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Macroeconomic determinants of income inequality among different income group countries: Evidence from panel data

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ABSTRACT

This paper investigates the macroeconomic determinants of income inequality among different income-group countries across the world by using panel data over the period from 1996 to 2019. In our research, we employ various econometric techniques to determine the model that best aligns with our purpose. Additionally, we assess the presence of autocorrelation and heteroskedasticity. Finally, we have employed FGLS and PCSE methods to estimate the impact of selected variables on income inequality and to counter the issues of autocorrelation and heteroskedasticity. Our results indicate that in low-income countries, population growth, gender equality, and globalization have a negative impact on income inequality, while HDI, civil liberty, and governance have a positive impact on income inequality. In lower-middle-income countries, economic growth, urbanization, HDI, and gender equality are inversely related to income inequality, while population growth, globalization, and governance are positively associated with income inequality. In upper-middle-income countries, urbanization, HDI, and unemployment are negatively associated with income inequality, whereas economic growth, population growth, civil liberty, and governance are positively related to it. In high-income countries, urbanization, HDI, inflation, civil liberty, globalization, and governance have a negative effect on income inequality, while economic growth, population growth, gender equality, and natural resources have a positive impact on it. The findings of the study suggest viable policy recommendations to reduce income inequality in different income-group countries.

Contribution/Originality: This study investigates the macroeconomic determinants of income inequality among different income group countries during the period 1996-2019, which is a novel contribution to the literature.

1. INTRODUCTION

The factors that determine income inequality have been a long-standing and empirically investigated topic in research (Ali, Attiaoui, Khalfaoui, & Tiwari, 2021; Alvarado, Tillaguango, López-Sánchez, Ponce, & Işık, 2021; Amate-Fortes, Guarnido-Rueda, Martínez-Navarro, & Oliver-Márquez, 2021; Batuo, Kararach, & Malki, 2022; Perugini & Tekin, 2022; Saha, Beladi, & Kar, 2021; Taresh, Sari, & Purwono, 2021; Ullah, Kui, Ullah, Pinglu, & Khan, 2021; Wolde, Sera, & Merra, 2022). A global trend of decreasing income inequality occurred in the 1990s, reversing the historical trend that had persisted since the early 19th century. However, this trend was not homogeneous among

countries, since most of them witnessed an upward trend in income inequality within their boundaries (United Nations, 2020; World Inequality Report, 2022). As per the World Inequality Report (2022), the richest 10 percent dominate up to 52 percent of the total global income, while the poorest half segment of the population earns only 8.5 percent of it World Inequality Report (2022). The UNDP's latest policy brief revealed that the poverty rate in poor countries has worsened over the past three years, with 165 million more people living below the $3.65-a-day threshold by 2023 (UNDP, 2023). This tremendous rise in income inequality is a growing worldwide issue, sending greater awareness to policy agendas and also being a topic of political and economic debates in recent decades (Sebri & Dachraoui, 2021). Many researchers and experts have discussed the consequences of income inequality on economic development. The pioneer economist Simon Kuznets hypothesized the association between income inequality and economic development as a reverse U-shaped curve. According to this hypothesis, income inequality rises with the initial increase in income, reaches a peak, and then declines as income continues to rise (Kuznets, 1955). In the initial phases of rapid economic development, when income inequalities tend to widen across social and spatial dimensions, such income inequality may be acceptable to society (Hirschman & Rothschild, 1973). But the persistent increase in income inequality poses an enormous issue for the contemporary world across various economic, social, and political dimensions (Huang, Morgan, & Yoshino, 2019; OECD, 2015). The evolution of income inequality is a multifaceted phenomenon that has various social issues, such as human rights violations, which indicate severe injustice, and obstacles to human development that constantly and persistently attract global attention (Mishchuk, Samoliuk, Bilan, & Streimikiene, 2018). According to Dabla-Norris, Kochhar, Suphaphiphat, Ricka, and Tsounta (2015), rising inequality poses a serious threat to the economy and society as it reduces investment and growth, disturbs economic, financial, and political stability, results in inefficient use of resources, corruption, and nepotism, and leads to adverse economic and social outcomes. However, according to Li and Zou (1998) and Alesina and Perotti (1996), income inequality has a beneficial effect on economic development. According to their assertion, fiscal redistribution, which involves imposing higher taxes on investors and capitalists, diminishes their motivation to invest. Conversely, this policy enhances the socio-political atmosphere by alleviating social conflict, which subsequently stimulates productive activities and the accumulation of capital within the country (Alesina & Perotti, 1996).

This present study adds to the body of research literature by investigating various determinants of income inequality among different income-group countries. While the previous research mostly focused on specific regions or countries or different groups of countries and provided mixed results, this present study adopts a global perspective and uses panel data from 90 countries over the period from 1996 to 2019, which are further divided into four income group countries (see details in section 3.1). There is a lack of comprehensive and comparative analysis on how the macroeconomic determinants of income inequality vary across different income group countries. Second, our study uses Gini index data as a proxy for income inequality from the World Inequality Database (WID), while previous research used income inequality data from the World Bank, the Standardized World Income Inequality Database (SWIID), the World Income Inequality Database (WIID), etc. We use econometric techniques like feasible generalized least squares (FGLS) and panel-corrected standard errors (PCSE) in this study to deal with the issue of heterogeneity and autocorrelation problems in panel data that are specific to each country. Thus, this study adds to the research literature by providing new insights and evidence on the heterogeneous effects of macroeconomic determinants on income inequality across different income group countries during the period from 1996 to 2019.

The subsequent sections of the paper are organized in the following manner: Section 2 pertains to the comprehensive examination of existing literature. Section 3 outlines the data utilized and the technique employed. Section 4 analyses and deliberates on the results obtained. Lastly, Section 5 ends the study and presents its implications for policy.

2. REVIEW OF LITERATURE

Following are the related reviews of literature based on empirical findings.

A very well-known Kuznets "inverted U" hypothesis was examined by many researchers in different countries. Bahmani-Oskooee, Hegerty, and Wilmeth (2008), while analyzing the factors influencing income inequality in 16 nations, found that Kenya conforms to the classic Kuznets hypothesis, while in Panama, national income has a long-run positive impact on income inequality that follows an "uninverted U" shape pattern. An investigation by Deyshappriya (2017) on the macroeconomic factors of income inequality in Asian nations supported the inverted U-shaped relationship between income inequality and gross domestic product (GDP). But Batuo, Kararach, and Malki (2022) found that the Kuznets curve is valid only for the bottom of income distribution countries. A study by Ullah et al. (2021) in 64 Belt and Road countries found a negative effect of economic growth on income inequality. Kim (2016) investigated this relationship for developed, developing, and underdeveloped countries using panel data and found a negative association for developing and underdeveloped countries and a positive association for developed countries. A study by Odedokun and Round (2001) found economic development to have an income-disequalizing effect. Wolde, Sera, and Merra (2022) investigated the income inequality-economic growth nexus in Ethiopia during 1980-2017 and revealed that there is a long-term negative relationship between the two; however, the relationship is positive in the short-term.

By conducting the study in 88 less-developed countries, Kentor (2001) found that the size of the population has a positive impact on income inequality. Ullah et al. (2021) in their study of 64 Belt and Road countries and Marsh (2015) in 142 developing, transitional, and developed societies both support such a similar outcome. However, a study by Butler, Wildermuth, Thiede, and Brown (2020) in rural America found a negative nexus between population growth and income inequality.

Sarkodie and Adams (2020); Taresh et al. (2021) and Amiti and Cameron (2012) revealed that income inequality is negatively associated with the human development index (HDI). But Prawoto and Cahyani (2020) found that HDI has a positive impact on income inequality. Theyson and Heller (2015), using 147 countries' data over the years 1992-2007, revealed an S-curve relationship between income inequality and human development (HDI).

As a macroeconomic factor, Kanbur and Zhuang (2013) and Sulemana, Nketiah-Amponsah, Codjoe, and Andoh (2019) suggest that urbanization prompts income inequality to increase. Ali, Attiaoui, Khalfaoui, and Tiwari (2021) analyzed the effect of industrialization and urbanization on income inequality and found that in the long run, urbanization can reduce income inequality. Castells-Quintana and Royuela (2012) differentiated the countries based on the level of urbanization and found that rising income inequality harms economic growth in both high and low levels of urbanization where a high level of unemployment exists.

Martínez, Ayala, and Ruiz-Huerta (2001) and Deyshappriya (2017) found a positive association between income inequality and unemployment. But Muryani, Sethi, and Iswanti (2021) provide a negative link between the two in the case of Indonesia. Law and Soon (2020) provided evidence that inflation worsens income inequality. Thalassinos, Uğurlu, and Muratoğlu (2012) revealed a positive effect of inflation on income inequality. The study by Jäntti and Jenkins (2010) did not find any evidence of inflation and unemployment as determinants of income inequality.

Grotti and Scherer (2016) and Baloch, Noor, Habibullah, and Bani (2018) found a negative effect of gender equality on income inequality. Research by Maxwell (1990) in the U.S. found a positive link between gender equality and income inequality. Amate-Fortes, Guarnido-Rueda, Martínez-Navarro, and Oliver-Márquez (2021), while analyzing the factors that determine income inequality in 33 European countries during the period 2003-2017, also showed a positive association between gender inequality and income inequality.

ElGindi (2017) revealed that natural resource dependency is positively interlinked with the increase in income inequality. Hartwell, Horvath, Horvathova, and Popova (2019) discovered that in non-democratic nations, natural resources worsen income inequality, while in democratic nations, natural resources seem to be effective in reducing income inequality. Alvarado et al. (2021) investigation on the impact of natural resource dependence on income inequality found that the relationship between the two is negative for lower-middle and upper-middle-income countries.

Munir and Bukhari (2020) revealed that trade globalization helps reduce income disparity in Asian emerging countries. The study by Ullah et al. (2021) analyzed the role of globalization on income inequality in One Belt One Road countries and found a negative effect of globalization on income inequality. But Milanovic (2005) and Thalassinos et al. (2012) showed a positive link between globalization and income inequality.

Perugini and Tekin (2022) analyzed how governance affects financial development and income inequality. Their study revealed that governance quality has a positive impact on income inequality. Saha, Beladi, and Kar (2021) and Xu, Han, Dossou, and Bekun (2021) found that there is a positive link between political stability, the rule of law, corruption, and income inequality. Such a similar result was also disclosed by Ullah et al. (2021) in One Belt One Road countries, as the countries are developing countries and weak institutional quality exists in such countries. Chaudhuri and Ravallion (2006) also argued that a failure in governance increases bad inequalities. Besides, prior studies by Law and Soon (2020), Sarkodie and Adams (2020), and Alesina and Perotti (1996) suggested that institutional quality reduces income inequality.

3. DATA USED AND METHODOLOGY

The present research entirely relies on secondary sources of data. Data were collected from different sources, as shown in Table 2, during the period from 1996 to 2019.

3.1. Classification and Selection of Countries

Table 1 shows the criteria for the classification of countries. Countries are classified using the World Bank classification method of the year 2021 based on GNI per capita in current US$ (Hamadeh, Rompaeyeric, & Metreau, 2022).

Table1. Classification of countries.

Group	GNI per capita in current US$
Low-income countries (LIC)	Less than 1,045
Lower-middle-income countries (LMIC)	Between 1,046 – 4,095
Upper-middle-income countries (UMIC)	Between 4,096 -12,695
High–income countries (HIC)	More than 12,695

Source: World Bank.

3.2. Data Source

Table 2 shows a description of the variables used and the data sources.

Table 2. Description of the variables used and data source.

Variable	Proxy	Symbol used	Description	Sources
Income inequality	Gini index	GINI	It measures the inequality of resources in an economy in a synthetic manner, and the index ranges from 0 to 1. (0 means perfect equality, and 1 means perfect inequality).	World inequality database
Economic growth	GDP purchasing power parity (PPP)	GDP	GDP is measured in terms of PPP.	World inequality database
Population	Population growth rate (Annual %)	POP	Rate of mid-year population growth (%) from t-1 to t.	World bank
Urbanization	Urban population growth (Annual %)	UB	People residing in urban areas.	World bank

Variable	Proxy	Symbol used	Description	Sources
Human development	Human development index	HDI	A concise summary of average performance or achievement in three essential aspects of human development: a healthy life, education, and standard of living. (Index: low (Less than 0.550), medium (Between 0.550-0.699), high (Between 0.700-0.799), very high (Greater than or equal to 0.800)).	UNDP
Inflation	Consumer prices (Annual %)	INF	Annual percentage change in the average consumer's cost of purchasing a basket of goods and services, which may be fixed or altered at predetermined periods.	World bank
Unemployment	Unemployment total	UNE	Percentage of the labor force that is unemployed but willing and able to work.	World bank
Gender equality	Gender equality index	GE	The country's execution of institutions and initiatives to enact laws and regulations that support fair and equitable access for men and women to the economy in terms of education, health, and legal protection (0=lowest score, 1=highest score).	World bank
Natural resource	Total natural resources rent (% of GDP)	NRR	Sum of rents from oil, natural gas, forest, minerals, and coal (Hard and soft).	World bank
Civil liberties	Civil liberties index	CL	It encapsulates the extent of individual liberty, the rule of law, and freedom of expression. Higher scores correspond to more liberties (0=lowest score, 1=highest score).	World bank
Globalization	Globalization index	GLOB	A simple average of economic, social, and political globalization (ranging from 0 to 100 score).	KOF swiss economic institute
Governance	Governance index	GOV	Six components[1] viz. rule of law (RL), government effectiveness (GE), control of corruption (CC), political stability and absence of or no violence (PV), regulatory quality (RQ), and voice and accountability (VA) (each of the components ranges from -2.5 to +2.5).	World bank, worldwide governance indicators (WGI)

3.3. Empirical Model

The present study formulates the model based on previous literature, which is as follows:

$$GINI = f(GDP, POP, UB, HDI, INF, UNE, GE, NRR, CL, GLOB, GOV) \quad (1)$$

All the variables used in Equation 1 are converted into log form, as conversion into log is an appropriate way to transform highly skewed variables into a normal distribution and reduce heteroskedasticity (Benoit, 2011). We estimate the following newly generated Equation 2 panel data regression model to investigate the impact of selected variables on income inequality. Panel data represents the combination of both cross-sectional data and time series data. In our study, we include a total of 90 countries (from LIC=12, LMIC=24, UMIC=24, and HIC=30) (see countries list in Annexure 1) and periods from 1996 to 2019, which differs from past studies. The availability of data determines the selection of nations and time periods for each income group.

[1]RL-upholds a healthy legal system, which includes property rights and the ability to enforce enforcement; GE-assesses the government's capacity to carry out effective policies and uphold its credibility; CC-the degree wherein public power is utilized for personal gain; PV-measures a government's resilience to political violence and terrorism; RQ-the government's capacity to design and carry out good policies and regulations that encourage the expansion of the private sector; VA-the degree to which a country's citizens can engage in political decision-making (Kaufmann, Kraay, & Mastruzzi, 2006).

$$\ln GINI_{it} = \alpha_{it} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln POP_{it} + \alpha_3 \ln UB_{it} + \alpha_4 \ln HDI_{it} + \alpha_5 \ln INF_{it} + \alpha_6 \ln UNE_{it} + \alpha_7 \ln GE_{it} + \alpha_8 \ln NRR_{it} + \alpha_9 \ln CL_{it} + \alpha_{10} \ln GLOB_{it} + \alpha_{11} \ln GOV_{it} + \varepsilon_{it} \quad (2)$$

Where, in Equation 2, i stands for a country and t stands time period; $\ln$ denotes natural logs; α is the intercept; $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8, \alpha_9, \alpha_{10}$, and α_{11} are the coefficients of GDP, POP, UB, HDI, INF, UNE, GE, NRR, CL, GLOB, and GOV, respectively; and $\boldsymbol{\epsilon}$ is the error term.

To transform into a log, the variables having negative values, including population growth, urban population growth, and inflation rate in our study, are transformed into positive values by following the method adopted by Busse and Hefeker (2007), as shown in Equation 3:

$$y = \ln(x + \sqrt{(x^2 + 1)} \quad (3)$$

Again, following the method used by Abbas, Junqing, Ramzan, and Fatima (2021), the governance index is calculated by taking the averages of all six components of governance and adding 2.5 to the mean value and multiplying it by 2 (the score ranges from 0 representing very weak governance to 10 representing very strong governance).

3.4. Estimation Method

3.4.1. Panel Unit Root Test

To check the stationarity or non-stationarity of the variables, the Levin-Lin-Chu (LLC) test has been performed (Levin, Lin, & Chu, 2002). The null hypothesis (H_0) in LLC assumes non-stationarity of the series, and the alternative hypothesis (H_a) assumes stationarity of the series.

3.4.2. Panel Data Estimation

In panel data analysis, three different panel models, namely the pooled ordinary least squares (POLS), fixed effect (FE), and random effect (RE) models are performed.

To decide which model is appropriate between POLS and FE, we run the F-test and the Wald test. The H_0 of F-test and Wald test is H_0: $\mu_1 = \mu_2 = \ldots = \mu$; where, μ_i denotes cross-sectional units. If we fail to reject H_0 then POLS is appropriate; otherwise, we run the FE model. Whereas to decide between POLS and RE models, we perform the Breusch-Pagan Lagrange Multiplier (LM) test (Breusch & Pagan, 1980). In the LM test, H_0 assumes the POLS model is appropriate, against H_a that the RE model is appropriate.

After running the LM test, if we fail to reject H_0, we are bound to run POLS. If, on the other hand, H_0 is rejected, then we decide to choose between the RE and FE models. To decide between FE and RE models, an appropriate test, popularly known as the Hausman test, is performed (Hausman, 1978). The H_0 in the Hausman test assumes that the RE model is suitable and H_a assumes that the FE model is suitable. If the p-value is found to be more than a 5% significance level, then we fail to reject H_0 and conclude that the RE model is appropriate. But if the p-value is below the 5% significance level, we accept H_a, i.e., the FE model is suitable.

3.4.3. Diagnostic Test

A diagnostic test has been performed to check the problem of heteroskedasticity and autocorrelation.

4. EMPIRICAL RESULTS AND INTERPRETATION

4.1. Panel Unit Root Test

The results of LLC presented in Table 3 show the mixed order of integration. In LIC, GDP and civil liberty index; in LMIC and UMIC, GDP, urbanization, and natural resource rent; and in HIC, civil liberties are not stationary at their level but become stationary after the first difference. While all other selected variables are stationary at the level.

Table 3. LLC unit-root test.

Variables	LIC		LMIC		UMIC		HIC	
	At level	1st difference	At level	1st difference	At level	1st difference	At level	1st difference
	t-statistics	t-statistics	t-statistics	t-statistics	t-statistics	t-statistics	t-statistics	t-statistics
lnGINI	-4.439***		-3.311***		-3.311***		-2.999***	
lnGDP	-0.981	-2.841***	0.742	-7.831***	0.742	-7.831***	-3.563***	
lnPOP	-15.379***		-7.683***		-7.683***		-8.697***	
lnUB	-10.207***		-0.7144	-5.439**	-0.714	-5.439***	-8.433***	
lnHDI	-3.978***		-8.900***		-8.900***		-8.099***	
lnINF	-2.162**		-6.057***		-6.057***		-7.134***	
lnUNE	-3.199***		-2.318**		-2.318**		-2.722***	
lnGE	-1.603*		-2.054**		-2.054**		-3.069***	
lnNRR	-1.422*		-1.247	-12.445***	-1.247	-12.445***	-3.030***	
lnCL	-0.375	-5.576***	-4.129***		-4.129***		2.923	-4.408***
lnGLOB	-5.572***		-8.137***		-8.137***		-9.549***	
lnGOV	-1.662**		-2.609***		-2.609***		-1.751***	

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

4.2. F-test/Wald Test and LM Test

The F-test/Wald test and LM test presented in Table 4 reveal that the F-test/Wald test is significant at a 1 % level, indicating that POLS cannot be used and the FE model is suitable for all income-group countries. The LM test at a 1% significance level also indicated that for LMIC, UMIC, and HIC, the RE model is significant. The p-value of the LM test in LIC is not significant, which shows that RE is not appropriate. However, the F-test/Wald test at a 1% significance level indicates that the data is not poolable for LIC.

Table 4. F-test/Wald test and LM test.

Income group countries	F-test/Wald test	LM test
LIC	F = 9.44, Probability = 0.000 Wald χ^2= 66.66, Probability= 0.000	$\bar{\chi}^2$ = 0.00 Probability = 1.000
LMIC	F = 11.31, Probability = 0.000 Wald χ^2 = 121.29, Probability= 0.000	$\bar{\chi}^2$ = 34491.74 Probability = 0.000
UMIC	F = 12.34, Probability = 0.000 Wald χ^2= 95.12, Probability= 0.000	$\bar{\chi}^2$ = 1730.07 Probability = 0.000
HIC	F = 13.53, Probability = 0.000 Wald χ^2 =138.94, Probability = 0.000	$\bar{\chi}^2$ = 3817.87 Probability = 0.000

4.3. Hausman Test

Now, to select the appropriate model between the FE and RE, the Hausman test has been used. The p-value in Table 5 is significant at a 1% level for LIC, UMIC, and HIC and at a 5% level for LMIC. This means that FE can be used to look into the relationship between the dependent and independent variables. But before going to run the FE model, it is necessary to perform a diagnostic test.

Table 5. Hausman test.

Income group countries	Hausman test	Probability value
LIC	χ^2 = 210.86	Probability = 0.000
LMIC	χ^2 = 24.55	Probability = 0.011
UMIC	χ^2 = 93.01	Probability = 0.000
HIC	χ^2 = 57.63	Probability = 0.000

4.4. Robustness Check for Heteroskedasticity and Autocorrelation

The Modified Wald test for heteroskedasticity (H_0: homogeneous) proposed by Greene (2000) and the Wooldridge test for autocorrelation (H_0: no autocorrelation) proposed by Wooldridge (2010) presented in Table 6 show the existence of heteroskedasticity and autocorrelation as the p-value is significant at a 1% level.

Table 6. Wald test and Wooldridge test.

Income group countries	Wald test	Wooldridge test
LIC	χ^2= 3427.60 Probability = 0.000	F = 273.103 Probability = 0.000
LMIC	χ^2 = 1713.12 Probability = 0.000	F= 44.111 Probability = 0.000
UMIC	χ^2 = 2729.41 Probability = 0.000	F = 36.131 Probability = 0.000
HIC	χ^2 = 5365.55 Probability = 0.000	F= 33.859 Probability= 0.000

4.5. FGLS and PCSE Regression Results

The diagnostic test shown in Table 6 found problems with heteroskedasticity and autocorrelation. This means that the FE model result cannot be used, or it could give wrong results. When you use the POLS, RE, and FE models on panel data, they might not work well or give you fair results because of autocorrelation and differences between countries (Greene, 2000). Because of this, the FGLS method is the best way to deal with problems like heteroskedasticity, autocorrelation, and endogeneity in panel data (Hicks, 1994; Kmenta, 1986; Parks, 1967; Reed & Ye, 2011). This method is considered to be more efficient than any other OLS (ordinary least squares) estimate (Bai, Choi, & Liao, 2021). In addition to FGLS, the PCSE method is applied because it provides more reliable results (Zhang & Zhao, 2014). People think that the PCSE method can handle errors better when they are heteroscedastic, cross-sectionally correlated, and auto-correlated (Beck & Katz, 1995).

Table 7. FGLS and PCSE results (Dependent variable: lnGINI).

Independent variables	LIC		LMIC		UMIC		HIC	
	FGLS	PCSE	FGLS	PCSE	FGLS	PCSE	FGLS	PCSE
lnGDP	-0.024 (-0.21)	-0.024 (-0.21)	-0.015*** (-5.82)	-0.015*** (-5.89)	0.033*** (13.61)	0.033*** (10.13)	0.021*** (5.54)	0.021*** (6.84)
lnPOP	-0.116*** (-3.84)	-0.116*** (-3.13)	0.055*** (6.78)	0.055*** (7.43)	0.146*** (15.42)	0.146*** (19.63)	0.110*** (12.53)	0.110*** (10.39)
lnUB	0.002 (0.11)	0.002 (0.11)	-0.019** (-2.56)	-0.019*** (-2.84)	-0.046*** (-5.56)	-0.046*** (-7.62)	-0.069*** (-3.54)	-0.069*** (-3.31)
lnHDI	0.240*** (2.94)	0.240** (2.59)	-0.222*** (-5.19)	-0.222*** (-9.94)	-0.271*** (-4.24)	-0.271*** (-4.71)	-0.333** (-2.24)	-0.333*** (-2.61)
lnINF	0.002 (0.63)	0.002 (0.71)	-0.004 (-0.94)	-0.004 (-0.96)	0.002 (0.52)	0.002 (0.60)	-0.014*** (-2.73)	-0.014** (-2.28)
lnUNE	-0.009 (-1.09)	-0.009 (-1.19)	-0.004 (-0.89)	-0.004 (-1.29)	-0.017*** (-3.01)	-0.017*** (-4.24)	-0.003 (-0.37)	-0.003 (-0.37)
lnGE	-0.066*** (-2.64)	-0.066*** (-2.83)	-0.121*** (-4.65)	-0.121*** (-6.74)	0.015 (0.69)	0.015 (0.95)	0.128*** (4.97)	0.128*** (5.07)
lnNRR	0.014 (1.47)	0.014 (1.42)	0.0001 (0.01)	0.0001 (0.01)	0.0001 (0.02)	0.0001 (0.01)	0.005** (2.53)	0.005*** (4.46)
lnCL	0.059* (1.70)	0.058* (1.69)	-0.012 (-0.55)	-0.012 (-0.79)	0.275*** (12.25)	0.275*** (13.99)	-0.073** (-2.35)	-0.073*** (-2.60)
lnGLOB	-0.146** (-2.08)	-0.146** (-2.43)	0.089*** (2.77)	0.089*** (5.33)	-0.044 (-1.11)	-0.044 (-1.27)	-0.694*** (-9.33)	-0.694*** (-7.81)
lnGOV	0.068*** (2.85)	0.068*** (4.47)	0.146*** (5.97)	0.146*** (6.96)	0.073*** (2.96)	0.073*** (5.11)	-0.231*** (-5.05)	-0.231*** (-4.57)

Note: Z statistics in parentheses;***, ** and * indicates significance level at 1%, 5%, and 10% respectively.

The results of Table 7 show that in LIC, economic growth has an insignificant impact on income inequality. But in LMIC, economic growth has a statistically significant and negative impact on income inequality. This result is consistent with the findings of Ullah et al. (2021). This reveals that the benefits accruing from economic growth are distributed in favour of the bottom section of the population. In UMIC and HIC, GDP has a significantly positive impact on income inequality. This finding is similar to that of Odedokun and Round (2001). Since most of the countries in UMIC and HIC are capitalist countries, probably rich people have higher savings as compared to the bottom section of the people who have a higher inducement to invest and thus higher profit, resulting in income inequality (Bourguignon, 1981).

In LIC, population has a significantly negative effect on income inequality. This finding is in line with Butler et al. (2020). One of the possible reasons may be the low development of technology and adoption of labor-intensive techniques in such countries, and hence, a growing population is employed to produce labor-intensive products. In LMIC, UMIC, and HIC, a positive impact of the population can be observed on income inequality. This finding corroborates that of Kentor (2001), Ullah et al. (2021), and Marsh (2015), who argued that as the population increases, the allocation of resources towards the bottom section of the population diminishes, which results in a widening of income inequality.

In LIC, the impact of urbanization on income inequality is not significant. In LMIC, UMIC, and HIC, income inequality reduces with the increase in urbanization. This result is parallel to that of Adams and Klobodu (2019) and Ha, Le, and Trung-Kien (2019). One possible explanation is the migration of rural residents to urban areas, where they can find jobs in industries or manufacturing sectors that offer higher wages than their previous occupations (Ha et al., 2019).

In LIC, the effect of HDI on income inequality is significantly positive. This indicates that only a few sections of the population enjoy a good education, a high standard of living, and a healthy life. Since HDI can raise the productivity of the labor force and raise their income level (Behrman, 1993), only a few sections of the population tend to raise their income level. On the other hand, in LMIC, UMIC, and HIC, a percentage improvement in HDI reduces income inequality. This outcome or result is the same as in the study of Amiti and Cameron (2012). Grimm, Harttgen, Klasen, and Misselhorn (2008) showed that in some of the LMIC and UMIC, such as Vietnam, Colombia, and Indonesia, and in developed countries such as the USA and Finland, inequality in HDI between rich and poor is small. One possible interpretation of our result is that the skill- and labor-based earnings distribution is relatively narrow, which demonstrates that income inequality among the people who use their human capital is low.

Inflation does not show any significant effect on income inequality in LIC, LMIC, and UMIC. In HIC, a significant negative effect of inflation is observed. This result resembles that of Ullah et al. (2021). The possible statement may be the implementation of stronger tax policies and higher tax revenue in HIC, and additionally, during times of inflation, redistribution of resources in favour of the poor by taxing the rich at a higher rate may be the probable reason (Gustafsson, 1999; Kim, 2016).

The impact of unemployment on income inequality is not significant in LIC, LMIC, and HIC. But the coefficient of unemployment is negative and significant in UMIC. This result is the same as that of Muryani et al. (2021), who argue that instead of lowering the unemployment rate, improvement in labour productivity is required to create a favourable effect on income distribution.

The gender equality significantly reduces income inequality in LIC and LMIC. Baloch et al. (2018) and Grotti and Scherer (2016) reported that a rise in the participation of females in the job market reduces income inequality. The coefficient of gender equality is positive but not significant in UMIC. In HIC, gender equality has a significantly positive impact on income inequality. This result is in line with the findings of Maxwell (1990), who suggested that a rise in income inequality is because of the continuing increase in the participation of females in the job market or the dual-earning of husband and wife.

The impact of natural resources on income inequality is not significant in LIC, LMIC, and UMIC. However, a significantly positive impact of natural resources can be seen on income inequality in HIC. The result is in line with ElGindi (2017). Supporting the resource curse argument, this result postulates that rent generated from natural resources is captured by the elite group and hence increases income inequality between the top and bottom classes of the people as the resources are not allocated in favour of the bottom section of the population (Anyanwu, 2016). Another possible explanation is that an increase in rent from natural resources promotes corruption and generates greed among policymakers, which leads to more unequal income distribution (Grossman & Helpman, 1996).

The coefficient of civil liberty is positive and statistically significant in LIC and UMIC. This indicates that rich people can influence policy, which benefits them more and prevents the poor from such benefits as an imperfection in the credit market (Banerjee & Newman, 1991; Bertola, 1993). But in LMIC, civil liberty does not show any significant impact. On the other hand, in HIC, a significant negative impact of civil liberty is observed on income inequality. This result shows that people vote for a government that brings equal opportunities and redistributes income from people with high incomes to people with low incomes (Esarey, Salmon, & Barrilleaux, 2012).

In LIC and HIC, the effect of globalization on income inequality is both negative and significant. The result is consistent with that of Ullah et al. (2021). Their study confirms that globalization boosts digitalization, investment, and employment for both semi-skilled and unskilled workforces and helps in the reduction of income inequality. But in LMIC, an increase in globalization increases income inequality. Such similar results are found in Milanovic (2005) and Thalassinos et al. (2012). The reason could be the negative impact of globalization that hinders human development, which widens the income gap both in the micro and macro economies by creating a skill imbalance in corporate practices (Haseeb, Suryanto, Hartani, & Jermsittiparsert, 2020). In UMIC, the coefficient of globalization is negative but insignificant.

A positive and statistically significant impact of governance is observed on income inequality in LIC, LMIC, and UMIC. This result is parallel to that of Chaudhuri and Ravallion (2006). Chaudhuri and Ravallion (2006) distinguished two types of inequalities: good and bad inequality. Good inequalities refer to those that reflect and support the market-based incentives required to promote growth, entrepreneurship, and innovation. Bad inequalities are those that prevent people from accessing markets and restrict investment in physical and human capital. However, this may be the good income inequality that is likely to increase due to improvements in governance quality (Zhuang, Dios, & Lagman-Martin, 2010). On the other hand, an improvement in governance reduces income inequality in HIC. This result is in line with those of Law and Soon (2020), Sarkodie and Adams (2020), and Alesina and Perotti (1996). Supporting their results, a better governance system and greater political stability in these countries could be the main reasons for low-income inequality.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The main objective of this paper is to investigate the factors that determine income inequality among different income-group countries during the period 1996-2019. For empirical analysis, this study employed FGLS and PCSE regression methods to find the determinants of income inequality.

5.1. Conclusion

The results suggest that LIC, HDI, civil liberty, and governance exacerbate income inequality, while population, gender equality, and globalization significantly reduce it. However, special attention should be focused on population growth because it may not be possible to employ a growing population in all productive services in the long run; rather, it may widen income inequality in the long-run. In LMIC, population, globalization, and governance increase inequality. On the other hand, GDP, urbanization, HDI, and gender equality significantly contribute to lowering income inequality. In UMIC, economic growth, population, civil liberty, and governance exacerbate income inequality, while urbanization, HDI, and unemployment have an income inequality-reducing effect. In HIC, economic

growth, population, gender equality, and natural resources worsen income distribution. But urbanization, HDI, inflation, civil liberty, globalization, and governance significantly reduce income inequality. Hence, to reduce income inequality, it is necessary to examine the role of these factors that exacerbate income inequality among different income-group countries.

5.2. Policy Recommendations

Based on these findings, a viable policy recommendation in LIC is to promote human development, gender equality, and good governance to further reduce income inequality. These factors may enhance the opportunities and capabilities of impoverished and marginalized groups, as well as improve the accountability and transparency of public institutions. Additionally, civil liberty should be balanced with social justice, as too much freedom may lead to exploitation and discrimination. Policies should enhance the quality of governance to improve the impact of the governance system on income inequality. In LMIC, policies that aim to reduce population growth, promote inclusive globalization, and improve governance quality may also help to reduce income inequality, but they should be accompanied by redistributive measures that guarantee that the fruits of growth and development are shared more fairly among all segments of society. A possible policy recommendation to mitigate income inequality in UMIC countries is to control population growth, and promote inclusive growth, which benefits all sections of society, especially the poor and marginalized sections. Investments in public services, infrastructure, social protection, and human capital can all help to achieve this goal while also creating more and better jobs. Moreover, enhancing civil liberty and governance quality can also help reduce income inequality by ensuring that people have equal access to opportunities, rights, and justice and that public resources are allocated fairly and transparently. In HIC, a possible policy recommendation is to adopt measures that share the benefits of economic growth, population control, gender equality for all sections, and investment from the rent of natural resources. For example, policies that can promote progressive taxation, social protection, redistribution, public investment, education, and health care can help reduce income disparities and ensure more inclusive and sustainable development. Additionally, policies that foster environmental sustainability, resource efficiency, and diversification of the economic structure can help reduce the reliance on natural resources and the associated hazards of volatility and rent-seeking.

5.3. Limitations and Future Scope

Although this study introduces novel aspects in terms of including more macroeconomic factors among different income group countries, due to data unavailability, some of the countries are excluded from the present study. Hence, future researchers could explore this study more deeply using country-specific data at a national or regional level.

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Annexure1. List of countries.

LIC	Central African Republic, Zambia, Malawi, Rwanda, DR Congo, Yemen, Sudan, Mali, Burundi, Niger, Togo, Uganda
LMIC	Lesotho, Republic of the Congo, Cambodia, Haiti, Bolivia, Honduras, El Salvador, Cameroon, Kenya, Iran, Benin, Philippines, Ukraine, Algeria, Kyrgyzstan, Pakistan, Nepal, Bangladesh, Mauritania, Indonesia, Tunisia, Mongolia, India, Vietnam
UMIC	Botswana, Mexico, South Africa, Peru, Brazil, Colombia, Paraguay, Guatemala, Jamaica, Dominican Republic, Thailand, Costa Rica, Albania, Belarus, Bulgaria, Moldova, Serbia, Azerbaijan, Armenia, China, Malaysia, Mauritius, Russia, Gabon
HIC	Chile, Qatar, Bahrain, Saudi Arabia, Kuwait, Panama, Trinidad and Tobago, Israel, Uruguay, USA, Japan, Estonia, Canada, Singapore, Romania, Czech Republic, Slovakia, Norway, Hungary, Sweden, Netherland, Slovenia, Denmark, Finland, Switzerland, Italy, France, Austria, Belgium, Poland