020.].

Dolado, J. J., Motyovszki, G., & Pappa, E. (2021). Monetary policy and inequality under labor market frictions and capital-skill complementarity. *American economic journal: macroeconomics*, *13*(2), 292-332.

Domanski, D., Scatigna, M., & Zabai, A. (2016). Wealth inequality and monetary policy. *BIS Quarterly Review March*.

Doumbia, D., & Kinda, T. (2019). Revisiting the link between government spending and inequality in developing countries. IMF Working Paper, No. 19/248. International Monetary Fund.

Dumitrescu, E.-I., Hurlin, C.J.E.m., 2012. Testing for Granger non-causality in heterogeneous panels. 29, 1450-1460

Fishburn, P. C., & Willig, R. D. (1984). Transfer principles in income redistribution. *Journal of Public*

Economics, 25(3), 323-328.

Furceri, D., & Ostry, J. D. (2019). Robust determinants of INQ. Oxford Review of Economic Policy, 35(3), 490-517.

Furceri, D., Loungani, P., & Zdzienicka, A. (2018). The effects of monetary policy shocks on inequality. *Journal of International Money and Finance*, *85*, 168-186.

Gupta, S. (2018). INQ and fiscal policy: Agenda for reform in developing countries. *Growth and Reduce INQ Series Working Paper*.

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

Husain, S., Sohag, K., Hasan, R., & Shams, S. R. (2020). Interest rate and income disparity: Evidence from Indonesia. *Strategic Change*, *29*(6), 665-672.

Ijaz, U. (2020). What determine inflation in Pakistan: an investigation through structural equation modeling by using time series data for a period from 1975 to 2017. *Economic Consultant, 4 (32),* 54-72.

Israel, K. F., & Latsos, S. (2020). The impact of (un) conventional expansionary monetary policy on INQ–lessons from Japan. *Applied Economics*, *52*(40), 4403-4420.

Jeanneney, S. G., & Hua, P. (2001). How does real exchange rate influence INQ between urban and rural areas in China? *Journal of development Economics*, *64*(2), 529-545.

Jenkins, S. (2017). The measurement of INQ. In *Economic inequality and poverty* (pp. 3-38). Routledge.

Kapingura, F. M. (2017). Financial sector development and INQ in South Africa. African Journal of Economic and Management Studies, 8(4), 420-432.

Khan, Z., & Khan, M. A. (2023). The effect of monetary policy on income inequality: Empirical evidence from Asian and African developing economies. *Journal of Central Banking Theory and Practice, 12(3),* 133-158.

Koenker, R., Bassett Jr, G.J.E.j.o.t.E.S., 1978. Regression quantiles. 33-50

Kunawotor, M. E., Bokpin, G. A., Asuming, P. O., & Amoateng, K. A. (2022). The distributional effects of fiscal and monetary policies in Africa. *Journal of Social and Economic Development*, 1-20.

Law, C. H., & Soon, S. V. (2020). The impact of inflation on INQ: the role of institutional quality. *Applied Economics Letters*, *27*(21), 1735-1738.

Ledoit, O. (2011). The redistributive effects of monetary policy. *University of Zurich Department of Economics Working Paper*, (44).

Lerman, R. I., & Yitzhaki, S. (1995). Changing ranks and the inequality impacts of taxes and transfers. *National Tax Journal, 48(1),* 45-59.

Malla, M. H., & Pathranarakul, P. (2022). Fiscal policy and INQ: the critical role of institutional capacity. *Economies*, *10*(5), 115.

Michetti, E., & Tropeano, D. (2008). Income distribution in an open developing economy: do monetary and exchange rate policy matter?

Min, H. G., Shin, S. O., & McDonald, J. A. (2015). INQ and the Real Exchange Rate: Linkages and Evidence. *Annals of Economics & Finance*, *16*(1).

Muinelo-Gallo, L., & Roca-Sagalés, O. (2014). Is the fiscal policy increasing INQ in Uruguay. *Journal of Economics and Development Studies*, *2*(3), 137-156.

Mumtaz, H., & Theophilopoulou, A. (2017). The impact of monetary policy on inequality in the UK. An empirical analysis. *European Economic Review*, *98*, 410-423.

Nakajima, M. (2015). The redistributive consequences of monetary policy. Federal Reserve Bank of

Philadelphia Business Review, 2, 9-16.

Nantob, N. (2015). INQ and inflation in developing countries: An empirical investigation. *Economics Bulletin*, *35*(4), 2888-2902.

Nolan, B., Richiardi, M. G., & Valenzuela, L. (2019). The drivers of INQ in rich countries. *Journal of Economic Surveys*, *33*(4), 1285-1324.

Parlaktuna, I., & Napari, A. (2019). Monetary policy and INQ in Ghana. *Research in Applied Economics*, *11*(4), 49-59.

Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric theory*, *20*(3), 597-625.

Pesaran, M.H.J.E.e., 2021. General diagnostic tests for cross-sectional dependence in panels. 60, 13-50

Pesaran, M.H.J.J.o.a.e., 2007. A simple panel unit root test in the presence of cross-section dependence. 22, 265-312

Ponce, P., Yunga, F., Larrea-Silva, J., & Aguirre, N. (2023). Spatial determinants of INQ at the global level: The role of natural resources. Resources Policy, 84, 103783.

Rahman, A., Tanjung, A. A., Ramli, R., & Arif, M. (2023). Determinants of INQ in a time perspective in Indonesia. *Economics Development Analysis Journal, 12(2)*, 231-242.

Saiki, A., & Frost, J. (2014). Does unconventional monetary policy affect inequality? Evidence from Japan. *Applied Economics*, *46*(36), 4445-4454.

Salotti, S., & Trecroci, C. (2018). Cross-country evidence on the distributional impact of fiscal policy. *Applied Economics*, *50*(51), 5521-5542.

Samarina, A., & Nguyen, A. D. (2019). Does monetary policy affect INQ in the euro area? https://onlinelibrary.wiley.com/doi/10.1111/jmcb.13017

Seabela, M., Ogujiuba, K., & Eggink, M. (2024). Determinants of INQ in South Africa: A Vector Error Correction Model Approach. *Economies, 12(7),* 169.

Shimeles, A., & Nabassaga, T. (2018). Why is inequality high in Africa? *Journal of African Economies*, *27*(1), 108-126.

Tridico, P. (2018). The determinants of INQ in OECD countries. *Cambridge Journal of Economics, 42(4),* 1009-1042.

Valadkhani, A., Nguyen, J., O'Brien, M.J.A.E., 2019. Asymmetric responses of house prices to changes in the mortgage interest rate: evidence from the Australian capital cities. 51, 5781-5792

Villarreal, F. G. (2014). Monetary policy and inequality in Mexico.

Vo, D. H., Nguyen, T. C., Tran, N. P., & Vo, A. T. (2019). What factors affect INQ and economic growth in middle-income countries? *Journal of Risk and Financial Management, 12(1),* 40.

Zhu, H., Duan, L., Guo, Y., Yu, K.J.E.M., 2016. The effects of FDI, economic growth and energy consumption on carbon emissions in ASEAN-5: evidence from panel quantile regression. 58, 237-248

Appendix

Countries list

Albania	Angola	Argentina	Armenia	Bangladesh	Belarus	Belize	Bhutan	Bolivia	Bosnia and Herzegovina
Botswana	Brazil	Bulgaria	Burkina Faso	Cabo Verde	Colombia	Costa Rica	Cote d'Ivoire	Dominican Republic	Egypt, Arab Rep.
Ethiopia	Georgia	Guatemala	Honduras	India	Indonesia	Iran, Islamic Rep.	Jamaica	Lebanon	Lesotho
Madagascar	Malaysia	Mali	Mauritius	Mexico	Moldova	Mongolia	Namibia	Nicaragua	North Macedonia
Pakistan	Paraguay	Peru	Philippines	Russian Federation	Rwanda	Serbia	Solomon Islands	South Africa	Tajikistan
Tanzania	Thailand	Togo	Uganda	Ukraine					