# Chapter 3

# Determinants of Income Inequality Among Different Income Group Countries

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## 3.1 Introduction

In the 1990s, a global trend emerged where income inequality began to decrease, reversing a pattern that had been in place since the early 19th century. However, this trend was not uniform across all countries, as many experienced an increase in income inequality within their own borders (UN, 2020; WIR, 2022). According to the WIR (2022), the wealthiest 10 percent of the population control up to 52 percent of the global income, while the poorest half segment earns just 8.5 percent of it. The United Nations Development Programme (UNDP) recently released policy brief revealed that poverty rates in poor nations, particularly in LICs and LMICs, have deteriorated over the past three years, with an additional 165 million population surviving below the $3.65 per day threshold by 2023 (UNDP, 2023). This significant rise in income inequality has become a worldwide issue, raising awareness of policy agendas and sparking economic and political debates in recent decades (Sebri & Dachraoui, 2021). A large number of researchers and experts have examined how income inequality affects economic development and how different factors affect income inequality. The pioneering economist Simon Kuznets proposed that the relationship between income inequality and economic development follows a shape of an inverted U. This hypothesis suggests that income inequality increases with an initial increase in economic growth, reaches a peak, and then decreases as income continues to rise (Kuznets, 1955). During the initial stages of rapid economic development, when income inequalities tend to rise across social and spatial dimensions, such income inequality may be tolerable to society (Hirschman & Rothschild, 1973). However, the persistent increase in income inequality poses significant challenges for the contemporary world in various social, economic, and political aspects (OECD, 2015; Huang *et al.*, 2019). The evolution of income inequality is a complex phenomenon intertwined with various social problems, such as human rights violations that highlight severe injustice and barriers to human development, which constantly and persistently draw global attention (Mishchuk *et al.*, 2018). Dabla-Norris *et al.* (2015) argued that increasing inequality presents a serious threat to both the economy and society as it

hampers investment and growth, disrupts financial, economic, and political stability, leads to inefficient resource utilization, nepotism, and corruption, resulting in adverse economic and social consequences. However, according to Alesina & Perotti (1996) and Li & Zou (1998), income inequality has a beneficial effect on economic development. They asserted that fiscal redistribution, which places a higher tax burden on investors and capitalists, diminishes their investment incentives. Conversely, this policy improves the socio-political atmosphere by reducing social conflict, thereby stimulating productive activities and capital accumulation within the country (Alesina & Perotti, 1996).

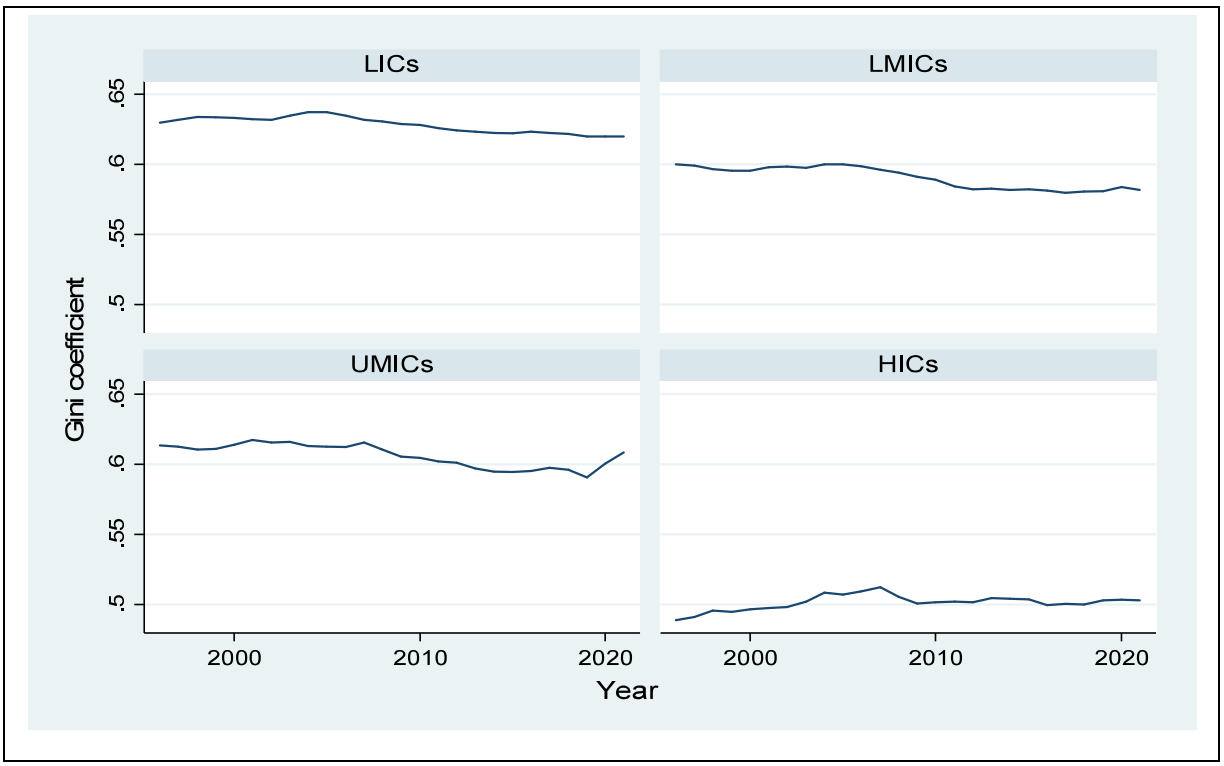
### 3.1.1 Some Stylized Facts: Trends in Average Income Inequality in LICs, LMICs, UMICs, and HICs During 1996-2021

Figure 3.1 reflects the average trends of income inequality across different income group countries from 1996 to 2021. Initially, in 1996, LICs exhibited the highest inequality (0.6297), while HICs showed the lowest (0.4889). Over the years, a general trend of decreasing inequality in LICs can be observed, with the Gini coefficient dropping to 0.6197 by 2021. In contrast, LMICs started with a Gini coefficient of 0.6001 in 1996 and saw a fluctuating trend, ultimately reaching 0.5816 in 2021. UMICs began with a coefficient of 0.6135 in 1996, experienced a decrease until 2019, and then rose to 0.6085 in 2021. HICs showed an increase in inequality, from 0.4889 in 1996 to 0.5028 in 2021.

Stylized facts emerging from this data include the observation that income inequality within LICs, LMICs, and UMICs tends to decrease over time. The reason behind the decline in income inequality is robust economic growth in developing countries in Asia, mainly India (LMIC) and China (UMIC) (UN, 2020; Darvas, 2019). Another reason could be that, as suggested by the SDGs, income inequality between nations could have diminished due to the increase in ODA and the influx of financial resources directed towards the world's most underdeveloped nations in the last few years (Makhlouf, 2023). Although many developing nations maintain smaller welfare systems in comparison to their more developed counterparts, certain nations have made strides in mitigating income inequality, which has been accomplished through the implementation of dynamic and inventive strategies, including reforms in the labor market (Gradín *et al.*, 2021). From 1990 to 2019, there was a notable rise in the share of labor income for women across Asia, except for China, while this trend showed the most significant increase in Latin America and Western Europe (WIR, 2022). Notably, countries like Brazil and Mexico have witnessed positive outcomes by

instituting minimum wage laws and adopting progressive taxation and benefits schemes (Gradín *et al.*, 2021). The most significant decrease in inequality was observed in the Maldives, with Kyrgyzstan and Azerbaijan also experiencing notable declines. This trend highlights the economic rebound of these nations from the financial turmoil that ensued after the dissolution of the Soviet Union [Economic and Social Commission for Asia and the Pacific (ESCAP), 2018]. A group of West African nations (Guinea, Mali, Mauritania, and Niger) and Cambodia, all agrarian with small-scale farmers, saw reduced inequality since 2005 due to better rural trade conditions, rising staple food prices, and good cotton and cash crop yields that boosted rural incomes, lessening rural-urban income inequality (Green, 2020). Since 1990, countries like Nigeria, Morocco, Ghana, Angola, Tunisia, Namibia, and Lesotho, which rank mid-tier in Africa's per capita national income, have experienced a notable rise in average earnings (Chancel *et al.*, 2019). The Sahel region, including Burkina Faso, Chad, Mali, Mauritania, Niger, and the Central African Republic, is grappling with a complex array of challenges such as rising insecurity, political upheaval, climate adversity, and economic crises, complicating efforts towards sustainable and inclusive growth in an already impoverished area (IMF, 2023). These countries have increased their average annual security spending over the period of 2012-2022 (IMF, 2023). In numerous developed HICs, there has been a trend towards lowering the marginal tax rates for higher income brackets, diminishing capital taxes, and implementing stricter controls on social expenditure and this shift has generally led to a diminution in the government's capacity to redistribute wealth, thereby weakening its role in achieving economic equity (Derviş & Qureshi, 2016). The increase in income inequality in most of the advanced HICs (Australia, Canada, France, Germany, Italy, Japan, Korea, the UK, and the USA) could happen through three channels: technology driving demand away from routine skills towards more advanced abilities; a shift in income from labor to capital due to automation; and more unequal capital income distribution with dominant firms gaining market power and economic benefits in concentrated markets that favor the leading players (Qureshi, 2023). In HICs (Germany, France, Japan, the U.S., and the U.K.), since the early 1980s, public wealth in affluent nations has plummeted from 15-30 percent to nearly zero or even negative figures in the U.K. and U.S. The zero or negative figure of public wealth in the Western nations signifies a shift in economic control to private entities (WIR, 2022).

Figure 3.1: Trends of the average Gini coefficient (income inequality) among different income group countries during 1996-2021




Source: Researcher's construction based on the WID

The structure of this chapter is as follows: Section 3.2 analyzes the theoretical link between income inequality and different factors; Section 3.3 analyzes the summary of empirical literature; Section 3.4 is the data and methodology; Section 3.5 is the interpretation of empirical results; and Section 3.6 is the conclusion of this chapter.

## 3.2 Conceptual Framework

The conceptual link between income inequality and different factors has been discussed in the following:

### Income Inequality and Economic Growth

Kuznets (1955) posits that economic development entails structural changes that affect income distribution. In the initial stages of development, most of the population is employed in low-productivity agriculture, while the small elite reap the benefits of industrialization, which results in a widening gap between the rich and the poor (Kuznets, 1955). However, as development advances, more people migrate from rural to urban areas, their income starts to improve and income inequality diminishes (Kuznets, 1955). Savings are the instruments that

can impact the relationship between economic growth and income inequality. In income inequality economies, generally, rich people have a higher saving rate as compared to marginalized sections, whose inducement to invest is higher and this will probably promote higher economic growth (Bourguignon, 1981). So, if the benefits of economic growth only favor the high-income classes against the lower-income social classes, it widens the income gap in society (Shahabadi *et al.*, 2017). However, economic growth can leads to a larger economic pie when income distributed equitably enhances the living standards of both rich and poor, despite a potential decrease in the income share of the rich (Gyimah-Brempong, 2002).

**Income Inequality and Urbanization**

Urbanization, on the one hand, can reduce income inequality by facilitating the migration of low-income rural workers to high-income urban areas, where they can access better employment opportunities, and has a long-term equalizing impact on income distribution (Ali *et al.*, 2022). On the other hand, urbanization can increase income inequality due to the influx of low-skilled rural migrants by exacerbating the wage gap between formal and informal sectors in urban areas, as well as the skill gap between rural and urban workers (Sulemana *et al.*, 2019).

**Income Inequality and Population**

In the traditional Heckscher–Ohlin framework and the related Stolper–Samuelson theorem, when the world economy is opened up, a nation with a high population and abundant labor force will tend to specialize and export goods that require more labor input, which will increase the demand and wages of unskilled workers and thus reduce the income gap within the nation (Han *et al.*, 2012). An increase in population creates a lack of job opportunities as the labor supply surpasses labor demand within job markets, which is the cause of the rise in income inequality (ElGindi, 2017). However, larger population sizes can also worsen income inequality because lower-income groups are more vulnerable to poverty due to their high dependency ratio (Ullah *et al.*, 2021; Taresh *et al.*, 2021). Ram (1984) also suggested that an increase in population reduces the income share of the bottom section of the population.

**Income Inequality and Human Development**

An increase in the level of human development helps in the reduction of inequality by increasing the level of education, because the higher the level of education, the higher the

wages as compared to the lower level of education (Taresh *et al.*, 2021; Prawoto & Cahyani, 2020). That means people with low education have a low level of human development, which lowers their productive capacity and lowers their income level (Behrman, 1993). In other words, people with higher incomes can invest more in education, health, communication, and so on. Hence, people can become more productive with improvements in human capabilities. On the other hand, Alvarado *et al.* (2021) showed that in LICs, LMICs, and HICs, the human capital index leads to an increase in income inequality.

**Income Inequality and Inflation**

Theoretically, inflation is considered to have an exacerbated impact on income inequality. According to Deyshappriya (2017), inflation can exacerbate income disparity by eroding the real income of the lower-income groups and forcing the middle-income groups into lower economic positions. Moreover, in a situation with low inflation, higher inflation reduces income inequality, and in a situation with high inflation, more inflation is associated with greater income inequality (Siami-Namini & Hudson, 2019). During times of inflation, if resources are redistributed from the rich income earners to poor people by imposing heavy taxes on rich people, then income inequality can be lower (Gustafsson & Johansson, 1999; Kim, 2015).

**Income Inequality and Unemployment**

The relationship between unemployment and income inequality is usually positive. Unemployment raises the income share of the top percent of the population and decreases the income share of the bottom percent of the population (Mocan, 1999). This means that people who lose their jobs tend to experience a decline in their income level unless they receive adequate social protection benefits (Martínez *et al.*, 2001; Deyshappriya, 2017). However, if the labor market offers better employment opportunities by enhancing labor productivity, then unemployment can have a negative effect on income inequality (Muryani *et al.*, 2021).

**Income Inequality and Gender Equality**

As a macroeconomic factor, women's involvement in social contexts marked by high degrees of disparity can reduce the gender gap between men and women and effectively lower income inequality (Grotti & Scherer, 2016; Baloch *et al.*, 2018). However, the persistent rise in female labor market participation and women with above-average earnings who were married to high-earning men could exacerbate income inequality (Maxwell, 1990). The

existing wage gap between male and female workers and the obstacles women encounter in advancing in their careers indicate that women's labor participation in the job market does not mitigate income inequality but rather intensifies it (Amate-Fortes *et al.*, 2021).

**Income Inequality and Natural Resources**

The rent from natural resources can exacerbate and reduce income inequality. The exploitation of natural resources by the government can worsen income inequality if they rely on selling minerals, oil, or gas for revenue instead of investing in the welfare and education of their citizens (ElGindi, 2017). The increase in natural resources rent can also foster corruption and self-interest among policymakers, leading to a more skewed distribution of income (Grossman & Helpman, 1996). However, the rent derived from natural resources can be used to enhance human capital and improve the income of the poorest segments of society (Alvarado *et al.*, 2021). Dependence on natural resources can be beneficial, as the revenue derived from these resources can lead to the creation of new job prospects in the public sector, which in turn can contribute to reducing inequalities in income levels (Ross, 2007).

**Income Inequality and Democracy**

According to some studies, democracy can have different effects on income inequality depending on how it benefits the rich and the poor. For example, when democracy is acquired by the rich and serves the needs of middle class population, income inequality gets worse (Acemoglu *et al.*, 2013). However, democracy might reduce income inequality if it can empower the poor to elect politicians who implement policies that redistribute income from the rich to the poor (Esarey *et al.*, 2012). Democratic political systems make it possible for state institutions to be more responsive to the needs of the underprivileged and more enthusiastic about acquiring better distributional results, such as through welfare-enhancing policies (Balcázar, 2016; Hassan *et al.*, 2021).

**Income Inequality and Globalization**

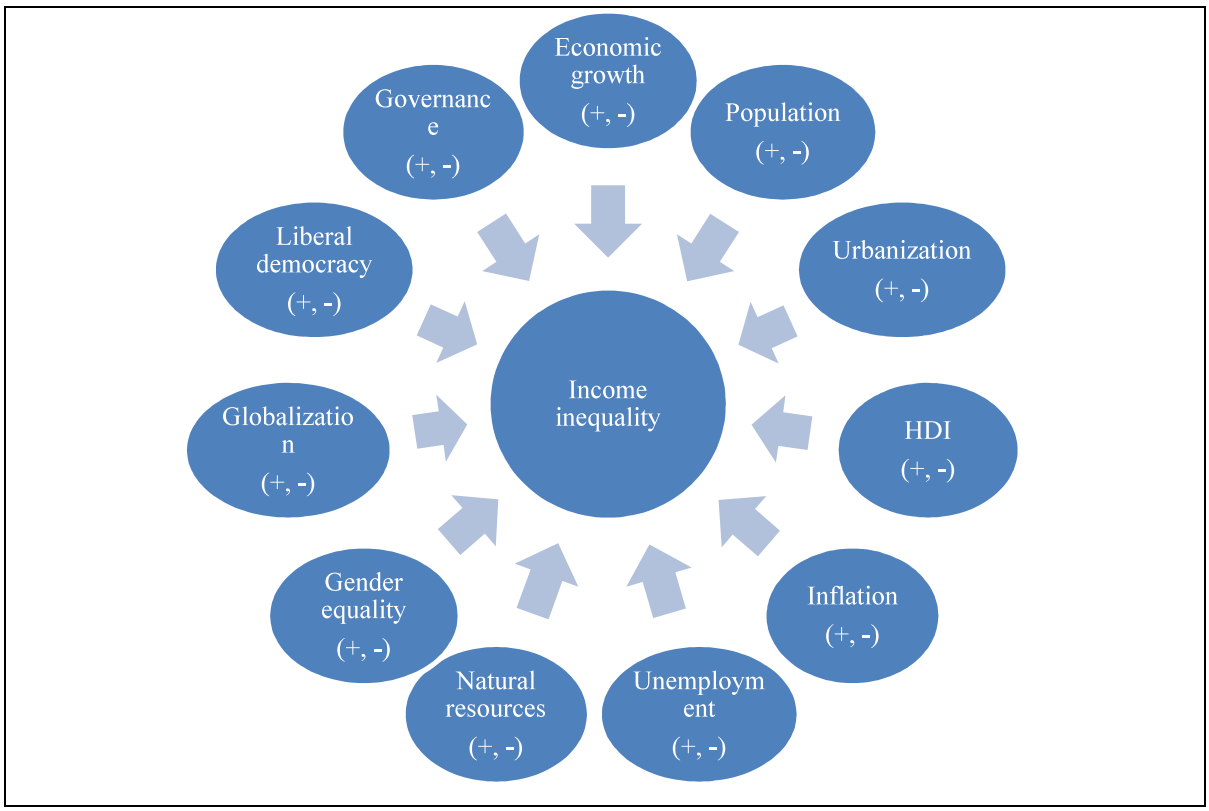
The traditional view of international trade states that while growing trade integration continues to be linked to improved relative wages for skilled workers in advanced countries, it puts deflationary pressure on unskilled workers, resulting in a widening of the wage gap (Kremer & Maskin, 2006). Despite the fact that rapid globalization and technical advancement on a global scale have brought many opportunities to numerous segments of society, the advantage still goes to the rich, which is an obstacle to fair income distribution

(Sağlam, 2021). According to Munir & Bukhari (2020) and Ullah *et al.* (2021), globalization facilitates the reduction of income inequality by enabling low-wage and low-skilled workers to benefit from the knowledge transfer from high-wage and high-skilled workers. However, globalization attracting FDI inflow may make income inequality worse by demanding a more highly skilled labor force and widening the pay difference between skilled and unskilled employees (Decreuse & Maarek, 2015; Çelik & Basdas, 2010).

**Income Inequality and Governance**

The quality of institutions or governance in a country that affects income inequality depends on how income is distributed among its population. Countries with poor governance systems tend to have more unequal income distribution (Ullah *et al.*, 2021). Higher institutional quality can also increase income inequality if the development projects in the region favor those who have the resources to start businesses (Nguyen *et al.*, 2021). However, this does not imply that better governance systems always worsen income inequality. A good governance environment can reduce the gap between rich and poor (Sarkodie & Adams, 2020; Roy-Mukherjee & Udeogu, 2020).

Figure 3.2: Conceptual link between income inequality and different factors




Source: Researcher's construction

### 3.3 Literature Review

In the following, a review of previous research has been explained:

**Income Inequality and Economic Growth**

Many researchers in different nations have looked into the well-known Kuznets inverted U-shaped. Bahmani-Oskooee *et al.* (2008), who analyzed the factors affecting income inequality in 16 countries, found that Kenya adheres to the traditional Kuznets hypothesis, whereas in Panama, national income has a long-term positive impact on income inequality following an 'uninverted U' shaped. The inverted U-shaped link between income inequality and GDP was supported by Deyshappriya (2017) while investigating the macroeconomic determinants of income inequality in Asian nations. However, Batuo *et al.* (2022) showed that the Kuznets hypothesis is valid only for the nations with the lowest income distribution. A study by Ullah *et al.* (2021) in 64 Belt and Road countries showed a negative impact of economic growth on income inequality. Kim (2015) looked at this association for the OECD and EU or in the eurozone and revealed that income inequality has a strongly detrimental impact on GDP growth in high-fragility countries and LICs. An investigation by Odedokun & Round (2004) showed economic development has the potential of causing income-disequalizing. Wolde *et al.* (2022) investigated this income inequality-economic growth relationship in Ethiopia over the period 1980-2017 and found that the relationship between the two is negative in the long run; however, this is positive in the short run.

**Income Inequality and Population**

The study carried out by Kentor (2001) in 88 less-developed nations revealed that income inequality is positively affected by population size. Such a similar outcome is also found out by Marsh (2015) in 142 developed, developing, and transitional societies and by Ullah *et al.* (2021) in 64 Belt and Road countries. Taresh *et al.* (2021) study in 33 provinces in Indonesia also showed that population growth increases income inequality. However, a study conducted in rural America by Butler *et al.* (2020) found a negative link between income inequality and population growth. A similar negative result was found by Walujadi *et al.* (2022) in 33 Indonesian provinces. But Deyshappriya (2017) did not find any significant relationship between population growth and income inequality.

**Income Inequality and Urbanization**

The studies by Kanbur & Zhuang (2013), Adams & Klobodu (2019), Sulemana *et al.* (2019), and Taresh *et al.* (2021) suggested that urbanization as a macroeconomic factor causes income inequality to rise. Ali *et al.* (2022), who investigated how industrialization and urbanization affect income inequality, found that urbanization can decrease income inequality in the long run. Johansson & Wang (2014) also found the negative effect of urbanization on income inequality. By classifying the countries according to their level of urbanization, Castells-Quintana & Royuela (2012) showed that income inequality hinders economic growth in both low and high urbanization levels in which persistent and high unemployment levels exixt.

**Income Inequality and HDI**

Amiti & Cameron (2012), Sarkodie & Adams (2020), Taresh *et al.* (2021), and Walujadi *et al.* (2022) found a negative link between the HDI and income inequality. Friderichs *et al.* (2023) indicated that improvement in education, by elevating the standard of schooling for everyone, could significantly contribute to reducing income inequality. But the study by Prawoto & Cahyani (2020) in Indonesia revealed the positive impact of HDI on income inequality. Similarly, Alvarado *et al.* (2021) showed that in LICs, LMICs, and HICs, the human capital index leads to an increase in income inequality. Theyson & Heller (2015), using data from 147 nations during the period from 1992 through 2007, showed an S-curve association between income inequality and HDI.

**Income Inequality and Inflation**

A study by Asogwa *et al.* (2022) revealed a negative impact of inflation on income inequality in a panel of 28 selected African countries. Zandi *et al.* (2022) found a positive impact on income inequality in 12 developing Asian countries. Thalassinos *et al.* (2012), Law & Soon (2020), and Berisha *et al.* (2020) also provided similar results that inflation exacerbates income inequality. But Jäntti & Jenkins (2010) found no evidence of inflation determining income inequality. Memon & Qureshi (2021) showed that there is a positive association between past inflation volatility and subsequent inequality. But this relationship does not exist in developed countries, while this relationship is stronger for developing economies. A study by Siami-Namini & Hudson (2019) confirmed the association of a nonlinear nexus between inflation and income inequality, implying that as inflation goes up, income inequality declines. After that, income inequality reaches a minimum and starts increasing

again. But Munir & Sultan (2017) showed the insignificant impact of inflation on income inequality.

**Income Inequality and Unemployment**

Shahpari & Davoudi (2014), Martínez *et al.* (2001), Zandi *et al.* (2022), Deyshappriya (2017), Taresh *et al.* (2021), and Prawoto & Cahyani (2020) found a positive link between income inequality and unemployment. Sheng (2011) in the U.S. during 1941-2010 found a tradeoff association between the changes in the unemployment rate and the wage share, i.e., there is a positive correlation between unemployment and income inequality. But the study by Muryani *et al.* (2021) in Indonesia provides a negative association between the two. The study by Jäntti & Jenkins (2010) did not find any evidence of unemployment as a determinant of income inequality. Signor *et al.* (2019) study demonstrated that the rise in the proportion of formal jobs in the labor market and the fall in labor income ratios between various ethnic groups both helped to lower income inequality. An investigation by Mocan (1999) in the U.S. revealed that structural unemployment raises the highest quintile's income share and decreases the income shares of the bottom 60 percent of the population.

**Income Inequality and Gender Equality**

Grotti & Scherer (2016) investigated in European countries (Denmark, Italy, Germany, and the U.K.) and the U.S. from the mid-1980s to the mid-2000s and Baloch *et al.* (2018) investigated in a panel of 103 countries during 2006-2013 and found a negative effect of gender equality on income inequality. Maxwell's (1990) study in the U.S. showed that increased in female labor force participation could potentially increase inequality among families with both husband and wife earners. Amate-Fortes *et al.* (2021), while studying the factors that affect income inequality in 33 European nations during 2003-2017, showed that gender inequality and income inequality are closely connected.

**Income Inequality and Natural Resources**

ElGindi (2017) and Teng *et al.* (2024) found a positive interlink between natural resource dependency and income inequality. Research by Hartwell *et al.* (2019) and Ponce *et al.* (2023) showed that while in non-democratic countries, natural resources exacerbate income inequality, they reduce income inequality in democratic nations. An investigation by Alvarado *et al.* (2021) found a negative relationship between the natural resource dependence and income inequality for LMICs and UMICs. Avom *et al.* (2022) investigated of 42 SSA

countries during the period 1998-2018 and found that natural resource rents negatively affect income inequality. Among the various forms of natural resources, forestry and oil rents reduce income inequality, while coal rents increase inequality. Fum & Hodler (2010) showed that natural resources increase income inequality in countries with polarized ethnic populations, like Bolivia or Mexico, but decrease it in nations with homogeneous ethnic populations, like Norway.

**Income Inequality and Democracy**

The study by Ponce *et al.* (2023) in 78 countries from 1995-2017 found that regions with strong democratic systems mitigate income inequality. Adams & Klobodu's (2019) study in 21 SSA countries during the period 1984-2014 also revealed that democratic reforms negatively affect income inequality. On the other hand, Lee & Lee (2018) demonstrated that democratic regimes are positively associated with income inequality when redistributive activities are controlled. A study by ElGindi (2017) in 96 developing countries during 1980-2010 revealed a positive impact of democracy on income inequality. A study by Park (2017) showed that political freedom has a marginal effect on inequity in the distribution of income. However, a study by Marsh (2015) in 142 developed, developing, and transitional societies found no net effect of liberal democracy on income inequality.

**Income Inequality and Globalization**

Munir & Bukhari's (2020) study in Asian emerging countries revealed that trade globalization contributes to reducing income inequality. Ullah *et al.* (2021) investigated in One Belt One Road countries and found that globalization has a negative effect on income inequality. Similarly, a study by Zhou *et al.* (2011) in 60 developed, developing, and transitional countries revealed the robust negative impact of globalization on income inequality. But Milanovic (2005), Dreher & Gaston (2008), and Thalassinos *et al.* (2012) showed a positive association between the two, i.e., globalization and income inequality. Results from the study by Bukhari & Munir (2016) showed that trade and technological globalization significantly help to reduce income inequality, while financial globalization raises income inequality.

**Income Inequality and Governance**

A study by Perugini & Tekin (2022) showed the positive impact of institutional or governance quality on income inequality. Xu *et al.* (2021) found that there is a positive

connection between the rule of law, political stability, corruption, and income inequality. Such a similar outcome was also revealed by Ullah *et al.* (2021) in One Belt One Road countries, as these countries are developing with weak institutional quality. Chaudhuri & Ravallion (2006) also claimed that governance failure exacerbates bad inequalities. Besides, prior studies by Alesina & Perotti (1996), Adams & Mengistu (2008), Law & Soon (2020), and Sarkodie & Adams (2020) suggested that institutional quality helps reduce income inequality. But a study by Deyshappriya (2017) showed no significant association between corruption and income inequality.

### 3.3.1 Research Gap

The factors that cause income inequality among different regions, countries, or groups of countries have been a long-standing topic of inquiry among researchers (Bahmani-Oskooee *et al.*, 2008). In recent years, a growing body of literature has investigated the factors that determine income inequality in their empirical studies (e.g., Ullah *et al.*, 2021; Taresh *et al.*, 2021; Alvarado *et al.*, 2021; Saha *et al.,* 2021; Amate-Fortes *et al.*, 2021; Wolde *et al.*, 2022; Batuo *et al.*, 2022; Perugini & Tekin, 2022). The research findings on the factors influencing income inequality are varied in the literature. From a different factors' perspective, this present study attempts to examine how economic growth, population, urbanization, human development, inflation, unemployment, gender equality, natural resources, liberal democracy, globalization, and governance quality affect income inequality among different income group countries, i.e., LICs, LMICs, UMICs, and HICs during 1996-2021. For this purpose, FGLS, PCSE, and DK regression methods are applied.

Therefore, this chapter investigates the determinants of income inequality among different income group countries over the period 1996-2021.

## 3.4 Data and Methodology

### 3.4.1 Data Source

The data are completely gathered from secondary sources, as shown in Table 3.1, during the period from 1996 to 2021. A total of 116 countries are taken into account to analyze the impact of different factors on income inequality among different income group countries. The selection of countries and time periods for the objectives are restricted by the availability of

data. In Table 3.1, the variable list, proxy, symbol used, description, and data sources are given.

Table 3.1: Variable list, proxy, symbol used, description, and data sources

| Variable | Proxy | Symbol used | Description | Data sources |
|---|---|---|---|---|
| Income inequality | Gini coefficient | INE | Measures inequality in the distribution of income in an economy (0 indicates perfect equality and 1 indicates perfect inequality). | WID |
| Economic growth | Gross domestic product per capita (GDPPC) dollar ($) constant, 2022 | EG | GDPPC expressed in terms of purchasing power parity (PPP). | WID |
| Population | Population growth rate (annual %) | POP | Exponential rate of midyear population growth from year t-1 to t (expressed as %). | The World Bank |
| Urbanization | Urban population growth (annual %) | UB | People living in urban areas. | The World Bank |
| Human Development | Human Development Index | HDI | Summary indicator of average achievement in three important areas of human development: long and healthy life, knowledge, and standard of living. (Index: low (<0.550), medium (0.550-0.699), high (0.700-0.799), very high (≥0.800)). | UNDP |
| Inflation | Consumer prices (annual %) | INF | Annual percentage change in the acquisition of a basket of goods and services for the average consumer that may be fixed or changed at predetermined periods (such as yearly). | The World Bank |
| Unemployment | Unemployment total | UNE | The percentage of the labor force who are unemployed but available for and actively seeking work. | The World Bank |
| Gender equality | Gender equality | GE | Execution of institutions and initiatives of the country to uphold laws and regulations that support equal opportunities for men and women in the areas of education, health care, the economy, and legal protection (0 showing the lowest score, 1 showing the highest score). | The World Bank |

| | | | | |
|---|---|---|---|---|
| Natural resource | Total Natural resources rent (% of GDP) | NRR | The sum of rents from oil, minerals, forests, natural gas, and coal (hard and soft). | The World Bank |
| Liberal Democracy | Liberal democracy index | LD | It provides information on free and fair elections, freedom of expression and association, voting rights, equality before the law, safeguarding of civil liberties, and executive constraints. It goes from 0 (lowest) to 1 (highest) democratic level. | Varieties of Democracy (V-Dem), Core v13 |
| Globalization | Globalization index | GLOB | Integration of countries in terms of economic, social, and political factors (score ranges from 0 to 100). | KOF Swiss Economic Institute |
| Governance | Governance index[5] | GOV | Six components viz., GE, RL, CC, PV, VA, and RQ, (each of the components' score ranges from -2.5 to +2.5)[6]. | The World Bank, Worldwide Governance Indicators (WGIs) |

Source: Researcher's construction based on secondary sources of data

Note: Using STATA software, interpolation and extrapolation techniques are applied to generate missing values data for inflation in Yemen (2015-2021), DR Congo (2017-2021), Lesotho (1997-1999), and the Republic of the Congo (1997-1998); rent from natural resources (% of GDP) in Yemen (2019-2021) and Kuwait (2021); liberal democracy in Bahrain (1996-2001); and data of governance indicators for all countries (1997, 1999, and 2021).

### 3.4.2 Criteria for Selection and Classification of Countries

The criteria used to classify the countries are displayed in Table 3.2. Using the World Bank's 2021 classification method, countries are classified according to their gross national income (GNI) per capita measured in current U.S. dollars ($) (Hamadeh *et al.*, 2021). Although some of the countries' positions in the group of LICs, LMICs, UMICs, and HICs change over time, using the 2021 classification gives a clear overview of the world economy at that period and

[5] The overall index is used as a proxy for governance quality because the use of a single indicator may provide misleading and biased results (Kousar *et al.,* 2020). According to Abbas *et al.* (2021), there seems to be a correlation and influence on one another among the six indicators offered by the WDIs.

[6] (i) GE- evaluates the capacity of government to implement policies that are effective and preserve its credibility; (ii) RL- probability of crime and violence, and the extent to which agents trust and adhere to social norms, especially the quality of the courts, police, and contract enforcement; (iii) CC- the degree to which official power is used for personal benefit; (iv) PV- evaluates how resilient a government is to terrorism and political violence; (v) VA- the extent of the ability of country's citizens to influence political decisions; (vi) RQ- government's ability to develop and implement sound regulations and policies that permit and promote the expansion of the private sector (Kaufmann *et al.* 2006).

facilitates cross-country comparisons at the time the research started. The study includes a total of 116 countries (from LICs = 13, LMICs = 31, UMICs = 29, and HICs = 43) (see A1 in Appendices for a list of countries) and a time period from 1996 to 2021, which differs from past studies. The selection of countries and time periods for each income group is determined by the availability of data.

Table 3.2: Classification of Countries

| Group | GNI per capita in current US$ |
|---|---|
| LICs | Less than 1,045 |
| LMICs | Between 1,046 – 4,095 |
| UMICs | Between 4,096 -12,695 |
| HICs | More than 12,695 |

Source: World Bank

### 3.4.3 Model Specification

Based on previous study, the study formulates the following equation:

INE=f (EG, POP, UB, HDI, INF, UNE, GE, NRR, LD, GLOB, GOV) (1)

To reduce heteroskedasticity and convert highly skewed data into a normal distribution, all of the variables in equation (1) are converted to log form (Benoit, 2011). Equation (2) is the newly generated baseline panel data regression model.

$$\ln INE_{it} = \beta_{it} + \beta_1 \ln EG_{it} + \beta_2 \ln POP_{it} + \beta_3 \ln UB_{it} + \beta_4 \ln HDI_{it} + \beta_5 \ln INF_{it} + \beta_6 \ln UNE_{it} + \beta_7 \ln GE_{it} + \beta_8 \ln NRR_{it} + \beta_9 \ln LD_{it} + \beta_{10} \ln GLOB_{it} + \beta_{11} \ln GOV_{it} + \varepsilon_{it} \quad (2)$$

Where, in equation (2), lnINE is the dependent variable; lnEG, lnPOP, lnUB, lnHDI, lnINF, lnUNE, lnGE, lnNRR, lnLD, lnGLOB, and lnGOV are independent variables; i and t indicate country and time period respectively; ln denotes natural logs; $\boldsymbol{\beta}$ is the intercept; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10,}$ and $\beta_{11}$ are the slope coefficients of lnEG, lnPOP, lnUB, lnHDI, lnINF, lnUNE, lnGE, lnNRR, lnLD, lnGLOB, and lnGOV respectively and Ɛ is the disturbance term.

In order to convert into a log, the variables with negative values, such as population growth, inflation rate, and urban population growth in this study, are converted into positive values using the method taken by Busse & Hefeker (2007):

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

Using the same method as used by Abbas *et al.* (2021), the governance quality index is computed by averaging the six governance components and adding 2.5 to the average value and then multiplying it by 2 (the score varies between 0 representing EWG to 10 representing ERG).

### 3.4.4 Estimation Procedure

#### 3.4.4.1 Descriptive Statistics and Bivariate Correlation

Before going to econometric analysis, the descriptive statistics of raw data, such as the mean, standard deviation (Std. dev.), maximum (max), and minimum (min) values of the selected variables and the bivariate correlation between dependent and independent variables, are presented.

#### 3.4.4.2 Panel Unit Root Test

To ensure that series are free from unit roots, it is necessary to test the unit root of the series. In this study, to check the panel unit root of the variables, the Levin-Lin-Chu (LLC) test propounded by Levin-Lin-Chu has been performed (Levin *et al.* 2002). In LLC, the null hypothesis ($H_0$) assumes that series are non-stationary and the alternative hypothesis ($H_a$) assumes that series are stationary.

#### 3.4.4.3 Hausman Test

In panel data, POLS, FE, and RE are popularly used methods. So, to choose the most appropriate model between the FE and RE models, a popular test developed by Hausman (1978) has been used for the present study.

#### 3.4.4.4 Diagnostic Tests

Since autocorrelation and heteroskedasticity are common problems in the FE and RE models in panel data, it is necessary to check the robustness of the series (Greene, 2000). Greene's (2000) test for heteroskedasticity ($H_0$: homogeneous) and Wooldridge's (2010) test for autocorrelation ($H_0$: no autocorrelation) were conducted to examine these issues. The analysis also included the CD test suggested by Pesaran (2021). The CD test is based on the $H_0$ that there are no CD issues.

#### 3.4.4.5 FGLS, PCSE, and DK Regression

In this chapter, FGLS, PCSE, and DK regression are applied due to the presence of autocorrelation, heteroskedasticity, and CD issues.

## 3.5 Empirical Results and Discussion

### 3.5.1 Descriptive Statistics and Bivariate Correlation

Descriptive statistics and a bivariate correlation between dependent and independent variables for LICs in Table 3.3, for LMICs in Table 3.4, for UMICs in Table 3.5, and for HICs in Table 3.6 have been discussed.

Table 3.3: Descriptive statistics and bivariate correlation of LICs

| Variable | Mean | Std. Dev. | Min | Max | Correlation coefficient |
|---|---|---|---|---|---|
| INE | 0.628 | 0.057 | 0.529 | 0.749 | 1.000 |
| EG | 4807.161 | 2844.644 | 1856.328 | 15397.696 | -0.240 |
| POP | 2.894 | 1.124 | -0.112 | 16.626 | -0.135 |
| UB | 29.673 | 12.943 | 7.412 | 63.222 | 0.136 |
| HDI | 0.429 | 0.072 | 0.243 | 0.575 | 0.060 |
| INF | 15.668 | 51.705 | -11.941 | 513.907 | -0.104 |
| UNE | 6.546 | 4.818 | 0.32 | 19.292 | 0.172 |
| NRR | 12.188 | 8.584 | 0.256 | 42.363 | 0.091 |
| LD | 0.223 | 0.13 | 0.018 | 0.536 | 0.046 |
| GE | 0.455 | 0.121 | 0.096 | 0.689 | 0.031 |
| GLOB | 42.098 | 7.817 | 22.925 | 58.518 | 0.005 |
| GOV | 3.177 | 1.005 | 0.956 | 5.05 | 0.121 |

Source: Researcher's calculation

Table 3.3 reports that in LICs, INE has a mean of 0.628 with a relatively low standard deviation of 0.057. EG shows a high mean of 4807.161, with a standard deviation of 2844.644. POP has a mean of 2.894 with a standard deviation of 1.124. UB shows a mean of 29.673 with a wider spread of the standard deviation of 12.943. The HDI has a mean of 0.429 and a standard deviation of 0.072. INF has a very high standard deviation of 51.705 compared to its mean of 15.668. UNE has a mean of 6.546 and a standard deviation of 4.818. NRR has a mean of 12.188 with a standard deviation of 8.584. LD has a low mean of 0.223 with a standard deviation of 0.13. GE has a mean of 0.455 and a standard deviation of 0.121. GLOB has a mean of 42.098 with a standard deviation of 7.817. Lastly, GOV has a mean of 3.177 with a standard deviation of 1.005, indicating a moderate spread of governance quality.

The correlation results displayed in Table 3.3 reveal that EG, POP, and INF have negative correlations with INE. On the other hand, UB, HDI, UNE, NRR, LD, GE, GLOB, and GOV show positive correlations with INE.

Table 3.4 reports the results of the summary statistics for LMICs. The mean of INE is 0.59, with a variation of 0.057. EG average is 11534.86 and its standard deviation is 5451.657. The mean for POP is 1.724, with a dispersion of 0.901. For UB, the average value is 43.657 with a standard deviation of 17.466. HDI has a mean of 0.588 and the standard deviation is equal to 0.1. The mean value for INF is 7.176, with variability equal to 7.484. UNE has an average score of 7.26 with a variation of 5.346. NRR mean score is 7.54 and the standard deviation is 9.697. LD has a mean of 0.31 with a standard deviation of 0.163. GE has a mean of 0.485 and its variability is equal to 0.116. The mean score of globalization is 52.48 and its dispersion is 9.384. The average score of GOV is 3.884 and its standard deviation is 0.695. The correlation result indicates that EG, UB, HDI, INF, LD, GE, and GLOB have a negative correlation with INE, while POP, UNE, NRR, and GOV have a positive correlation with INE.

Table 3.4: Descriptive statistics and bivariate correlation of LMICs

| Variable | Mean | Std. Dev. | Min | Max | Correlation coefficient |
|---|---|---|---|---|---|
| INE | 0.59 | 0.057 | 0.386 | 0.733 | 1.000 |
| EG | 11534.86 | 5451.657 | 2971.002 | 26688.602 | -0.221 |
| POP | 1.724 | 0.901 | -1.051 | 4.156 | 0.307 |
| UB | 43.657 | 17.466 | 11.35 | 76.345 | -0.066 |
| HDI | 0.588 | 0.1 | 0.372 | 0.789 | -0.331 |
| INF | 7.176 | 7.484 | -9.616 | 80.326 | -0.112 |
| UNE | 7.26 | 5.346 | 0.14 | 29.77 | 0.013 |
| NRR | 7.54 | 9.697 | 0.065 | 59.684 | 0.041 |
| LD | 0.31 | 0.163 | 0.05 | 0.673 | -0.001 |
| GE | 0.485 | 0.116 | 0.159 | 0.737 | -0.322 |
| GLOB | 52.48 | 9.384 | 25.486 | 74.835 | -0.266 |
| GOV | 3.884 | 0.695 | 1.766 | 5.533 | 0.016 |

Source: Researcher's calculation

Table 3.5 reports the results of the summary statistics for UMICs. The mean value of INE is 0.606, with a standard deviation of 0.085. EG mean is 23918.489 and its deviation is 8342.836. The mean value for POP is 1.074, with a dispersion of 1.277. UB average value is 62.916, with a standard deviation of 14.486. For HDI, the mean is 0.711 and the standard deviation is equal to 0.062. The mean value for INF is 10.08, with variability equal to 42.116. UNE has a mean score of 9.121 with its standard deviation of 5.643. For NRR, the mean score is 6.262 and the standard deviation is 10.809. LD has an average score of 0.388 with a

standard deviation of 0.218. GE mean value is 0.551 and its standard deviation is equal to 0.124. The mean score of globalization is 60.269 and its variation is 10.102. The average score of GOV is 4.506 and its standard deviation is 1.028. The correlation results show that EG, POP, UB, UNE, LD, and GOV have a positive correlation with INE, while HDI, INF, NRR, GE, and GLOB have a negative correlation with INE.

Table 3.5: Descriptive statistics and a bivariate correlation between dependent and independent variables of UMICs

| Variable | Mean | Std. Dev. | Min | Max | Correlation coefficient |
|---|---|---|---|---|---|
| INE | 0.606 | 0.085 | 0.389 | 0.781 | 1.000 |
| EG | 23918.489 | 8342.836 | 5825.93 | 54337.061 | 0.229 |
| POP | 1.074 | 1.277 | -2.171 | 11.794 | 0.419 |
| UB | 62.916 | 14.486 | 26.008 | 91.626 | 0.201 |
| HDI | 0.711 | 0.062 | 0.516 | 0.845 | -0.313 |
| INF | 10.08 | 42.116 | -16.117 | 1058.374 | -0.088 |
| UNE | 9.121 | 5.643 | 0.25 | 28.77 | 0.005 |
| NRR | 6.262 | 10.809 | 0.002 | 65.318 | -0.016 |
| LD | 0.388 | 0.218 | 0.038 | 0.865 | 0.437 |
| GE | 0.551 | 0.124 | 0.166 | 0.842 | -0.086 |
| GLOB | 60.269 | 10.102 | 33.022 | 81.059 | -0.110 |
| GOV | 4.506 | 1.028 | 1.198 | 6.741 | 0.233 |

Source: Researcher's calculation

Table 3.6: Descriptive statistics and bivariate correlation of HICs

| Variable | Mean | Std. Dev. | Min | Max | Correlation coefficient |
|---|---|---|---|---|---|
| INE | 0.501 | 0.091 | 0.322 | 0.751 | 1.000 |
| EG | 64522.242 | 30334.815 | 15490.106 | 187485.69 | 0.098 |
| POP | 0.818 | 1.665 | -4.257 | 19.36 | 0.426 |
| UB | 76.372 | 13.567 | 50.649 | 100 | 0.263 |
| HDI | 0.86 | 0.059 | 0.684 | 0.962 | -0.425 |
| INF | 2.97 | 6.204 | -4.863 | 154.763 | 0.025 |
| UNE | 7.285 | 4.211 | 0.1 | 27.47 | -0.204 |
| NRR | 4.318 | 10.252 | 0.0001 | 59.07 | 0.560 |
| LD | 0.7 | 0.22 | 0.02 | 0.898 | -0.577 |
| GE | 0.715 | 0.175 | 0.091 | 1 | -0.687 |
| GLOB | 77.32 | 9.044 | 50.859 | 90.929 | -0.612 |
| GOV | 6.945 | 1.285 | 2.827 | 8.894 | -0.561 |

Source: Researcher's calculation

Table 3.6 reports the results of the summary statistics for HICs. The average value of INE is 0.501, with a standard deviation of 0.091. EG mean is 64522.242 and its standard deviation is 30334.815. The mean score for POP is 0.818, with a variation of 1.665. UB average value is

76.372, with a standard deviation of 13.567. For HDI, the mean is 0.86 and the standard deviation is equal to 0.059. The average value for INF is 2.97, with variability equal to 6.204. For UNE, the mean score is 7.285 with a dispersion of 4.211. For NRR, the mean score is 4.318 and the standard deviation is 10.252. LD has a mean score of 0.7 with a standard deviation of 0.22. GE mean value is 0.715 and its standard deviation is equal to 0.175. The mean score of globalization is 77.32 and its variation is 9.044. The average score and standard deviation of GOV are 6.945 and 1.285, respectively. The correlation results show that EG, POP, UB, INF, and NRR have a positive correlation, and HDI, UNE, LD, GE, GLOB, and GOV have a negative correlation with INE.

### 3.5.2 Panel Unit Root Test

The results of the LLC unit root test presented in Table 3.7 show the mixed order of integration. In LICs, lnEG, lnUB, lnUNE, and lnGOV; in LMICs, lnEG, lnPOP, lnUB, and lnUNE; in UMICs, lnPOP, lnUB, and lnUNE; and in HICs, lnUB and lnLD are not stationary at their level but become stationary after the first difference. While all other selected variables are stationary at level.

Table 3.7: LLC unit root test

| Variables | LICs | | LMICs | | UMICs | | HICs | |
|---|---|---|---|---|---|---|---|---|
| | At level | 1st difference | At level | 1st difference | At level | 1st difference | At level | 1st difference |
| lnINE | -3.526*** | - | -4.394*** | - | -2.430*** | - | -2.152** | - |
| lnEG | -1.044 | -3.826*** | -1.063 | -7.809*** | -3.456*** | - | -4.435*** | - |
| lnPOP | -9.051*** | - | 0.933 | -5.892*** | -0.332 | -5.378*** | -2.487*** | - |
| lnUB | 0.282 | -11.909*** | 0.679 | -4.941*** | -0.522 | -2.521*** | 1.932 | -4.360*** |
| lnHDI | -5.769*** | - | -9.666*** | - | -8.362*** | - | -14.001*** | - |
| lnINF | -1.922** | - | -7.082*** | - | -6.395*** | - | -8.985*** | - |
| lnUNE | 1.042 | -4.548*** | -0.354 | -5.818*** | -0.983 | -8.009*** | -5.255*** | - |
| lnNRR | -3.129*** | - | -3.187*** | - | -3.946*** | - | -3.925*** | - |
| lnLD | -2.181** | - | -2.893*** | - | -3.273*** | - | -0.043 | -10.729*** |
| lnGE | -3.130*** | - | -4.816*** | - | -3.380** | - | -6.083*** | - |
| lnGLOB | -5.332*** | - | -10.366*** | - | -10.951*** | - | -13.185*** | - |
| lnGOV | -1.100 | -7.087*** | -3.143*** | - | -1.592* | - | -2.360*** | - |

Source: Researcher's calculation

Note: *, **, and *** indicate levels of significance at 10%, 5% and 1%, respectively. lnUB in LICs and LMICs is considered stationary when including time trend.

### 3.5.3 Diagnostic Tests and Appropriate Regression

The results from Table 3.8 show that the FE model is appropriate for all income group countries except LICs, where the RE model is appropriate. But before going to analyze the results from the FE or RE model, the investigator has performed some diagnostic tests. The diagnostic tests presented in Table 3.8 show the problems of autocorrelation and heteroskedasticity in all income group countries since the tests are significant at statistical levels, so the FE or RE model cannot be used; otherwise, the result obtained is biased and ineffective. Therefore, the FGLS method is preferred to address such heteroskedasticity and autocorrelation problems in panel data (Parks, 1967; Reed & Ye, 2009). Compared to other OLS estimates, this method appears to be more effective (Bai *et al.*, 2021). The PCSE approach is used in addition to FGLS since it generates more accurate results (Zhang & Zhao, 2014). The PCSE method is considered more robust to errors (disturbances) that are heteroscedastic, auto-correlated, and cross-sectionally correlated (Beck & Katz, 1995). The researcher has also checked the CD, which is a serious issue in panel data, using the CD test proposed by Pesaran (2021). The CD test presented in Table 3.8 shows the existence of cross-sectional issues for all groups of countries except LICs.

Table 3.8: Diagnostic check

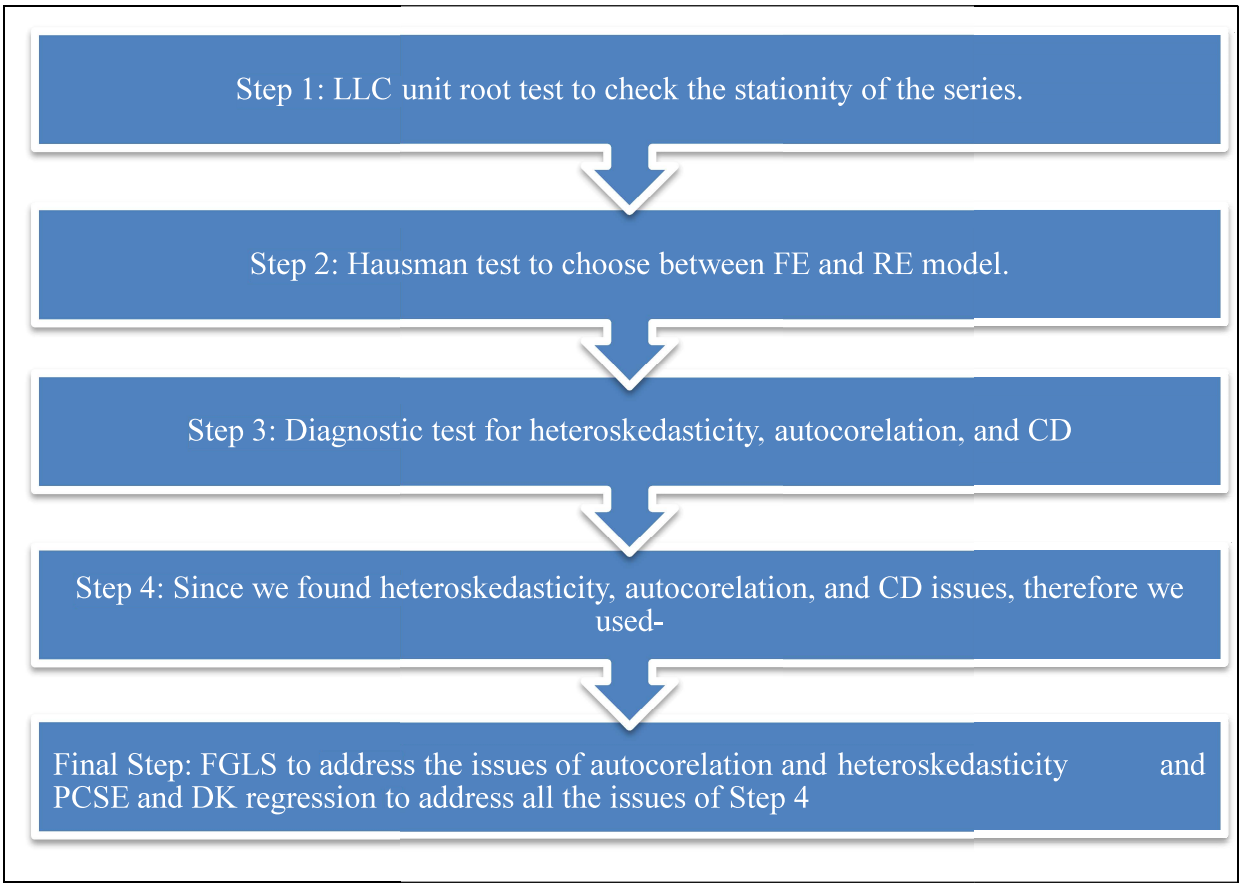
| Group of countries | Hausman tests | Autocorrelation | Heteroskedasticity | CD test |
|---|---|---|---|---|
| LICs | 2.68 | 342.436*** | 27952.84*** | -1.454 |
| LMICs | 18.27* | 37.723*** | 3009.36*** | 8.435*** |
| UMICs | 257.51*** | 48.015*** | 21711.77*** | 3.965*** |
| HICs | 39.94*** | 56.404*** | 9971.80*** | 2.147** |

Source: Researcher's calculation

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

After detecting these issues, the researcher has moved towards the DK standard error estimation regression model (Driscoll & Kraay, 1998). One of the advantages of using the DK regression estimator is that this method addresses the potential concerns of dependencies across countries, heteroskedasticity, and autocorrelation (Baloch *et al.*, 2019; Sarkodie & Strezov, 2019). So, this method can produce effective results in both temporal dependence and cross-sectional forms (Sarkodie & Adams, 2020).

Figure 3.3: Steps to analyze the regression results




Source: Researcher's construction

### 3.5.4 FGLS, PCSE, and DK Regression Results

Table 3.9: FGLS, PCSE, and DK regression results (lnINE: dependent variable)

| Independent Variables | LICs | | | LMICs | | | UMICs | | | HICs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FGLS (1) | PCSE (2) | DK (3) | FGLS (1) | PCSE (2) | DK (3) | FGLS (1) | PCSE (2) | DK (3) | FGLS (1) | PCSE (2) | DK (3) |
| lnEG | 0.007 | 0.007 | 0.007 | -0.123 | -0.123 | -0.123 | 0.148*** | 0.148*** | 0.148*** | 0.016 | 0.016 | 0.016 |
| | (0.07) | (0.06) | (0.070) | (-1.28) | (-1.17) | (-1.040) | (11.19) | (11.15) | (12.470) | (0.84) | (1.05) | (0.840) |
| lnPOP | -0.094*** | -0.094*** | -0.094** | -0.1** | -0.1** | -0.100* | -0.018 | -0.018 | -0.018 | 0.051*** | 0.051*** | 0.051*** |
| | (-5.09) | (-3.80) | (-2.070) | (-2.43) | (-2.54) | (-1.830) | (-0.84) | (-0.98) | (-0.970) | (7.96) | (6.40) | (3.270) |
| lnUB | -0.18 | -0.18 | -0.180 | 1.764*** | 1.764*** | 1.764*** | 1.235** | 1.235*** | 1.235** | 1.862 | 1.862** | 1.862 |
| | (-0.43) | (-0.68) | (-0.590) | (4.06) | (5.65) | (6.790) | (2.40) | (3.34) | (2.820) | (1.63) | (2.44) | (1.660) |
| lnHDI | 0.202*** | 0.202*** | 0.202*** | -0.141*** | -0.141*** | -0.141*** | -0.751*** | -0.751*** | -0.751*** | 0.191 | 0.191** | 0.191 |
| | (3.47) | (3.38) | (3.870) | (-4.95) | (-10.56) | (-8.180) | (-9.66) | (-8.83) | (-7.360) | (1.49) | (2.21) | (1.330) |
| lnINF | -0.008** | -0.008** | -0.008** | -0.012*** | -0.012*** | -0.012** | -0.001 | -0.001 | -0.001 | -0.013*** | -0.013** | -0.013** |
| | (-2.40) | (-2.52) | (-2.370) | (-3.33) | (-3.32) | (-2.670) | (-0.17) | (-0.20) | (-0.220) | (-3.04) | (-2.48) | (-2.610) |
| lnUNE | -0.001 | -0.001 | -0.001 | -0.025 | -0.025 | -0.025 | 0.058** | 0.058** | 0.058* | -0.006 | -0.006 | -0.006 |
| | (-0.02) | (-0.02) | (-0.020) | (-1.13) | (-1.13) | (-1.610) | (2.37) | (1.98) | (2.000) | (-0.77) | (-0.83) | (-0.600) |
| lnNRR | 0.012* | 0.012* | 0.012 | -0.01*** | -0.01*** | -0.010*** | 0.014*** | 0.014*** | 0.014*** | 0.006*** | 0.006*** | 0.006** |
| | (1.85) | (2.05) | (1.640) | (-4.06) | (-5.77) | (-3.200) | (6.30) | (11.30) | (12.320) | (3.10) | (4.31) | (2.660) |
| lnLD | 0.044*** | 0.044*** | 0.044*** | 0.008 | 0.008 | 0.008** | 0.098*** | 0.098*** | 0.098*** | -0.21** | -0.21*** | -0.210*** |
| | (4.97) | (5.46) | (5.160) | (1.15) | (1.67) | (2.370) | (14.95) | (17.35) | (22.400) | (-2.54) | (-2.74) | (-3.650) |
| lnGE | -0.04*** | -0.04*** | -0.040*** | -0.167*** | -0.167*** | -0.167*** | -0.107*** | -0.107*** | -0.107*** | -0.038* | -0.038*** | -0.038** |
| | (-2.68) | (-4.91) | (-6.160) | (-10.99) | (-18.52) | (-12.820) | (-4.10) | (-5.20) | (-5.070) | (-1.96) | (-2.65) | (-2.350) |
| lnGLOB | -0.16*** | -0.16*** | -0.160*** | 0.031 | 0.031 | 0.031 | 0.01 | 0.01 | 0.010 | -0.548*** | -0.548*** | -0.548*** |
| | (-2.94) | (-3.33) | (-4.560) | (1.08) | (1.58) | (1.200) | (0.28) | (0.30) | (0.230) | (-8.78) | (-8.03) | (-5.660) |
| lnGOV | -0.036 | -0.036 | -0.036 | 0.11*** | 0.11*** | 0.110*** | 0.053** | 0.053*** | 0.053** | -0.257*** | -0.257*** | -0.257*** |
| | (-0.43) | (-0.39) | (-0.400) | (4.79) | (6.49) | (3.870) | (1.97) | (3.08) | (2.460) | (-9.06) | (-9.99) | (-7.410) |
| Constant | 0.498** | 0.498** | 0.498*** | -0.973*** | -0.973*** | -0.973*** | -2.335*** | -2.335*** | -2.335*** | 2.01*** | 2.01*** | 2.010*** |
| | (1.97) | (2.25) | (2.850) | (-7.29) | (-12.62) | (-9.830) | (-11.21) | (-9.11) | (-7.950) | (6.11) | (7.36) | (5.050) |
| R-Squared | - | 0.17 | 0.17 | - | 0.26 | 0.26 | - | 0.55 | 0.55 | - | 0.55 | 0.55 |

Source: Researcher's calculation

Note: *, **, and *** indicate levels of significance at 10%, 5% and 1%, respectively; Z statistics (models 1 and 2) and t statistics (model 3) in parentheses.

Box 3.1: Regression results of LICs, LMICs, UMICs, and HICs in equation form

**LICs**

**FGLS**

INE = 0.498** + 0.007 EG - 0.094*** POP - 0.18 UB + 0.202*** HDI - 0.008** INF - 0.001 UNE + 0.012* NRR + 0.044*** LD - 0.04*** GE - 0.16*** GLOB - 0.036 GOV

**PCSE**

INE = 0.498** + 0.007 EG - 0.094*** POP - 0.18 UB + 0.202*** HDI - 0.008** INF - 0.001 UNE + 0.012* NRR + 0.044*** LD - 0.04*** GE - 0.16*** GLOB -0.036 GOV

R squared: 0.17

**DK**

INE = 0.498*** + 0.007 EG - 0.094** POP - 0.180 UB + 0.202*** HDI - 0.008** INF - 0.001 UNE + 0.012 NRR + 0.044*** LD - 0.040*** GE - 0.160*** GLOB - 0.036 GOV

R squared: 0.17

**LMICs**

**FGLS**

INE = -0.973*** - 0.123 EG - 0.1** POP + 1.764*** UB - 0.141*** HDI - 0.012*** INF - 0.025 UNE - 0.01*** NRR + 0.008 LD - 0.167*** GE + 0.031 GLOB + 0.11*** GOV

**PCSE**

INE = -0.973*** - 0.123 EG - 0.1** POP + 1.764*** UB - 0.141*** HDI - 0.012*** INF - 0.025 UNE - 0.01*** NRR + 0.008 LD - 0.167*** GE + 0.031 GLOB + 0.11*** GOV

R squared: 0.26

**DK**

INE = -0.973*** - 0.123 EG - 0.100* POP + 1.764*** UB - 0.141*** HDI - 0.012** INF - 0.025 UNE - 0.010*** NRR + 0.008** LD - 0.167*** GE + 0.031 GLOB + 0.110*** GOV

R squared: 0.26

**UMICs**

**FGLS**

INE = -2.335*** + 0.148*** EG – 0.018 POP + 1.235** UB - 0.751*** HDI - 0.001 INF + 0.058** UNE + 0.014*** NRR + 0.098*** LD - 0.107*** GE + 0.01 GLOB + 0.053** GOV

**PCSE**

INE = -2.335*** + 0.148*** EG - 0.018 POP + 1.235*** UB - 0.751*** HDI - 0.001 INF + 0.058** UNE + 0.014*** NRR + 0.098*** LD - 0.107*** GE + 0.01 GLOB + 0.053**

| |
|---|
| GOV<br>R squared: 0.55<br>**DK**<br>INE = -2.335*** + 0.148*** EG - 0.018 POP + 1.235** UB - 0.751*** HDI - 0.001 INF + 0.058* UNE + 0.014*** NRR + 0.098*** LD - 0.107*** GE + 0.010 GLOB + 0.053** GOV<br>R squared: 0.55 |
| **HICs**<br>**FGLS**<br>INE = 2.01*** + 0.016 EG + 0.051*** POP + 1.862 UB + 0.191 HDI - 0.013*** INF - 0.006 UNE + 0.006*** NRR - 0.21** LD - 0.038* GE - 0.548*** GLOB - 0.257*** GOV<br>**PCSE**<br>INE = 2.01*** + 0.016 EG + 0.051*** POP + 1.862** UB + 0.191** HDI - 0.013** INF - 0.006 UNE + 0.006*** NRR - 0.21*** LD - 0.038*** GE - 0.548*** GLOB - 0.257*** GOV<br>R squared: 0.55<br>**DK**<br>INE = 2.010*** + 0.016 EG + 0.051*** POP + 1.862 UB + 0.191 HDI - 0.013** INF - 0.006 UNE + 0.006** NRR - 0.210*** LD - 0.038** GE - 0.548*** GLOB - 0.257*** GOV<br>R squared: 0.55 |

Source: Researcher's calculation

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

Table 3.9 presents the results of the FGLS, PCSE, and DK regression estimators.

**Impact of Economic Growth:** The results of Table 3.9 show that in LICs, LMICs, and HICs, economic growth has an insignificant impact on income inequality (fail to reject $H_0$ of our study). In UMICs (models 1, 2, and 3), economic growth has a significantly positive impact on income inequality (reject $H_0$ of our study). This result is similar to that of Odedokun & Round (2004), ElGindi (2017), Munir & Sultan (2017), Lee & Lee (2018), and Adams & Klobodu (2019). This suggests that perhaps an increase in economic growth has benefited the rich more than the poor (Aiyar & Ebeke, 2019).

**Impact of Population:** Population has a significant income inequality reducing effect in LICs (models 1, 2, and 3) (reject $H_0$ of our study) and LMICs (models 1, 2, and 3) (reject $H_0$

of our study). This finding is in line with Butler *et al.* (2020) and Walujadi *et al.* (2022). The possibility of this result is that a nation with a high population and abundant labor force will tend to specialize and export goods that require more labor input, which will increase the demand and wages of unskilled workers and thus reduce the income gap within the nation (Han *et al.*, 2012). In UMICs, the impact of population on income inequality is negative and not significant (fail to reject $H_0$ of our study). However, in HICs (models 1, 2, and 3), a positive and significant impact of the population can be observed on income inequality (reject $H_0$ of our study). This finding corroborates ElGindi (2017), Kentor (2001), Taresh *et al.* (2021), Ullah *et al.* (2021), and Marsh (2015). An increase in population creates a lack of job opportunities as the labor supply surpasses labor demand within job markets, which is the cause of the increase in income inequality (ElGindi, 2017).

**Impact of Urbanization:** In LICs, the impact of urbanization on income inequality is negative and not significant (fail to reject $H_0$ of our study). In LMICs (models 1, 2, and 3), UMICs (models 1, 2, and 3), and HICs (model 2), income inequality is positively affected by urbanization (reject $H_0$ of our study). This result is consistent with the findings of Sulemana *et al.* (2019), Munir & Sultan (2017), Adams & Klobodu (2019), Padhan *et al.* (2022), Taresh *et al.* (2021), and Dossou (2023). In LMICs, the possible reason could be that they have not passed the 'turning point' of urbanization, which indicates the positive impact of urbanization on income inequality (Kanbur & Zhuang, 2013). Perhaps the cities of UMICs and HICs are disproportionately wealthy, which is one of the main reasons for urbanization that rural people migrate (Liddle, 2017). Therefore, urbanization can increase income inequality due to the influx of low-skilled rural migrants by exacerbating the wage gap between formal and informal sectors in urban areas (Sulemana *et al.*, 2019), as well as the skill gap between rural and urban workers (Siddique *et al.*, 2014).

**Impact of HDI:** In LICs (models 1, 2, and 3) and HICs (model 2), the effect of HDI on income inequality is positive and significant (reject $H_0$ of our study). This result is similar to that of Prawoto & Cahyani (2020) and Alvarado *et al.* (2021). For LICs, it can possibly be asserted that only a small percentage of the population has access to high-quality education, a healthy lifestyle, and a high standard of living. Given that HDI can boost both labor productivity and income levels (Behrman, 1993), only a small percentage of the population typically sees a rise in their income. In certain HICs, the association of one of the components of HDI, i.e., education, with substantial expenses can restrict educational opportunities for individuals from lower-income backgrounds, where the high cost of education can drastically

curtail the ability of those in the lowest income brackets to access educational resources (Carr-Hill, 2020). So, further improvement in HDI may be associated with a higher level of education, which in turn leads to higher wages as compared to a lower level of education (Taresh *et al.*, 2021; Prawoto & Cahyani, 2020).

On the other hand, in LMICs (models 1, 2, and 3) and UMICs (models 1, 2, and 3), a percentage improvement in HDI reduces income inequality (reject $H_0$ of our study). This outcome or result is identical as in the studies of Amiti & Cameron (2012), Taresh *et al.* (2021), and Walujadi *et al.* (2022). Grimm *et al.* (2008) showed that the HDI gap between rich and poor is minimal in some of the developed nations, such as the USA and Finland, as well as some LMICs and UMICs, like Vietnam, Indonesia, and Colombia. One possible explanation of this result is that there is limited income inequality among those who deploy their human capital because the earnings distribution of skill- and labor-based is quite narrow.

**Impact of Inflation:** Inflation has a significantly negative effect on income inequality in LICs (models 1, 2, and 3) (reject $H_0$ of our study), LMICs (models 1, 2, and 3) (reject $H_0$ of our study), and HICs (models 1, 2, and 3) (reject $H_0$ of our study). This result is similar to that of Asogwa *et al.* (2022), Siami-Namini & Hudson (2019), and Ullah *et al.* (2021). Siami-Namini & Hudson (2019) result in LDCs stated that in a situation with low inflation, higher inflation reduces income inequality, and in a situation with high inflation, more inflation is associated with greater income inequality. In HICs, implementing stricter tax policies and raising tax revenues could be the probable answer and in addition, during inflation, redistribution of resources to the poor by increased taxes on wealthy people could likely be the reason (Gustafsson & Johansson, 1999; Kim, 2015). However, the result is negative and insignificant in UMICs (fail to reject $H_0$ of our study).

**Impact of Unemployment:** the coefficient of unemployment is positive and significant in UMICs (models 1, 2, and 3) (reject $H_0$ of our study). The result is in line with Shahpari & Davoudi (2014), Monnin (2014), Deyshappriya (2017), Mocan (1999), Prawoto & Cahyani (2020), Taresh *et al.* (2021), and Zandi *et al.* (2022). Mocan (1999) showed that structural unemployment raises the highest quintile's income share and decreases the income shares of the bottom 60 percent of the population. This means that people who lose their jobs tend to experience a decline in their income level unless they receive adequate social protection benefits (Martínez *et al.*, 2001; Deyshappriya, 2017). In LICs, LMICs, and HICs, the

coefficient of unemployment in all models is negatively insignificant (fail to reject $H_0$ of our study).

**Impact of Natural Resources:** A positive and significant impact of natural resources can be seen on income inequality in LICs (models 1 and 2) (reject $H_0$ of our study), UMICs (models 1, 2, and 3) (reject $H_0$ of our study), and HICs (models 1, 2, and 3) (reject $H_0$ of our study). The result is in line with Akpa (2023), Anyanwu *et al.* (2016), ElGindi (2017), Alvarado *et al.* (2021), and Teng *et al.* (2024). This implies the possibility that the elite group captures the rent generated from natural resources, thereby increasing income inequality between the top and lower classes, as the resources are not distributed in favor of the lower segment of the population (Anyanwu *et al.*, 2016). Over the last five decades, the extraction of natural resources has tripled due to massive infrastructure development and increased material consumption in UMICs and HICs (UN, 2024). This increases extraction of natural resources in such countries, especially in UMICs and HICs, which could be the rent seeking behaviour of entrepreneurs, where business leaders might exploit resources to maximize profits without contributing to value creation. Canh *et al.* (2021) showed that entrepreneurs in HICs have stronger rent-seeking behaviors than low and middle income countries.

On the other hand, natural resources have a negative effect on income inequality in LMICs (models 1, 2, and 3) (reject $H_0$ of our study). The result is the same as the findings of Hartwell *et al.* (2022), Avom *et al.* (2022), and Chekouri (2023). This result indicates that the rent derived from natural resources can be used to enhance human capital and improve the income of the poorest segments of society (Alvarado *et al.*, 2021). Reliance on natural resources can be seen as a boon, as the income generated from these resources facilitates the creation of new employment opportunities within the public sector and consequently helps to narrow income inequality (Ross, 2007).

**Impact of Liberal Democracy:** The coefficient of liberal democracy is positive and significant in LICs (models 1, 2, and 3) (reject $H_0$ of our study), LMICs (model 3) (reject $H_0$ of our study), and UMICs (models 1, 2, and 3) (reject $H_0$ of our study). This positive impact is similar to the study of Shahbaz *et al.* (2017), Lee & Lee (2018), and ElGindi (2017), who found democracy increases income inequality. It may be that the existing democratic levels are inadequate for harnessing the potential benefits and mitigating the inequality in income distribution (Shahbaz *et al.,* 2017) or this result postulates the possibility that when democracy is acquired by the rich and serves the needs of middle class population, income

inequality get worse (Acemoglu *et al.*, 2013). On the other hand, in HICs (models 1, 2, and 3), a significant negative impact of liberal democracy is observed on income inequality (reject $H_0$ of our study). The finding is the same as that of Reuveny & Li (2003), Trinugroho *et al.* (2023), Anyanwu *et al.* (2016), and Gossel (2024), who found democracy reduces income inequality. It is possible that liberal democracies in these nations enable people to elect a government that promotes equality of opportunity and redistributes income from the rich to the poor (Esarey *et al.*, 2012). Democracy in such countries perhaps encourages the government to increase spending on public facilities that boost the earning potential for the poor (Shen & Yao, 2008).

**Impact of Gender Equality:** Income inequality in all income group countries (models 1, 2, and 3) is significantly reduced by gender equality (reject $H_0$ of our study). The result is the same as that of Baloch *et al.* (2018) and Grotti & Scherer (2016). Their study reported that a rise in the participation of females in the job market reduces income inequality. Empowering women economically leads to a more equitable sharing of income, fostering collective well-being and prosperity (IMF, 2018).

**Impact of Globalization:** In LICs (models 1, 2, and 3) and HICs (models 1, 2, and 3), globalization and income inequality are negatively related (reject $H_0$ in our study). This result is consistent with the results of Zhou *et al.* (2011), ElGindi (2017), and Ullah *et al.* (2021). The findings show that globalization serves as a driver for employment, digitization, and investment for both unskilled and semi-skilled workforces and contributes to lower income inequality (Ullah *et al.,* 2021). In LMICs (models 1, 2, and 3) and UMICs (models 1, 2, and 3), globalization has a positively insignificant impact on income inequality (fail to reject $H_0$ of our study).

**Impact of Governance Quality:** In LICs (models 1, 2, and 3), the coefficient of governance quality is negative and not significant (fail to reject $H_0$ of our study). A positive and significant impact of governance quality is observed on income inequality in LMICs (models 1, 2, and 3) (reject $H_0$ of our study) and UMICs (models 1, 2, and 3) (reject $H_0$ of our study). This result is consistent with that of Chaudhuri & Ravallion (2006), Dossou *et al.* (2022), and Dossou *et al.* (2023c). Chaudhuri & Ravallion (2006) distinguish between two types of inequalities: good and bad inequality. Good inequalities are those that encourage market-based incentives, fostering growth, innovation, and entrepreneurship. Conversely, bad inequalities hinder market access and limit investment in human and physical capital.

However, improvements in governance quality may lead to an increase in good income inequality (Zhuang *et al.*, 2010). On the other hand, an improvement in governance quality reduces income inequality in HICs (models 1, 2, and 3) (reject $H_0$ of our study). This result is consistent with those of Law & Soon (2020), Coccia (2021), Nguyen *et al.* (2019), Adams & Mengistu (2008), Huynh *et al.* (2023), Dossou (2023), Sarkodie & Adams (2020), and Alesina & Perotti (1996). Supporting their findings, an improved governance system and enhanced political stability in these countries may be the key reasons contributing to lower income inequality.

### 3.6 Conclusion

The main objective of this chapter is to investigate the factors that determine income inequality among different income group countries during the period 1996-2021. For empirical analysis, this study employs the FGLS, PCSE, and DK regression methods to find the determinants of income inequality. The results suggest that in LICs, HDI, natural resources, and liberal democracy exacerbate income inequality, while population, inflation, gender equality, and globalization significantly reduce it. However, it should be noted that in the long run, employing a growing population in different sectors may not be possible; instead, it may widen it. In LMICs, urbanization and governance quality increase income inequality. On the other hand, population, HDI, inflation, natural resources, and gender equality significantly contribute to reducing income inequality. In UMICs, economic growth, urbanization, unemployment, natural resources, liberal democracy, and governance quality exacerbate income inequality, while HDI and gender equality have an income inequality-reducing effect. In HICs, population, urbanization, HDI, and natural resources worsen income distribution. But inflation, liberal democracy, gender equality, globalization, and governance quality significantly reduce income inequality.

In LICs, the $H_0$ of economic growth, urbanization, unemployment, and governance quality is accepted (fail to reject); while $H_0$ of population, HDI, inflation, natural resources, liberal democracy, gender equality, and globalization is rejected. In LMICs, the $H_0$ of economic growth, unemployment, and globalization is accepted (fail to reject); while $H_0$ of population, urbanization, HDI, inflation, natural resources, gender equality, liberal democracy, and governance quality are rejected. In UMICs, the $H_0$ of population, inflation, and globalization is accepted (fail to reject); while economic growth, urbanization, HDI, unemployment,

natural resources, gender equality, liberal democracy, and governance quality are rejected. In HICs, the $H_0$ of economic growth and unemployment is accepted (fail to reject); while population, urbanization, HDI, inflation, natural resources, gender equality, globalization, liberal democracy, and governance quality are rejected.

This chapter demonstrates the impact of different factors on income inequality among different income group countries, and it is found that different factors have heterogeneous effects on income inequality. Therefore, in the next chapter, the investigator has analyzed the role of these factors, especially governance quality and liberal democracy, in EWG and ERG countries to deeply understand how these factors are associated with income inequality if countries are classified based on the intensity of governance quality.