# Exploring Macroeconomic Factors of Income Inequality: A Comparative Analysis of Emerging Markets and Developing Economies and Advanced Economies

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## Abstract

Income inequality has exhibited a dynamic and variable trend throughout history. After declining post World War II in Advanced Economies (AEs), it surged during the 1980s due to sluggish economic growth. Meanwhile, Emerging Markets and Developing Economies (EMDEs) witnessed higher Gini Coefficients during the 1980s but saw moderate levels of inequality in the early 2000s. Over the past decade, however, income inequality in AEs and EMDEs has become increasingly unpredictable, reaching some of the highest levels recorded. While prior studies have explored this area, they have focused on either a broad sample of countries or numerous factors, rarely combining both aspects. This study analyses the impact of 8 macroeconomic factors on income inequality, proxied by the Gini Coefficient, in EMDEs and AEs from 2010 to 2021. It employs a Fixed Effects Model for the 24 EMDEs and Random Effects Model for the 31 AEs, thereby factoring in a total of 5280 observation points. The findings reveal that unemployment is the biggest driver of inequality in both EMDEs and AEs. It exerts a positive bearing at a significance level of less than 1%, exerting a more pronounced impact in EMDEs than AEs. Additionally, in EMDEs, fertility rate and economic growth significantly increase income inequality while financial development mitigates it. Conversely, economic growth has a negative influence on the Gini Coefficient in AEs. Contrary to expectations, traditional economic indicators like inflation, foreign Investment, and trade openness do not significantly impact income inequality in either group. Literacy, often believed to lower the Gini, is also statistically insignificant. The evolving and multifaceted nature of inequality underscores the need for this study - a more holistic approach to studying income inequality, considering factors beyond conventional economic metrics. This research provides valuable insights for policymakers and economists striving to address income inequality in EMDEs and AEs.

***Keywords:*** *Income Inequality; Gini Coefficient; Income Distribution; Economic Growth; Unemployment; Financial Development*

## 1. Introduction

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According to an Oxfam International report (2023), the world's richest 1 percent captured 42 trillion USD in new wealth between December 2019 and 2021, while only 16 trillion USD was distributed among the remaining 99 percent of the population. Moreover, the gap between the world's bottom 50 percent and top 10 percent has doubled over the past two decades, making global income inequality "as great as it was at the peak of Western Imperialism in the early 20th century" (World Inequality Report 2022, 2022). Income inequality, defined as the disparity in the distribution of assets, wealth, or income among individuals, groups, social classes, or countries, indicates how evenly income is distributed within a population (Howard & Carter, 2024). This inequality has severe consequences, including reduced economic growth and stability, lower investment and innovation, and hindered human capital development, all of which impact a country's long-term growth. Additionally, it leads to decreased social mobility, higher crime rates due to increased resentment and poverty, reduced social cohesion, lower civic participation, poor health outcomes, and increased political instability, undermining democratic institutions and policy making. Although income inequality has been a persistent issue for centuries now, it has worsened significantly post the COVID-19 pandemic.

Income inequality originates from a range of economic, social, cultural, and geopolitical factors. Economic factors are the most commonly studied indicators because they directly influence the distribution of resources and opportunities within a nation. For instance, while economic growth or foreign investment may be assumed to reduce income inequality, they can often lead to greater wealth concentration and wage disparities, especially without measures for financial inclusion. Additionally, factors such as openness to trade affect economic growth, and understanding these economic dynamics at both national and global levels is crucial. Key sociocultural factors significantly affect income inequality by affecting individual and communal capabilities and opportunities within a society. For example, some of the most important factors affecting the population size are social factors which also thereby affect the distribution of income and economic opportunities. Human Capital, such as levels of education and healthcare attained or received by the population, is also associated with economic opportunities and income inequality. Investments in these areas are crucial in addressing inequality. Given the severity of the issue, studying the factors affecting income inequality in Emerging Market and Developing Economies (EMDEs) and Advanced Economies (AEs) is crucial. Addressing these factors effectively is vital for individual and collective well-being.

This paper examines the impact of various macroeconomic factors on income inequality in Emerging Market & Developing Economies (EMDEs) and Advanced Economies (AEs). In order to gain a more holistic understanding of the impact of various sectors on income inequality, this study analyses the impact of eight macroeconomic factors ranging from conventional economic factors such as economic growth and financial development to more socio-cultural factors such as fertility and literacy. It investigates the extent of impact of these factors on the Gini Coefficient, the most frequently used statistical measure of income inequality. It measures the extent to which the distribution of income among individuals within an economy deviates from perfectly equal distribution.

## 1.1 Theoretical Background

### 1.1.1 Income Inequality Trends in EMDEs

EMDEs, through the 1980s and 1990s, underwent structural changes leading to market liberalisation, privatisation, and reduced public spending. These measures resulted in high levels of income inequality since they particularly benefited the upper segments of society. Rapid urbanisation and industrialization also added to the cause. During the early 2000s, globalisation or the integration of nations into the global economy increased substantially resulting in economic growth and in most countries, although there was some variation, an increase in income inequality. During the 2010s, numerous efforts were taken to implement inclusive growth policies in order to reduce inequality. These often caused a decrease in income inequality. However, progress came to a halt as a result of the COVID-

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19 pandemic. In general, the variation for income inequality in Emerging Markets and Developing Economies has been significant: while some countries have experienced a rise in income inequality, in regions including Latin America, the Middle East and North Africa, and sub-Saharan Africa, income inequality levels remained constant. However, it's important to note that inequality was already high in these regions - the highest in the world.

### 1.1.2 Income Inequality Trends in AEs

AEs have experienced significant fluctuations as well. Post World War II, income inequality decreased due to strong economic growth and progressive taxation. This period is characterised by strong labour unions that resulted in a narrow income gap between the rich and the poor. However, income inequality began to rise in the 1970s. Neoliberal economic policies were gaining prominence in the 1980s and tax cuts for the wealthy along with deregulation resulted in significant disparities. All the 9 advanced economies of the G-20 saw a substantial increase in the Gini coefficient during this period (Derviş & Qureshi, 2016). The global financial crisis of 2008 slowed this trend as economic downturns affected the higher income earners disproportionately. Technological advancements, financialization, and globalisation all resulted in widening the gap between the rich and the poor. The sharpest rise in the Gini coefficient was seen in the United States during this period, where it rose from 34.7 in 1980 to 41.2 in 2015 (Derviş & Qureshi, 2016b). However, during the 2010s, countries implemented austerity measures and inclusive policies to address the issue. Hence, there was some mitigation during this period. Although the COVID-19 pandemic significantly worsened the state of income inequality in most nations, it increased the recognition of the need to address income inequality.

### *2. Literature Review*

The following section looks at the existing body of work exploring the impact of the following variables on income inequality.

### 2.1 Economic Growth

The majority of studies examining the impact of economic growth on income inequality have found a positive correlation, explaining a portion of the Kuznets curve. For example, Munir & Sultan (2017) examined the relation between per capita GDP (PCGDP) in India and Pakistan. Their analysis consisted of 5 models where the first model included all 12 variables with each successive model excluding one that was insignificant, yielding a fifth model with only significant variables. They obtained a positive relation between PCGDP and income inequality. With this positive relation, they concluded that India and Pakistan are both in their early stages of development. Lee et al. (2017) studied the impact of economic growth using the natural logarithm of GDP as its proxy (ln(GDP/Pop)) in the Republic of Korea. Their analysis yielded a positive relation between income inequality and PCGDP at 1 percent significance, supporting Barro's hypothesis. Dharmadasa (2023) also examined the relationship between per capita GDP and income inequality and concluded a positive relationship in Sri Lanka between 1978 and 2021. In general, there exists a paucity of papers that examine data post 2018.

### 2.2 Unemployment

Unemployment is one of the most controversial macroeconomic factors affecting income inequality with numerous studies providing a variety of results for similar as well as different countries, sometimes even with overlapping time frames. The 2013 study of the South Korean (Lee et al., 2013) income inequality factors had 3 labour market indices - unemployment rate, female employment rate, and self-employment rate. The study found that, while a positive relationship was found between unemployment and inequality and self-employment and inequality, a negative relation was found between female employment and inequality, indicating that an increase in it would cause a decrease in inequality.

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Furthermore, Kaasa (2003) determined this relationship specifically for transition economies using 23 countries with data from 1990-1998 and found that unemployment exhibits a negative impact on income inequality. Another study by Meloni & Stirati (2020) studied the relationship between labour market slack and income distribution where labour market slack was a combination of the unemployment rate and intensity. The study was based on secondary data of 8 countries from 1960 to 2017. The study concluded a negative relationship between labour market slack and wage share in addition to a stable wage share resulting in no tendency to return to a normal unemployment rate. In recent years, Zandi et al. (2022) studied this relationship in 12 developing Asian countries, using panel data of 15 years from 2006 to 2020 from World Bank Indicators (WDI) Databases. It used the Gini Index as the measure of income inequality, employing the Random Effect Model (REM) and Generalised Method of Moments (GMM) to examine the relationship. The study found that unemployment has a significant positive impact on income inequality, guiding policy makers to formulate regulations to focus on unemployment. Therefore, it is evident that unemployment's impact on income inequality has been inconsistent.

### 2.3 Inflation

Inflation's impact on income inequality is highly debated and can vary significantly on the basis of different economic structure and contexts. Munir & Sultan (2017) determined the relation between inflation and unemployment using the 5-model system explained above. However, in the first model itself, inflation had a negative but insignificant impact on income inequality in India and Pakistan, and hence, it was eliminated from the models. Lee et al. (2017) also examined the impact of inflation using ∆CPI, which is the yearly consumer price growth rate. The study found a negative relationship of CPI with income inequality in all models and a significance of 1 percent in 6 of the 8 models. Dharmadasa (2023) analysed the impact of inflation on income inequality, in Sri Lanka, using average prices as the proxy. The study concluded that its results matched those of Galli & van der Hoeven (2001) who said that growing inflation can be linked to both increasing and decreasing levels of income inequality, depending on the starting inflation rate. Gustaffson & Johanson (1997) also proposed the idea that usually higher inflation rates can deepen inequality as they redistribute income from the people with fixed nominal income who are usually the socially less insured and poorer part of the population. The effect on inflation on income inequality has also been studied by Zandi et al. (2022) who found a significant positive impact of inflation on income inequality in 12 developing Asian countries, using panel data from 2006-20. Additionally, Law & Soon (2020) also explored the relation between inflation and income inequality, with a dataset consisting of 4-year non-overlapping averages from 1987 to 2014 for 65 developed and developing countries. They found that inflation exacerbates income inequality. Siami-Namini & Hudson (2019) check both linear and non-linear effects of inflation on income inequality, followed by testing the Kuznets hypothesis. They use data from 24 developed countries and 66 developing countries from 1990 to 2015. They conclude that there is no bi-directional Granger causality between inflation and income inequality in the short run while it does exist in the long run for both Developed Countries (DCs) and Less Developed Countries (LDCs). Furthermore, Berisha et al. (2020) analyse the impact of real interest rates, income growth, and inflation on income inequality across the BRICS nations (Brazil, Russia, India, China, and South Africa) from 2001 to 2015. They found a positive relationship between inflation and income inequality. This finding has also been supported by Kaasa (2003).

### 2.4 Fertility

While numerous studies discuss the impact of income inequality on fertility and population, very few discuss the inverse relation: the impact of fertility on income redistribution and inequality. Sarkar (2008) studied this relationship by analysing the impact of fertility and child mortality in an overlapping generation model while determining factors of persistent income inequality in different income groups. He concluded that the interaction between these two factors particularly stops the poorer groups of society from spending on education of their offsprings, resulting in higher fertility rate causing higher income inequality. Munir & Sultan (2017) found fertility to be one of the most prominent factors affecting

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income inequality in India and Pakistan where high fertility is a common social issue. They found it to have a positive relationship, particularly since the population below the poverty line has a higher fertility rate making them more vulnerable towards poverty.

## 2.5 Human Capital Index

Munir & Sultan (2017) used the gross enrolment ratio of secondary education as a proxy for human capital. It depicted a negative but significant impact on income inequality. Lee et al. (2017) used the share of middle school students (MidST) as a measure of human capital. They concluded a significant negative relationship between MidST and income inequality. Thus, this study affirms the role of educational attainment in alleviating income inequality. Dharmadasa (2023) utilised the secondary school enrolment ratio (SER) and found that although it has a positive impact on income inequality, it is insignificant in Sri Lanka. Kaasa (2003) examined the impact of expenditure on education and healthcare as a share of the GDP on income inequality. The study found a negative relation. Okatch (2013) studied the relation between education and income inequality in Botswana and found that primary education level has a negative relation with inequality while secondary education level has a positive relation with inequality. Research along these lines has also extended to determining the impact of educational and gender inequality on income and income inequality. Munir & Kanwal (2020) studied these relationships in 6 South Asian countries using panel data from 1980 to 2010 at a five-year average. Using Fixed Effect Model (FEM) and Random Effect Model (REM), the study revealed a positive significant impact of educational inequality and gender inequality on income inequality, emphasising the need to focus on human capital development. Arshed et al. (2019) developed a quadratic relationship between education and income inequality among developing Asian economies from 1960 to 2015. It is again noted that while initial, primary, secondary, and tertiary enrolment increases inequality, after a certain threshold, it has a negative impact on income inequality.

## 2.6 Foreign Investment

Munir & Sultan (2017) examined the relation between Foreign Direct Investment (FDI) and income inequality. Overall, FDI was found to not affect income inequality, a finding consistent with that of Lee et al (2013). Franco & Gerussi (2013) studied the impact of inward FDI on income inequality for 18 transition countries between 1990 and 2006. They also concluded an insignificant impact. Herzer & Nunnenkamp (2011) analysed the short-term and long-term relation between FDI and income inequality in the case of 10 European countries using data between 1980 and 2000. They used causality and panel cointegration techniques to come to the conclusion that there is a positive relation between FDI and income inequality in the short run while negative relation between them in the long run. Le et al (2020) analysed the impact of foreign direct investment on income inequality in Vietnam, under the constraints of institution and education levels. A panel data set containing 63 provinces in Vietnam over a period of 2012-18 was used under a GMM system estimator. The study concluded that FDI has directly contributed to increasing income inequality. Secondly, a non-linearity relationship between FDI and income inequality is also confirmed but at a decreasing rate over time. Although numerous studies have investigated the relationship between FDI and income inequality, a variety of results have been obtained with no definite conclusion. For example, Goldberg & Klein (2005), Milanovic (2002), Hemmer et al (2005), Slywester (2005) found no significant impact on income inequality. Some studies including Jen & Rosas' (2007), Bhandari's (2007), and Chintrakarn et al (2012) found a negative relationship. On the other hand, Bornschier et al. (1978), Beer & Boswell (2002), Choi (2006), and Gopinath & Chen (2010) found a positive relationship. Interestingly, Figini & Gorg (2011) and Blonigen & Slaughter (2001) have found a nonlinear relationship between FDI and income inequality. Rezk et al. (2022) studied the impact of inward FDI on income inequality in Egypt from 1975 to 2017. The study found a negative correlation that a 1% increase in FDI results in a 0.0188 decrease in the Gini coefficient, indicating that the Egyptian policymakers should continue and strengthen the Open-Door Policy. Lee et al. (2020) investigated the relationship between FDI, financial development, and income inequality for a sample of 37 countries

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from 2001 to 2015, wherein they concluded that FDI helps reduce income inequality. However, it's important to note that FDI's impact becomes weaker after a certain threshold of financial development. Yuldashev et al. (2023) analysed the impact of FDI on income inequality in 10 selected Asian economies from 1990 to 2020. They found a negative correlation with the impact being more pronounced in the presence of human capital.

## 2.7 Trade Openness

Munir & Sultan (2017) used the KOF index to measure the globalisation of a nation across an extended period basis social, political, and economic dimensions. The coefficient of KOF yielded a positive and significant (at 1 percent) relation with income inequality throughout all the 5 models, suggesting that it is an important factor influencing income inequality in India and Pakistan. The justification provided for this is that the rich class of the country has more opportunities to develop financially. This results in the concentration of money in a few hands, increasing income inequality. Similarly, Barro (2000), found a positive relationship between trade openness and income inequality in rich nations while a negative relation between them in poorer countries. Lee et al. (2017) used (Export + Import)/GNI as a proxy for trade openness. This study also found a positive and significant relationship and concluded that trade openness exacerbates income inequality. Xu et al. (2021) analysed the nexus between trade openness, FDI, and income inequality in Sub-Saharan Africa from 2000 to 2015. They found a significant positive relationship between trade openness and income inequality. This finding is also consistent with Dharmadasa (2023) that depicted a positive and significant effect in Sri Lanka. This was explained by the fact that Sri Lanka is a middle-income country with 70 percent of the population living in rural areas. Thus, much of the population does not have access to engage with trade and investments, unlike their urban counterparts. This increases income inequality. However, some studies have also shown a negative relationship between trade openness and income inequality (Perera et al., 2004). Munit & Bukhari (2020) studied the impact of 3 modes of globalisation - trade, financial, and technological - on income inequality in 11 emerging Asian economies. They used data from 1980 to 2014 and found a significant negative relationship between trade globalisation and income inequality.

## 2.8 Financial Development

Financial development has also proved to have a variety of results throughout the years. Law & Tan (2009) investigated the impact of financial development in influencing income inequality in Malaysia over the period of 1980-2000. The financial indicators used included the private sector credit (as per cent of GDP), stock market capitalization (as per cent of GDP), domestic credit (as per cent of GDP), total share value traded (as per cent of GDP), finance-size, and finance-activity. The study concluded that there is no link between financial development and income distribution in Malaysia and it is an insignificant determinant of income inequality. Jauch & Watzka (2016) researched the link between these 2 factors for a broad and unbalanced dataset of 138 developed and developing countries from 1960-2008. They used credit (as per cent of GDP) as a measure of financial development and found a significant positive correlation between financial development and income inequality. Seven & Coskun (2016) examined the relation between bank and stock market development and income inequality and poverty in emerging economies. They used dynamic panel data methods and considered a period of 1987-2011. They developed 3 aggregate measures: bank development, stock market development, and overall financial development using bank and stock market development indicators. Both bank and stock market development had a positive significant relation with poverty and income inequality, possibly since the development failed to reach the poorest segments of society in emerging countries. Ratnawati (2020), on studying this relationship in 10 Asian countries, found a negative impact of financial inclusion on income inequality. Mushtaq & Bruneau (2019) analysed the role of ICT (information and communication technologies) in 61 countries from 2001 to 2012. Finding that ICT boosts financial inclusion, they also found that financial inclusion reduces income inequality. Omar & Inaba (2020) investigated the influence of financial inclusion on poverty and income inequality in 116 developing countries from 2004 and 2016.

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It was found that financial inclusion significantly reduces poverty and income inequality in developing countries. Zhang & Naceur (2019) carry out a multi-dimensional investigation on the nexus between financial development, income inequality, and poverty. They find that some aspects of financial development - such as access, depth, efficiency, and stability - reduce income inequality and poverty while trade liberalizations exacerbate inequality and poverty. Specifically, the development of the banking sectors has a more significant impact on income distribution than the development of the stock market, indicating that more emphasis needs to be placed by policymakers on the former. Demir et al. (2020) also assessed this relationship, between FinTech and income inequality, in 140 countries for the years 2011, 2014, and 2017. It is also important to note that financial inclusion exhibits a significant negative relationship with income inequality primarily in higher-income countries.

### 2.9 Knowledge Gap and Rationale of the Study

The immense variability in the value of the Gini coefficient makes it interesting to investigate the factors affecting it. This is crucial for promoting social justice, ensuring economic stability, drafting effective policies for social mobility, and addressing national and international disparities. This paper addresses gaps in existing research on income inequality in several ways:

Firstly, it considers a diverse set of factors. Among the eight macroeconomic variables studied, trade openness, foreign investment, inflation, and unemployment show inconsistent relationships with income inequality. By grouping countries based on economic status (Advanced Economies and Emerging Markets & Developing Economies), this paper addresses these inconsistencies. It also examines the often-overlooked impact of high fertility on income inequality, especially in EMDEs, and explores the effects of foreign investment and economic growth post-2018. It studies the impact of human capital to gain a more holistic view. Additionally, it highlights the need for more research on financial development, focusing on credit inclusion. Secondly, while most studies either analyse a few macroeconomic factors across many countries or a comprehensive set of factors in a few countries, this study examines eight factors across 24 EMDEs and 31 AEs, aiming for a more comprehensive conclusion. Finally, most studies choose a sample of countries based on their geographical location. This regional classification, however, doesn't account for structural and ideological differences in fundamental economic institutions, which limits the generalizability of these studies. Therefore, by focusing on differences in advancement and development of nations (EMDEs versus AEs), the study accounts for similarities across factors and reduces sample heterogeneity. With a sample of 24 EMDEs and 31 AEs, the results are significantly more generalizable to their respective groups.

### *3. Methodology*

### 3.1 Research Aim

The purpose of this study is to analyse the impact of eight macroeconomic factors on income inequality in EMDEs and AEs and the extent of their impact from 2010 to 2021. The eight macroeconomic factors considered for this purpose are economic growth, unemployment, inflation, fertility, human capital index, foreign investment, trade openness, and financial development.

### 3.2 Sampling and Data Collection

This research is a quantitative study using secondary data from the World Bank's Open Database and World Development Indicators. The study employs a panel-data analysis incorporating time-series and cross-sectional data. The use of panel data allows for continuity allowing the analysis to provide a higher-level efficiency with more variability in terms of variables used. To select the EMDEs and AEs, the International Monetary Fund's (IMF) country classification from the World Economic Outlook Database has been used. This classification divides all IMF member nations into Advanced Economies

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(AEs) and Emerging Market and Developing Economies (EMDEs) based on composite data (weighted averages) of domestic economy, fiscal sector, external sector, foreign trade volumes, etc. The following countries have been selected for the two groups:

Table 1: Sample Units

| EMDEs (N=24) | | AEs (N=31) | |
|---|---|---|---|
| Armenia | Indonesia | Austria | France |
| Bulgaria | Kyrgyz Republic | Belgium | United Kingdom |
| Belarus | Moldova | Switzerland | Greece |
| Brazil | North Macedonia | Cyprus | Croatia |
| Columbia | Panama | Germany | Iceland |
| Costa Rica | Peru | Czech Republic | Ireland |
| Dominican Republic | Poland | Denmark | Israel |
| Ecuador | Paraguay | Spain | Italy |
| Georgia | Romania | Estonia | Latvia |
| Hungary | Russian Federation | Finland | Lithuania |
| El Salvador | Ukraine | Romania | Luxembourg |
| Thailand | Uruguay | Slovak Republic | Malta |
| | | Slovenia | Netherlands |
| | | Sweden | Norway |
| | | United States | Poland |
| | | | Portugal |

The necessary data has been collected for a period of 12 years from 2010 to 2021, resulting in a total number of observations of 5280.

### 3.3 Model Specification and Research Design

To examine the influence of the macroeconomic factors on income inequality in EMDEs and AEs, by finding the impact of the 8 variables for the period 2010-2021 on the Gini coefficient, panel data regression analysis was conducted. Two models have been designed. Model 1 includes 24 EMDEs while Model 2 comprises 31 AEs. In order to identify the regression model (Fixed Effects Regression or Random Effects Regression) most suited for each group, the Hausman specification test has been utilised for the differentiation. The null hypothesis for the Hausman test is the following: *$H_0$: Random-Effects Regression Model is appropriate.* A p-value of less than 0.05 suggests that the null hypothesis is rejected and therefore the Fixed Effects Regression Model is utilised while a value greater than 0.05 suggests that the null hypothesis, and thus the Random Effects Regression Model, is utilised.

Table 2: Hausman Specification Test for Model 1 and Model 2

| | **Chi-Square Statistic** | **P-Value** |
|---|---|---|
| **Model 1 (EMDEs)** | 34.2000 | 0.0000 |
| **Model 2 (AEs)** | 14.3200 | 0.0629 |

Therefore, with reference to Table 2, it is observed that the Fixed Effects Regression Model (FEM) is appropriate for Model 1 while the Random Effects Regression Model (REM) is suited to be used for Group 2.

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### 3.4 Variables and Hypotheses

Table 3 describes the dependent (DV) and independent variables (IV) used in the study.

Table 3: Description of Variables

|  | Symbol | Variable Name | Measured by | Definition | Rationale |
|---|---|---|---|---|---|
| DV | GINI | Income Inequality | Gini Coefficient | The extent to which the distribution of income or consumption among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. |  |
| IV | GDPGR | Economic Growth | Gross Domestic Product Growth Rate | The annual average rate of change of the GDP at market prices based on constant local currency, for a given national economy, during a specified period. | Studying aggregate income expansion can provide insights into overall income growth and its impact on inequality, which can help identify income distribution disparities and assist in drafting targeted policies. |
| IV | UNEMP | Unemployment | Unemployment rate | The share of the labour force that is without work but available for and seeking employment. | Can signal to what extent underutilization of labour will affect income disparity; a strong social & economic factor contributing to income inequality and redistribution. |
| IV | INF | Inflation | Inflation rate | The annual percentage increase of the cost of living as measured by the consumer price index. | Can help understand how change in purchasing power will affect inequality dynamics by studying to what extent it disproportionately affects lower-income groups. |
| IV | FER | Fertility | Total fertility rate | The number of children that would be born to a | Serves as a demographic indicator into population |

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|  | Symbol | Variable Name | Measured by | Definition | Rationale |
|---|---|---|---|---|---|
|  |  |  |  | woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates currently observed. | dynamics; can be pivotal in understanding how societal and population changes impact income inequality. |
| IV | LIT | Human Capital Index | Secondary school enrolment rate (gross percent) | The number of students enrolled in secondary education regardless of age as a proportion of the population of the age group which officially corresponds to secondary education, multiplied by 100. | Can help quantify the amount of investment required in human capital development in nations. |
| IV | FDI | Foreign Investment | Foreign Direct Investment (percent of GDP) | Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. | Can help to study how skill development and improvement in technology affects income inequality. It will provide information regarding how globalisation and international capital flows influence economic disparities in a country. |
| IV | TRADE | Trade Openness | Import (in USD)/Gross National Income (Atlas) | The outward or inward orientation of a given country's economy. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. | Crucial factor to understand the impact of globalisation and to assess the distributional effects of trade liberalisation policies and identifying strategies to mitigate potential adverse consequences for certain vulnerable populations. |
| IV | FDEV | Financial Development | Domestic Credit to Private Sector (percent of GDP) | The financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other | Essential to analyse the impact of financial inclusion and availability of services on income distribution and hence inequality. This information will promote inclusive financial systems |

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| | Symbol | Variable Name | Measured by | Definition | Rationale |
|---|---|---|---|---|---|
| | | | | accounts receivable, that establish a claim for repayment. | to support broad-based economic growth. |

Following are the hypotheses for the EMDE group:

1. $H_{E1}$: There is a significant positive impact of economic growth on income inequality in emerging economies.

2. $H_{E2}$: There is a significant positive impact of unemployment on income inequality in emerging economies.

3. $H_{E3}$: There is a significant positive impact of inflation on income inequality in emerging economies.

4. $H_{E4}$: There is a significant positive impact of fertility on income inequality in emerging economies.

5. $H_{E5}$: There is a significant negative impact of human capital index on income inequality in emerging economies.

6. $H_{E6}$: There is a significant positive impact of foreign investment on income inequality in emerging economies.

7. $H_{E7}$: There is a significant positive impact of trade openness on income inequality in emerging economies.

8. $H_{E8}$: There is a significant negative impact of financial development on income inequality in emerging economies.

Following are the hypotheses for the AE group:

1. $H_{A1}$: There is a significant negative impact of economic growth on income inequality in emerging economies.

2. $H_{A2}$: There is a significant positive impact of unemployment on income inequality in emerging economies.

3. $H_{A3}$: There is a significant positive impact of inflation on income inequality in emerging economies.

4. $H_{A4}$: There is a significant positive/negative impact of fertility on income inequality in emerging economies.

5. $H_{A5}$: There is a significant negative impact of human capital index on income inequality in emerging economies.

6. $H_{A6}$: There is a significant negative/positive impact of foreign investment on income inequality in emerging economies.

7. $H_{A7}$: There is a significant negative impact of trade openness on income inequality in emerging economies.

8. $H_{A8}$: There is a significant negative impact of financial development on income inequality in emerging economies.

As previously mentioned in Section 3.3, FEM will be used for Group 1 and REM will be used for Group 2. The equation for both regressions is as follows:

$$GINI_{it} = \alpha_i + \beta_1 GDPGR_{it} + \beta_2 UNEMP_{it} + \beta_3 INF_{it} + \beta_4 FER_{it} + \beta_5 LIT_{it} + \beta_6 FDI_{it} + \beta_7 TRADE_{it} + \beta_8 FDEV_{it} + \epsilon_{it}$$

Here, $GINI_{it}$ is the dependent variable, $\beta_j$ is the estimated coefficient of the explanatory variables, $\alpha_i$ is the unobserved effect and $e_{it}$ is the estimated error value in the equation.

## 4. Data Analysis and Interpretation

### 4.1 Diagnostic Tests

For regression models to be conducted, certain conditions must be met. For the Fixed and Random Effects Models, the groups should have an absence of multicollinearity, autocorrelation, and heteroscedasticity. In the case that these conditions are not met, certain adjustments to take these factors into consideration are made.

### 4.1.1 Multicollinearity

To check multicollinearity, which is a situation wherein two or more independent variables are highly linearly related resulting in unreliable and unstable estimates, two tests are conducted. The first test is manual assessment using a correlation matrix. As observed in Table 4 and Table 5, the models do not suffer from the problem of multicollinearity since all correlation coefficients presented are between the range of -0.80 and 0.80.

Table 4: Correlation Matrix for Model 1: EMDEs

| Variables | GDPGR | UNEMP | INF | FER | LIT | FDI | TRADE | FDEV |
|---|---|---|---|---|---|---|---|---|
| **GDPGR** | 1.000 | | | | | | | |
| **UNEMP** | -0.071 | 1.000 | | | | | | |
| **INF** | -0.068 | -0.059 | 1.000 | | | | | |
| **FER** | 0.189 | -0.247 | -0.049 | 1.000 | | | | |
| **LIT** | -0.120 | -0.056 | 0.069 | -0.362 | 1.000 | | | |
| **FDI** | 0.022 | -0.008 | -0.003 | 0.019 | 0.041 | 1.000 | | |
| **TRADE** | 0.141 | 0.002 | 0.043 | -0.066 | -0.144 | 0.190 | 1.000 | |
| **FDEV** | -0.092 | -0.065 | -0.209 | -0.292 | 0.160 | -0.042 | 0.112 | 1.000 |

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Table 5: Correlation Matrix for Model 2: AEs

| Variables | GDPGR | UNEMP | INF | FER | LIT | FDI | TRADE | FDEV |
|---|---|---|---|---|---|---|---|---|
| **GDPGR** | 1.000 | | | | | | | |
| **UNEMP** | -0.214 | 1.000 | | | | | | |
| **INF** | 0.081 | -0.197 | 1.000 | | | | | |
| **FER** | 0.136 | -0.168 | 0.065 | 1.000 | | | | |
| **LIT** | -0.013 | -0.089 | -0.005 | -0.058 | 1.000 | | | |
| **FDI** | 0.039 | 0.112 | -0.032 | -0.073 | -0.095 | 1.000 | | |
| **TRADE** | 0.133 | -0.129 | -0.056 | -0.237 | 0.171 | 0.086 | 1.000 | |
| **FDEV** | -0.221 | 0.102 | -0.086 | -0.079 | 0.062 | 0.282 | 0.008 | 1.000 |

The second test is the Variance Inflation Factor (VIF). The Mean VIF is 1.172 for EMDEs and 1.127 for AEs, thereby indicating that there is no multicollinearity in both the data sets since the values are under 10 which is the generally accepted threshold for multicollinearity. Therefore, both groups are free from multicollinearity as tested by the correlation matrix and Variance Inflation Factor.

### 4.1.2 Autocorrelation

The presence of autocorrelation suggests that there are underlying relationships between consecutive data points which can affect the accuracy of statistical models, implying that the data is not purely random. The Wooldridge test for autocorrelation in panel data is utilised in both models. The null hypothesis states that there is no first-order autocorrelation. A p-value 0.0008 for Group 1 and 0.0002 for Group 2 indicate the rejection of the null hypothesis and presence of autocorrelation.

### 4.1.3 Heteroskedasticity

The presence of heteroskedasticity suggests that the variance of residuals in the regression model is not constant across all levels of independent variables, leading to biassed standard errors. For Group 1, the Modified Wald Test has been utilised while for Group 2, White's test has been used. The null hypotheses state that homoscedasticity in the data set. Both Groups had a p-value of 0.0000 indicating the rejection of the null hypotheses and thus presence of heteroskedasticity.

### 4.2 Descriptive Statistics for EMDEs and AEs

Table 6: Descriptive Statistics Comparing EMDEs and AEs

| | Mean | | SD | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|
| | **EMDEs** | **AEs** | **EMDEs** | **AEs** | **EMDEs** | **AEs** | **EMDEs** | **AEs** |
| **GINI** | 38.596 | 31.520 | 8.374 | 4.097 | 24.000 | 23.200 | 55.100 | 42.600 |
| **GDPGR** | 2.918 | 2.100 | 4.216 | 3.697 | -17.668 | -11.167 | 15.836 | 24.475 |
| **UNEMP** | 7.782 | 8.351 | 5.371 | 4.608 | 0.250 | 2.020 | 33.130 | 27.690 |
| **INF** | 4.532 | 1.572 | 6.079 | 1.439 | -1.550 | -1.736 | 59.220 | 6.091 |

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| FER | 1.906 | 1.594 | 0.466 | 0.326 | 1.160 | 1.130 | 3.300 | 3.110 |
|---|---|---|---|---|---|---|---|---|
| LIT | 95.092 | 110.416 | 13.594 | 15.234 | 63.477 | 86.197 | 141.203 | 164.080 |
| FDI | 3.933 | 8.173 | 8.548 | 32.021 | -40.086 | -117.419 | 106.594 | 279.361 |
| TRADE | 0.511 | 0.728 | 0.238 | 0.815 | 0.039 | 0.009 | 1.144 | 4.872 |
| FDEV | 48.293 | 96.858 | 25.696 | 46.487 | 11.488 | 24.623 | 164.298 | 255.310 |

A significant disparity exists in income inequality levels, measured by the Gini coefficient, between EMDEs and AEs, with the mean for EMDEs being 7 points higher than that of AEs. Recent integration of EMDEs into global markets has, however, had an impact on economic growth. EMDEs have a mean of 2.918 for economic growth while it is 2.100 for AEs. Yet, higher income levels and greater consumer demand for imported goods result in increased trade openness for AEs (0.728) compared to EMDEs (0.511). It's surprising to note that the unemployment rate is higher for AEs than EMDEs, but factors such as large informal sector, greater percent of low-skilled workers, and a less representative sample of EMDEs explain the abnormality. Inflation, on the other hand, follows the conventional norm of being higher for EMDEs than AEs with an average of 1.572 for AEs and 4.523 for EMDEs. This can be attributed to the weak financial systems and currency depreciation in EMDEs. They also fluctuate significantly in EMDEs with a range of over 60. Expectedly, fertility, financial development and foreign investment are higher in AEs than EMDEs. The mean for domestic credit provided to the private sector (proxy for financial development) is twice as much for AEs than EMDEs indicating more inclusive financial systems. FDI for AEs is also double that of EMDEs due to sophisticated infrastructure and better regulatory environments that favour investments. Additionally, the fertility rate is higher and more variable for EMDEs than AEs due to strong cultural beliefs and societal norms regarding family size.

## 5. Results and Discussion

As observed from Section 4.1, the diagnostic tests indicate that while there is no multicollinearity present in the model, it is yet plagued by autocorrelation and heteroskedasticity. To overcome the biassed standard errors caused, clustering has been utilised to obtain robust standard errors. The 'vce(cluster id)' function in STATA has been used to overcome these challenges.

### 5.1 Model 1: EMDEs

As seen in Table 7, the F ratio provides the statistical test for the overall model fit. The null hypothesis states that the model is not the best for analysis. Hence, the F ratio of 0.000 means that the Fixed Effects Model has the best fit. The $R^2$ value of 0.341 indicates that 34.1 percent variation in the dependent variable is explained by the 8 macroeconomic factors considered. Four of the eight macroeconomic factors were found to have a significant impact on the Gini coefficient. These are GDPGR, UNEMP, FER, and FDEV. With reference to the beta values or coefficients of the equation, we can conclude that GDPGR, UNEMP, and FER have a positive impact on GINI. Contrastingly, FDEV negatively impacts income inequality. Ultimately, this means that in EMDEs, a higher growth rate leads to an increase in income inequality, contradicting traditional beliefs. An increase in unemployment and fertility rate also exacerbates income inequality, with unemployment's impact being severe. Financial development, however, helps mitigate income inequality. Overall, the model leads to the rejection of the null hypotheses $H_{E1}$, $H_{E2}$, $H_{E4}$, $H_{E8}$.

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Table 7: Result of Panel Data Regression Using Fixed Effects Model for Group 1

| DV: GINI | Coefficient | P-Value |
|---|---|---|
| Constant | 33.761 | 0.000 |
| GDPGR | 0.050 | 0.068* |
| UNEMP | 0.275 | 0.001*** |
| INF | 0.005 | 0.677 |
| FER | 3.246 | 0.029** |
| LIT | -0.011 | 0.634 |
| FDI | 0.000 | 0.971 |
| TRADE | 0.589 | 0.709 |
| FDEV | -0.06 | 0.006*** |

| R-squared | 0.341 | Number of obs | 288 |
|---|---|---|---|
| F-test | 13.705 | Prob > F | 0.000 |

*$***p<0.01, **p<0.05, *p<0.1$*

As found through the regression analysis, economic growth, proxied by the GDP Growth Rate, demonstrated a highly significant positive influence on income inequality in developing economies. This relationship can be justified using the Kuznets curve which depicts that in initial stages of development, growth tends to benefit higher-income groups more (Munir & Sultan, 2017; Lee et. al, 2017; Dharmadasa, 2023). The unequal distribution of growth with a large proportion of the population in EMDEs being involved in the informal supports a positive relationship.

Similarly, unemployment is also found to significantly enhance income inequality. This can be explained because of its direct effect of widening the gap between the rich and the poor. In EMDEs, it is influential at a significance level of 1% especially because of the lack of social safety nets - the absence of programs leaves the unemployed more vulnerable. This finding is supported by Gustaffson & Johanson (1997) - who provided an explanation that unemployment worsens the situation of those at the bottom of the income distribution system - and Zandi et al. (2022). However, existing studies have found contradicting outcomes as well (Kaasa, 2003; Melo & Stirati, 2020).

Fertility's positive relation with income inequality can be explained since high rates of fertility can often lead to educational and health inequality as well (Sen et al., 2023). Limited access to these services results in inequality. In EMDEs, high levels of fertility are also commonly associated with child labour (Admassie, 2002). Although not a significant amount of research has been conducted in this field, Sarkar (2008) also found a positive correlation explained as high fertility rate stops poorer groups of society from spending on education of their offsprings. Munir & Sultan (2017) had the same finding and explained it since the population below the poverty line had a higher fertility rate.

Financial Development has been seen to be the only factor that can statistically reduce income inequality, possibly since improving access to credit for the private sector enables more individuals to improve their economic status by starting businesses, investing in education, accessing better healthcare facilities and so on. In essence, it improves financial inclusion. These findings have been supported by

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Ratnawati (2020), Mushtag & Bruneau (2019), Omar & Inaba (2020), Zhang & Naceur (2019), and Demir et al. (2020). A majority of these studies found a negative relationship with income inequality and poverty. However, positive correlations have also been found by Jauch & Watzka (2016) and Seven & Coskun (2016).

It is also important to note the unconventional results obtained including literacy rate and trade openness being insignificant variables. Literacy, one of the key factors usually attributed to reducing income inequality, has a negative but insignificant effect because its impact may be limited by the quality of education, labour market rigidities, and lack of economic policies (Checchi, 2001) (Hanushek & Woessmann, 2006). Trade openness, also considered an indicator of globalisation which is a major reason for lower income inequality in EMDEs, has a negative insignificant relationship with income inequality. This can be explained by the existing economic structure and levels of inequality in EMDEs for which the effects of trade may not be sufficient to overcome. Furthermore, EMDEs lack the appropriate infrastructure, skilled labour, and often institutional framework necessary to take advantage of trade (Dollar & Kraay, 2001). EMDEs are also subject and vulnerable to external shocks which reduce the impact of trade openness (Kaminsky & Reinhart, 2002).

### 5.2 Model 2: AEs

As observed in Table 8, it is observed that a 10.3 percent variation in the dependent variable is explained by the factors included in the model. Moreover, two of the eight macroeconomic factors - GDPGR and UNEMP - were found to have a significant impact on income inequality. Both these factors are significant at 1%. While UNEMP has a positive impact on income inequality, exacerbating it, GDPGR has a negative impact and mitigates it. Overall, this signifies that in AEs, a higher economic growth rate results in a decrease in income inequality while higher levels of unemployment increase inequality. Thus, the model leads to the rejection of the null hypotheses $H_{A1}$ and $H_{A2}$.

Table 8: Result of Panel Data Regression Using Random Effects Model for Group 2

| DV: GINI | Coefficient | P-Value |
|---|---|---|
| Constant | 29.291 | 0.000 |
| GDPGR | -0.031 | 0.005*** |
| UNEMP | 0.208 | 0.001*** |
| INF | 0.035 | 0.433 |
| FER | -0.312 | 0.726 |
| LIT | 0.011 | 0.426 |
| FDI | 0.001 | 0.754 |
| TRADE | -2.02 | 0.679 |
| FDEV | -0.001 | 0.910 |

| R-squared | 0.103 | Number of obs | 372 |
|---|---|---|---|

*****p<0.01, **p<0.05, *p<0.1*

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The negative impact of economic growth on the income inequality in advanced economies can be attributed to the increase in employment opportunities and wages for workers, resulting in better living standards. Additionally, government revenues and social spending also increases due to higher tax collections without necessarily raising tax rates. Thus, the reduction in poverty and enhanced social well-being caused by economic growth helps reduce income inequality. This finding has been supported by Mekenbayeva & Karakus, 2011 who found a strong negative relationship between economic growth and inequality as a country develops.

On the other hand, unemployment has a positive influence on income inequality because high income earners often have more secure jobs and better benefits resulting in the poorer sections of society suffering the most. Since this section does not have significant savings or other sources of income, it widens the gap between the rich and the poor. Unemployment can have lasting intergenerational effects, making upward mobility difficult to achieve, resulting in a cycle of poverty.

It's also important to consider the six insignificant variables in this study. It's interesting to note that literacy has a positive correlation with income inequality since it should ideally yield more equitable income distribution. However, in AEs, literacy alone may not help secure employment. Additionally, the variation in literacy rates may not be as high as that in EMDEs and thus it doesn't significantly affect it. Secondly, fertility rate helps reduce inequality due to increase in investment in human capital in the private and public sectors and presence of appropriate labour market policies.

## 6. Interpretation

Ultimately, the results of the study indicate notable differences in the macroeconomic factors influencing income inequality in EMDEs and AEs. While certain factors like unemployment exhibited consistent findings for both Models, other factors like economic growth, financial development, and fertility demonstrated divergent impacts reflecting the different economic, social, and policy contexts of these countries.

Unemployment yielded a significant positive correlation with the Gini coefficient in both EMDEs and AEs. This is explained since higher unemployment reduces income opportunity for the lower-income population and widens the gap between the rich and the poor, regardless of whether it's an EMDE or AE. UNEMP had a coefficient of 0.275 in EMDEs and 0.208 in AEs, and this difference can be accounted for because of the lack of social security nets in EMDEs that cause a more significant impact. Hence, unemployment worsens income inequality regardless of the economy-type by disproportionately impacting those at the bottom of the income distribution (Gustaffson & Johanson, 1997).

The results also help demonstrate the trendline of income inequality as it moves through different stages of development. Economic growth which exhibits contrasting impacts by positively affecting GINI in EMDEs and negatively impacting Gini in AEs elucidates the findings of the Kuznets Curve hypothesis. It is observed that in developing economies, income growth increases inequality while in advanced economies, it reduces income inequality, giving the downward U shape of the curve.

Furthermore, it's interesting to note that financial development, proxied by the credit given to the private sector, is the only factor mitigating income inequality in EMDEs but is insignificant in AEs, although it has a negative correlation. Thus, we can conclude that while financial inclusion helps in early stages of economic development to reduce income inequality, it is not particularly helpful in later stages when countries' financial systems are highly developed and access to credit is widespread. Since the baseline level of financial inclusion is much higher in AEs, additional improvements do not significantly affect income inequality.

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Also, notably, trade openness has been insignificant in both models - while intra-country income inequality has been rising, inter-country inequality has been falling in recent decades. Globalisation has been a key factor towards this. However, the results of the study show that it doesn't help reduce income inequality within countries and even has a positive insignificant relation with Gini in EMDEs.

## Conclusion

The aim of this study was to understand the impact of 8 macroeconomic factors on income inequality, proxied by the Gini coefficient, in EMDEs and AEs from 2010 to 2021. The research findings underscore the complexity of income inequality in different economies and the multifaceted nature of its determinants. While certain factors such as unemployment consistently exacerbate income inequality across both economic contexts, others like fertility rate and financial development exhibit divergent impacts. Economic growth proved to have diverse results by worsening the situation in EMDEs and improving it in AEs.

The results of the study have important implications for policymakers and academics. Specifically, in EMDEs, policymakers should prioritise financial inclusion and enhance access to credit for small businesses. Additionally, increasing employment opportunities and establishing robust social safety mechanisms are essential to mitigate unemployment's adverse effects. Emphasising family planning programs is also crucial, as high fertility rates contribute to income inequality in EMDEs. Furthermore, the government should continue to promote inclusive economic growth to reduce inequality. Strong redistributive policies are necessary to counteract the impact of unemployment and economic growth on income disparity.

For AEs, the government should continue to promote sustainable economic growth through investments and provision of a conducive environment for businesses. Policymakers should improve existing labour market policies by promoting training programs and possible entrepreneurship.

The study also significantly contributes to the existing literature by highlighting the importance of contextual factors in understanding income inequality. By examining two groups of countries based on their economic development, it lays a strong foundation for policy formulation tailored to each country's needs and economic environment. The study explores the impact of various controversial variables in different contexts, providing greater clarity on their influence on income inequality. Ultimately, this research sheds new light on the topic by utilising data from recent decades.

However, the research has certain limitations. While a sample of 31 out of 40 countries was selected for Model 2 (Advanced Economies), the representativeness for Emerging Markets and Developing Economies (EMDEs) was less accurate, potentially affecting the generalizability of the findings across all EMDEs. Additionally, data availability posed a major obstacle, particularly concerning the Gini coefficient. The World Bank has not updated Gini coefficient data for 2021, 2022, and 2023 for most countries, limiting the study's time frame. Future research can improve by expanding the sample size, especially for EMDEs. A sectoral analysis investigating the roles of different economic sectors by combining various variables could also be valuable. Variables for future study can include environmental factors, political stability, and the impact of automation and technological advancements on labour markets. This study underscores the need for tailored policy approaches based on specific economic contexts and developmental stages, providing a foundation for policymakers to create more equitable and inclusive societies.

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