

Global Uncertainties and Income Disparities in Developing Countries

1. Raza, 2. Sadia, 3. Azeez

1. Independent Researcher

<https://orcid.org/0009-0008-7019-2163>

2. Assistant Professor, School of Economics, International Institute of Islamic Economics,
International Islamic University, Islamabad, Pakistan

<https://orcid.org/0000-0001-6705-7405>

3. Assistant Professor, School of Economics, International Institute of Islamic Economics,
International Islamic University, Islamabad, Pakistan

<https://orcid.org/0000-0002-4571-9778>

haleema.sadia@iiu.edu.pk (Corresponding Author)

Abstract

Income inequality has remained an important concern for social scientists since the 1980s. Global uncertainties profoundly exacerbate income disparities in developing countries, in addition to economic and institutional factors. This study investigates the relationship between world uncertainty and income inequality for a panel of 52 developing countries from 1996 to 2024. The study employs the Generalized Method of Moments to address endogeneity, unobserved heterogeneity, and dynamic panel data bias. The authors conducted a robustness analysis using the Two-Stage Least Squares method.

The empirical findings reveal that an increase in world uncertainty widens income inequality in developing countries. Heightened uncertainty discourages new investments, slows economic activity, and disproportionately affects low-income groups. Moreover, an increase in GDP per capita enhances income inequality at early stages of development and then lowers it, providing evidence for the Kuznets curve. High inflation enhances income inequality, whereas

the distributional impacts of official development assistance, human capital, and quality of institutions are favorable. These findings are robust to estimation methodology.

The study suggests more effective crisis-management strategies to deal with income inequality during uncertain periods. The study also calls for increasing HC investments to reduce income inequality by raising wage income. Development aid may be an effective tool to mitigate INEQ.

Keywords: World uncertainty, income inequality, developing countries, Generalized Method of Moments, Two-Stage Least Squares

JEL Classification: O15, D31, D81

1. Introduction

Uncertainties play a vital role in shaping economic outcomes such as investment decisions, labor market behavior, and income distribution. Frequent disruptions in the form of financial crises, geopolitical conflicts, trade disruptions, the COVID-19 pandemic, Brexit, the US-China trade war, and the recent Iran-US war have substantially impacted income disparities. Neoclassical economists viewed uncertainty as a form of risk, whereas Keynesian economists acknowledged deep and highly unpredictable uncertainty as fundamental uncertainty (Ferrari-Filho & Conceicao, 2005). World Uncertainty (WU) is defined as unpredictability about political, social, and economic landscapes that affect countries and markets worldwide (Bloom, 2014). An escalation in WU makes investors cautious in allocating resources to new projects. Businesses delay expansion plans, and consumers reduce their spending. These actions stagnate growth in real and financial sectors.

Developing countries have been disproportionately affected by trade disputes, financial turbulence, geopolitical unrest, and climate-related disturbances, which have destabilized global supply chains and increased market volatility (Ahir et al., 2022). For example, the Global Financial Crisis of 2007-2009 originated from the collapse of the U.S. housing market, which led to a liquidity crunch and several economic downturns (Reinhart & Rogoff, 2009).

Income inequality (INEQ) remained a pressing issue across developing countries and is an important concern of the Sustainable Development Goals (SDG 10). It refers to unequal income distribution among individuals or households, influencing access to opportunities and social

mobility. It weakens economic development and increases social conflicts (Piketty, 2014). Income disparities cause social unrest, hinder economic growth, and call for concrete policy changes. These disparities have become more substantial in periods of high WU, as noted by Ahir et al. (2022).

The empirical relationship between WU and INEQ is important because periods of increased WU disproportionately impact low-income individuals, as high-income households are much more resilient to uncertainty. The process of industrialization, economic crises, wars, and uncertain policies has exacerbated INEQ. Following World War II, robust labor protection and welfare programs helped reduce inequalities. However, globalization and technological advancements have widened inequalities since the 1980s. Recently, governments have used taxation and social policies to address growing income disparities (Piketty, 2014; Saez & Zucman, 2016; Stiglitz, 2012). Thus, how WU impacts INEQ remains an empirically unaddressed question for developing countries.

Over the past decades, developing nations have been exposed to various external shocks, such as economic crises, geopolitical tensions, and uncertainty in global policies. These external shocks have significant implications for income distribution. The study examines the impact of WU on INEQ in developing countries. It contributes to the existing literature by employing a multidimensional measure of global uncertainty across countries. Extensive research has examined how specific shocks alter income distribution. In this regard, Furceri et al. (2017) demonstrated that macroeconomic shocks can widen inequality, particularly through labor market adjustments. Brueckner and Vespignani (2017) evaluated the impact of trade uncertainty on INEQ for 61 countries. Bodea et al. (2021) and Nguyen (2022) examined how financial crises tend to enhance INEQ for a panel of 66 countries. Although these contributions are important, they primarily focus on individual events or country-specific shocks, limiting their scope to capture the persistence of WU.

This study takes a broader approach by accounting for multiple sources of uncertainty through a composite world uncertainty index (WUI) developed by Ahir et al. (2022). It also contributes to the scant empirical literature on WU-INEQ in developing countries. The only study that analyzed the WU-INEQ nexus was done by Kebalo and Zouri (2024). The impact of WU on INEQ is highly relevant in the current economic, institutional, and policy environment. The findings of this study are beneficial to policymakers and government officials in developing countries for narrowing down income disparities.

2. Literature Review

The empirical literature on WU and INEQ builds around forms of uncertainty and their impacts on INEQ. For instance, Fawaz et al. (2012) highlighted that INEQ narrows during economic booms in 55 low-income developing countries, whereas it moves counter-cyclically in 56 high-income developing countries. The authors confirmed the Kuznets inverted U-curve hypothesis, emphasizing that human capital development plays a crucial role in mitigating inequality. Likewise, Furceri et al. (2017) examined how monetary policy shocks impact INEQ for 32 developing countries. The study shows that tight monetary policy shocks, e.g., a rise in interest rates, widen the income gap.

Brueckner and Vespignani (2017) analyzed the relationship between trade uncertainty and INEQ and the moderating role of education for a panel of 66 countries. The study finds that trade uncertainty widens INEQ. The impact is more pronounced in countries characterized by low educational attainment. Thye et al. (2021) studied the effect of internal and external shocks on INEQ in ASEAN 5 countries. The study highlights that external uncertainty shocks have a significant impact on income disparity, in addition to internal shocks. Wu et al. (2022) provided a comprehensive examination of how various economic, financial, political, and geopolitical risks contribute to increasing INEQ in the context of Emerging economies. All types of risks exacerbate INEQ. The study calls for governments' financial support, which tends to mitigate the effects of risks on INEQ.

Several studies examined the impact of financial crises on INEQ. In this vein, Bodea et al. (2021) explored the relationship between financial crises and INEQ for a panel of 66 countries. The study indicates that currency, banking, external, and internal debt crises worsen INEQ, particularly in the long run. Nguyen (2022) investigated the relationship between the financial crisis and INEQ over the last six decades for a global panel of countries. The results indicate that low- and middle-income countries experience a surge in INEQ following all types of financial crises, whereas high-income countries face high INEQ during banking crises. Similarly, Sweidan (2023) examined the impact of geopolitical risk on INEQ for 18 countries. The study confirms that the impact of GPR on INEQ varies over time due to recurring geopolitical events and structural factors.

A few studies examined the impact of economic policy uncertainty (EPU) on INEQ. For instance, Farooq et al. (2023) studied the EPU-INEQ nexus for 20 developing countries. They

conclude that EPU tends to enhance INEQ in developing countries. Likewise, Magwedere and Marozva (2025) studied how EPU, inflation, and financial development affect income distribution in African nations. The results indicate that EPU decreases INEQ in the long-run. The symmetric and asymmetric adverse shocks to EPU have a mitigating impact on inequality. In contrast, inflation widens INEQ, especially in periods of extremely high inflation. The study finds that developed financial markets help reduce INEQ, particularly when access to financial services is expanded for low-income groups. Law et al. (2025) analyzed the moderating effect of financial inclusion on the nexus between EPU and INEQ for 58 emerging and developing countries from 2004 to 2022. Findings indicate that economic uncertainty mitigates INEQ only if financial inclusion exceeds a certain level. The study also finds that financial inclusion unambiguously helps narrow INEQ on its own, and its effect then reinforces beyond the threshold level. This evidence indicates that economic uncertainty's influence on income distribution is conditional on the degree of financial inclusion.

Very few studies have addressed the link between global uncertainty and income inequality. For instance, Kebalo and Zouri (2024) examined the effect of global uncertainty on INEQ for a panel of 66 developing countries. The study used GMM to control endogeneity. The findings confirm that uncertainty increases INEQ during periods of fiscal constraint. The findings indicate that uncertainty shocks disproportionately impact lower-income populations by raising employment instability and reducing economic opportunities. Huynh and Pham (2025) analyzed the relationship between uncertainty and INEQ for 32 Asian countries from 2002 to 2018. The study shows that high uncertainty is likely to reduce INEQ by decreasing income shares of both the low- and the high-income groups.

Despite extensive research on exploring the sources of INEQ, several gaps remain in the literature, which the current study intends to address. *First*, previous studies subjectively account for event-specific uncertainty. This study uses a comprehensive measure of global uncertainty (WUI) developed by Ahir et al. (2022). It accounts for political and economic uncertainties as well. Another advantage of using WUI is that it is not merely a subjective assessment and provides a comparison of the WU across developing countries. *Second*, existing studies have primarily examined specific types of WU separately, including economic policy, trade uncertainty, climate change, geopolitical risks, financial uncertainty, technological uncertainty, GPR, and terrorism-related uncertainty. *Third*, research on internal and external shocks has examined their effects on INEQ for specific shocks and concluded that external

shocks matter. However, research examining the effects of a comprehensive measure of aggregate shocks, such as WU, on INEQ remains limited.

3. Methodology

This section develops a theoretical framework for examining the WU-INEQ nexus. It further explains data and econometric procedures.

3.1 Theoretical Framework

WU encompasses economic crises, geopolitical conflicts, health emergencies, and environmental changes, which disproportionately affect lower-income groups (Bordo & Meissner, 2012). This phenomenon originates from different economic perspectives. *First*, the *Keynesian deficient demand perspective* suggests that economic agents become cautious in their consumption and investors become risk-averse in response to uncertainties. It ultimately decreases economic growth and aggregate demand while increasing unemployment among low-skilled and poor workers (Keynes, 1936). This exacerbates economic downturns, as decreased consumer and business spending leads to lower production and job losses.

Second, the Neoclassical growth model posits that uncertainty hinders investment and reduces productivity, thereby altering income distribution. The capital accumulation and productivity enhancement in growth models suggest that economic growth becomes stagnant when uncertainty compels investors to delay capital investments in both human capital and physical assets. In contrast, capital returns remain concentrated among high-income earners or capitalists (Solow, 1956). Third, WU creates complications in credit markets, disrupting the credit supply and lowering investment. The ability of individuals to move up the social ladder becomes restricted in uncertain economic conditions. Thus, it leads to increased social divisions (Stiglitz, 2012). Fourth, the skill-biased technological change theory aligns with the concept that wages rely on the skill level of the workers. Uncertainty tends to favor high-skilled workers, contrary to low-skilled workers, as the latter are less engaged in technological advancements and innovations. Accordingly, the income gap between high- and low-skilled workers widens (Autor et al., 2003).

Fifth, *structuralist and institutional theories* elucidate how labor market structures and wage negotiations become more complex during periods of uncertainty. During economic crises, the combination of labor market deregulation and weakened labor unions leads to wage stagnation among lower-income workers. At the same time, high-income individuals, who rely more on capital income than wages, secure their income through capital investments (Piketty, 2014) and

even grow their wealth. This channel worsens income disparity by lowering wages of low-income earners.

3.2. Model Specification

The study estimates the following econometric model for examining the WU-INEQ nexus:

$$\text{INEQ}_{it} = \alpha_0 + \alpha_1 \text{INEQ}_{it-1} + \alpha_2 \text{WU}_{it} + \alpha_j X_{jit} + \varepsilon_{it} + u_i \quad (1)$$

where INEQ_{it} = Income inequality in the i^{th} country at time t

INEQ_{it-1} = Income inequality in the i^{th} country at time $t-1$

WU_{it} = World uncertainties in the i^{th} country at time t

X_{jit} = Vector of j control variables for i^{th} country at time t .

ε_{it} = Error term

u_i = Country-specific unobservable effects

The study controls for several variables to handle omitted-variable bias. The vector of control variables includes income per capita (YPC), square of income per capita (YPC^2), inflation (INF), official development assistance and aid (DA), human capital (HC), and institutional quality (IQ).

The first control variable, YPC, impacts inequality non-linearly as elaborated by the *Kuznets curve*. At the initial stages of development, structural transformations from agriculture to industry enhance INEQ; once industrialization matures, high YPC enables access to education, modern skills, and high-paying jobs, which helps to narrow INEQ (Kuznets, 1955). The second control variable is INF. A stable and low-inflation environment is vital for maintaining purchasing power and narrowing down INEQ. A rise in INF affects the income of various groups heterogeneously. The purchasing power of the labor-income class is hurt more than the capital-income class with a rise in inflation, as their ability to preserve purchasing power is limited. Further, they have limited access to financial markets to cope with high inflation. Thus, high inflation worsens INEQ (Beck et al., 2007; Glawe & Wagner, 2024).

The next control variable is DA. It helps bridge INEQ by enhancing the poor's affordability of education and enabling them to participate in the economic process. Nonetheless, the impact

of DA on inequality is dependent on how it is allocated, governed, and implemented. DA can significantly reduce INEQ by reducing poverty and enhancing the living standards of low-income and vulnerable groups (Batuo et al., 2022). The fourth control variable, HC, serves as a vital means of bridging disparities. The economic differences between people persist because wealthier groups can afford better educational opportunities that are inaccessible to more disadvantaged individuals (Schultz, 1961; Becker, 1964). Accessible, high-quality education leads to a decrease in INEQ between population groups (Galor & Zeira, 1993). High-quality education leads to better skills and productivity, and to access to high-paying jobs and other economic opportunities for disadvantaged groups, thereby reducing INEQ. The last control variable is IQ. It not only serves as a precondition for development; rather, it impacts the ongoing distribution of income. Strong institutions allocate more resources for social spending, particularly for low-income individuals. This improves the living standards of poor masses and makes income distribution fair (Uzar, 2023).

3.3. Data and Econometric Procedure

The authors used annual panel data from 1996 to 2024 to investigate the impact of WU on INEQ in a panel of 52 developing countries.

The study considers data from secondary sources. Table 1 explains the measurement and data sources. This research uses System GMM to study the relationship between WU and INEQ. It is a dynamic panel estimation method designed to address endogeneity, measurement error, and unobserved heterogeneity (Blundell & Bond, 1998). Pre-estimation Durbin–Wu–Hausman (DWH) is conducted to test endogeneity (Durbin, 1954; Hausman, 1978; Wu, 1973).

Table 1: List of Variables, Measurements, and Data Sources

Variables	Measurement	Data Sources
Income Inequality (INEQ)	The Gini coefficient measures income distribution, ranging from 0 (perfect equality) to 1 (perfect inequality).	WDI, WB
World Uncertainty (WU)	WUI is a quantitative measure of global economic and political uncertainty, capturing the frequency of uncertainty-related Economic Intelligence Unit country reports	Ahir et al. (2022)
Income Per Capita (YPC)	Ratio of total GDP to the population	WDI, WB
Inflation (INF)	Percentage change in consumer price index	WDI, WB
Official Development Assistance & Aid (DA)	Total net disbursements from official sources to recipient countries, measured in USD	WDI, WB
Human Capital (HC)	It is the productivity-adjusted level of human capital based on average years of schooling and returns to education.	PWT 10.1 Dataset
Institutional Quality (IQ)	IQ is measured through 12 components of political risk using ICRG methodology.	ICRG, PRS

The study also conducted a robustness analysis by using the Two-Stage Least Squares (2SLS) technique. The 2SLS approach addresses endogeneity arising from simultaneity, reverse causality, and omitted variable bias in econometric models (Theil, 1971).

4. Empirical Findings

The results section starts with descriptive statistics, followed by regression-based and robustness analyses.

4.1 Descriptive Analysis

Table 2 reports the mean, standard deviation, minimum, and maximum for each variable.

Table 2: Descriptive Statistics

Variables	Observations	Mean	St. Dev	Minimum	Maximum
INEQ	1435	41.61	8.47	25.25	76.35
WUI	1435	-1.99	0.85	-5.49	0.29
LYPE	1435	7.44	1.18	4.61	10.12
INF	1435	8.21	4.02	3.10	425.21
DA	1435	19.96	1.35	13.56	23.12
HC	1435	2.23	0.17	1.05	3.91
IQ	1435	49	5.08	41	79

The mean INEQ is 41.61, indicating a moderate level of INEQ across the sampled countries. The standard deviation of 8.47 suggests substantial variation in inequality levels, ranging from a minimum of 25.25 to 76.35. The mean of INEQ is 41.61, indicating a moderate level of INEQ across the sampled countries. The standard deviation of 8.47 suggests substantial variation in inequality levels, ranging from a minimum of 25.25 to 76.35. The mean of LWUI is -1.988, which lies closer to the minimum value of WUI. It shows a moderate level of uncertainty in developing countries. The standard deviation is 0.852, suggesting slight variation in uncertainty levels.

The mean LYPE is 7.43, reflecting a moderate average growth rate of income per capita across the sample. The standard deviation of 1.17 highlights limited variation in LYPE among countries. The minimum and maximum values illustrate that low and high growth rates of per capita income are represented within the sample. The mean INF indicates a moderate inflation rate in developing countries, with a broader range indicating a heterogeneous inflation profile of the sampled countries. The mean value of LDA is 19.96 with a standard deviation of 1.34. It demonstrates moderate variation in aid inflows received by the sampled countries. The minimum and maximum values show that most countries receive aid close to the average, while only a few receive much lower amounts, causing a slightly left-skewed distribution. The mean of HC is 2.22 with a standard deviation of 0.165. It shows slightly low variation across countries in the stock of HC. This demonstrates that education level is relatively stable and similar across nations. The minimum and maximum values reflect some disparities in HC development. The mean IQ indicates a relatively weak IQ in developing countries. However, substantial variation does exist across countries.

4.2 Durbin–Wu–Hausman Test for Endogeneity

The study conducted Durbin–Wu–Hausman (DWH) to check whether endogeneity exists in the model. The null hypothesis for the DWH test states that the explanatory variables are exogenous. Table 3 reports the results of the Durbin–Wu–Hausman test. The null hypothesis of the test states that the explanatory variables are exogenous.

Table 3: Durbin–Wu–Hausman Test for Endogeneity

Test Statistics	Model (1)
Durbin χ^2 Statistics	4.62822*** (0.0315)
Wu–Hausman F Statistics	4.6238*** (0.0317)
Note: the values in parentheses are probability values. *** shows significance at 1%.	

The results indicate that the p-value is less than 0.05; the null hypothesis of exogeneity is rejected at the 5% significance level. These findings confirm the presence of endogeneity in the model. Therefore, the Ordinary Least Squares (OLS) estimator may be biased and inconsistent. Hence, the use of instrumental variable techniques such as 2SLS and GMM is justified and appropriate for obtaining consistent and efficient estimates in this study.

4.3 Regression-Based Analysis

Next, the study estimates an empirical model using system GMM to examine the relationship between WUI and INEQ for a sample of 52 developing countries from 1996 to 2024. Table 4 reports the empirical findings of the WU-INEQ nexus. The coefficient of lagged INEQ is positive and statistically significant at the 1% level. A unit increase in INEQ in the previous period tends to increase INEQ in the current period by 0.8542 units. The positive coefficient reflects persistent INEQ. This observation is consistent with previous empirical research documenting income distributional inertia (Forbes, 2000).

Table 4. Results of the World Uncertainty and Income Inequality Nexus

Variables	Coefficient Estimates using System GMM
L.INEQ	0.8542*** (0.0613)
LWUI	0.0928*** (0.0438)
LYPC	0.4144* (0.2450)
LYPC ²	-0.1428* (0.0814)
INF	1.2471*** (0.1240)
DA	-0.2833* (0.1433)
LHC	-0.0381*** (0.0174)
LIQ	-0.1715*** (0.0714)
Observations	1385
Number of Countries	52
Number of Instruments	14
F Statistics	11799.58 (0.000)
AR(1)	-2.25 (0.024)
AR(2)	0.03 (0.978)
Hansen Test	8.27 (0.142)

Note: Income Inequality (INEQ) is an independent variable. LWUI is the log of the World Uncertainty Index. Per Capita Income (LYPC), Square of Per Capita Income (LYPC²), Official Development Assistance (LDA), Human Capital (HC), and Institutional Quality (IQ) are control variables. The values in parentheses represent robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level respectively.

Source: Author's Estimates

The positive coefficient of LWU indicates that higher levels of global uncertainty tend to enhance INEQ. A 1% increase in WUI increases INEQ by 0.0928 units. The fact that low-income individuals are more vulnerable to external shocks helps explain this income disparity.

Nevertheless, the results remain statistically insignificant. To some extent, the lack of significance could be attributed to the slow response of inequality measures, such as the Gini coefficient, which typically take time to capture external shocks (Obiakor et al., 2022).

The study considers several control variables to avoid omitted variable bias. The first control variable is LYPC. Its coefficient is positive and statistically significant at the 10% level. A 1% increase in per capita income tends to increase INEQ by 0.4141 units and later on decreases it by 0.1428 units. Thus, income gains are not distributed across the population when countries are at the initial stages of development. Most of the benefits primarily accrue to the richer segment of society, while the poor segment's income remains low. As a result, improvements in living standards are much greater for the rich than for the poor, which tends to widen INEQ. Once countries reach advanced stages of development and industries evolve, they provide access to education, skills, and high-paying job opportunities, thereby narrowing down the INEQ. These findings validate the Kuznets hypothesis (Kuznets, 1955) and empirical findings of Milanovic (2016).

The next control variable is INF. A percentage point increase in INF tends to raise INEQ by 1.2471 units. INF hurts purchasing power, particularly for the poor income group that relies heavily on fixed income, thereby widening INEQ. The findings are in line with Glawe and Wagner (2024). The coefficient of DA, the second control variable, is negative and statistically significant at the 10% level. A percentage point increase in foreign aid reduces INEQ by 0.283 units. This highlights that development aid is redistributive, as it can facilitate poverty-alleviation initiatives and improve access to basic facilities among poorer populations. The finding is in line with the view that income inequalities can be alleviated through effective and well-targeted aid, especially in developing and aid-reliant economies (Addison et al., 2005).

The coefficient of LHC is negative and statistically significant at the 5% level. A percentage point increase in HC leads to a 0.038-unit reduction in INEQ. It highlights that education and skill development improve society's access to economic opportunities, thereby narrowing INEQ. This finding supports the human capital theory proposed by Schultz (1961). The findings also support the empirical evidence that education is a primary tool in eliminating inequality (Gregorio & Lee, 2002). The negative coefficient of IQ confirms that IQ has an inequality-reducing impact, as strong institutions allocate resources for the social well-being of the vulnerable segments. This finding is in line with Beck et al. (2007) and Glawe and Wagner (2024).

The diagnostic tests confirm the reliability of the System GMM estimates. A high F-statistic and a low probability confirm the model's joint significance. The findings confirm presence of first-order serial correlation, as anticipated in dynamic panels. The AR(2) coefficient is small, and the probability value is large, confirming the absence of second-order serial correlation. To test the instrument's validity, the study conducts Sargan and Hansen tests. The high Sargan test statistic value and a low probability value confirm rejection of the null hypothesis. Similarly, a low Hansen test value with a high probability confirms that the instruments used in the model are valid and indicates no over-identification problem.

4.4 Robustness Analysis

To check the reliability of the findings, the study conducted a robustness analysis by estimating the WU-INEQ nexus using the 2SLS method. Table 5 reports the findings. The results of the WU-INEQ nexus using the 2SLS technique show that, once again, the coefficient of WUI is positive and highly significant at the 1% level. A percentage point increase in WUI tends to enhance INEQ by 0.818 units. It demonstrates that uncertainty shocks disproportionately affect lower-income groups through job insecurity, capital market volatility, reduced investment, and tightening fiscal policy. The effect of the WUI change becomes positive and statistically significant when we use 2SLS. This highlights a stronger role of increasing inequality once endogeneity is addressed. The robustness check confirms that an increase in WUI tends to enhance INEQ. This aligns with Obiakor et al. (2022), indicating that external shocks and uncertainty have a disproportionate effect on the income distribution in developing countries.

Table 5: Results of Robustness Analysis

Variables	Baseline Model
LWUI	0.818*** (0.244)
LYPC	0.3914*** (0.277)
LYPC ²	-0.1078*** (0.201)
INF	-0.971** (0.358)
DA	-2.037*** (0.136)
LHC	-0.270*** (0.015)
LIQ	0.1641** (0.0391)
Constants	60.25*** (3.426)
Observations	1385
R-squared	0.288
F-Statistics	558.4 (0.000)

The coefficient of LYPC is positive and statistically significant at the 1% level. A 1 % increase in YPC tends to increase INEQ by 4.01 units initially, and once industrialization matures, INEQ narrows down by 2.178%. This can be explained by the *Kuznets Curve* (Kuznets, 1955), which states that as an economy grows, income increases more rapidly for wealthier people rather than lower-income people. In addition, capital income tends to increase at a greater percentage than wage income. This contributes significantly to widening the income gap in societies having unequal access to education, skills, and financial resources. Inflation once again widens INEQ, making the finding robust to Table 4 and Glawe and Wagner (2024). The coefficient of DA is negative and statistically significant at the 1% level. This highlights that DA supports

social programs, education, healthcare, and other poverty-alleviation programs that tend to raise the income of low-income households. This contributes to bridging INEQ (Birdsall et al., 2003). The coefficient of LHC is negative and significant at the 1% level. A percentage point increase in HC tends to decrease INEQ by 0.27 units. This highlights that high HC reduces INEQ by enhancing education and skills, allowing lower-income groups to access better employment opportunities and higher wages. Consequently, income distribution becomes more equitable, and the overall income gap narrows (Barro, 2000).

These outcomes are in conformity with the System GMM estimates, highlighting the robustness of the results across methods. The F statistic confirms that, collectively, the independent variables have a strong and statistically significant effect on the dependent variable.

5. Conclusion and Policy Recommendation

The empirical findings indicate dynamic persistence of INEQ across time. Differences in education, skills, and lack of access to opportunities did not change quickly for the poor in developing countries. As a result, economic gains were concentrated among high-income individuals, whereas low-income individuals experienced restricted opportunities for upward mobility. The findings reveal that WU significantly amplifies INEQ in developing countries. The periods of heightened global uncertainty tend to widen income disparities, primarily because vulnerable groups are more exposed to economic shocks, employment instability, and reduced income opportunities. An increase in YPC is likely to raise INEQ, indicating an uneven distribution of gains for the poor and the rich. DA consistently has an inequality-reducing effect, reflecting how external financial assistance helps governments to protect vulnerable groups during challenging times. In a similar manner, HC reduces INEQ, which emphasizes the long-term significance of HC development in promoting more equitable income distribution.

The findings highlight the importance of inclusive and resilient crisis management policies that can help vulnerable groups while also enhancing economic stability in developing nations. The study also calls for raising HC investments that can help boost the wage incomes of low-income households and make income distribution fair. Further, the governments in developing countries should use development aid as a tool to mitigate INEQ.

6. Appendix:

Table 6: List of Sampled Developing Countries

1. Albania	27. Malaysia
2. Argentina	28. Mexico
3. Bangladesh	29. Moldova
4. Benin	30. Mongolia
5. Botswana	31. Mozambique
6. Burundi	32. Niger
7. Brazil	33. Nigeria
8. Burkina Faso	34. Pakistan
9. China	35. Panama
10. Cameroon	36. Paraguay
11. Chile	37. Peru
12. Egypt	38. Philippines
13. El Salvador	39. Poland
14. Ethiopia	40. Romania
15. Gambia	41. Rwanda
16. Ghana	42. South Africa
17. Guatemala	43. Senegal
18. Honduras	44. Tajikistan
19. India	45. Tanzania
20. Indonesia	46. Thailand
21. Iran	47. Togo
22. Jordan	48. Tunisia
23. Jamaica	49. Uganda
24. Kenya	50. Uruguay
25. Kazakhstan	51. Vietnam
26. Madagascar	52. Zambia

References

- [1] Addison, T., Mavrotas, G., & McGillivray, M. (2005). Development assistance and development finance: Evidence and global policy agendas. *Journal of International Development*, 17(6), 819–836. <https://doi.org/10.1002/jid.1243>
- [2] Ahir, H., Bloom, N., & Furceri, D. (2022). The World Uncertainty Index. *The Quarterly Journal of Economics*, 137(4), 1821–1876. <https://doi.org/10.1093/qje/qjac041>
- [3] Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- [4] Barro, R. J. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth*, 5(1), 5–32. <https://doi.org/10.1023/A:1009872104982>
- [5] Batuo, M. E., Kararach, G., & Malki, I. (2022). The dynamics of income inequality in Africa: An empirical investigation on the role of macroeconomic and institutional forces. *World Development*, 157, Article 105939. <https://doi.org/10.1016/j.worlddev.2022.105939>
- [6] Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, 12(1), 27–49. <https://doi.org/10.1007/s10887-007-9010-6>
- [7] Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. Chicago: University of Chicago Press.
- [8] Birdsall, N., Claessens, S., & Diwan, I. (2003). Policy selectivity forgone: Debt and donor behavior in Africa. *World Bank Economic Review*, 17(3), 409–435. <https://doi.org/10.1093/wber/lhg029>
- [9] Bloom, N. (2014). Fluctuations in uncertainty. *Journal of Economic Perspectives*, 28(2), 153–176. <https://doi.org/10.1257/jep.28.2.153>
- [10] Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- [11] Bodea, C., Houle, C., & Kim, H. (2021). Do financial crises increase income inequality? *World Development*, 147, 105635. <https://doi.org/10.1016/j.worlddev.2021.105635>

- [12] Bordo, M. D., & Meissner, C. M. (2012). Does inequality lead to a financial crisis? *Journal of International Money and Finance*, 31(8), 2147–2161. <https://doi.org/10.1016/j.jimonfin.2012.05.006>
- [13] Brueckner, M., & Vespignani, J. L. (2017). Trade uncertainty, education, and income inequality. *Journal of International Economics*, 108, 18–36. <https://doi.org/10.1016/j.jinteco.2017.05.004>
- [14] Durbin, J. (1954). Errors in Variables. *Review of International Statistical Institute*, 22(1), 23-32. <https://jstor.org/stable/1401917>
- [15] Farooq, M., Saeed, A., & Zafar, N. (2023). Economic policy uncertainty and income inequality: The moderating role of ease of doing business. *Economic Modelling*, 120, 106785. <https://doi.org/10.1016/j.econmod.2022.106785>
- [16] Fawaz, F., Rahnamamoghadam, M., & Valcarcel, V. (2012). Fluctuations, uncertainty and income inequality in developing countries. *Eastern Economic Journal*, 38(4), 495–511. <https://doi.org/10.1057/eej.2011.32>
- [17] Ferrari-Filho, F., & Conceicao, O. A. C. (2005). The Concept of Uncertainty in Post Keynesian Theory and in Institutional Economics. *Journal of Economic Issues*, 39(3), 579-594. <https://doi.org/10.1080/00213624.2005.11506837>
- [18] Forbes, K. J. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review*, 90(4), 869–887. <https://doi.org/10.1257/aer.90.4.869>
- [19] Furceri, D., Loungani, P., Ostry, J. D., & Pizzuto, P. (2017). The rise of inequality: The role of monetary policy. *International Monetary Fund Working Papers*, 17/243. <https://doi.org/10.5089/9781484329428.001>
- [20] Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *Review of Economic Studies*, 60(1), 35–52. <https://doi.org/10.2307/2297811>
- [21] Glawe, L., & Wagner, H. (2024). Inflation and inequality: new evidence from a dynamic panel threshold analysis. *International Economics and Economic Policy*, 21(2), 297-309. <https://doi.org/10.1007/s10368-023-00580-x>
- [22] Gregorio, J.D., & Jong-Wha Lee. (2002). Education and income inequality: New evidence from cross-country data. *Review of Income and Wealth*, 48(3), 395–416. <https://doi.org/10.1111/1475-4991.00060>
- [23] Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the Econometric Society*, 46(6), 1251-1271. <https://jstor.org/stable/1913827>

- [24] Huynh, C. M. & Pham, K. N. (2025). Unlocking the puzzle: Exploring income inequality and uncertainty in Asian nations. *Poverty & Public Policy*, 17(1), e70000. <https://doi.org/10.1002/ppp2.70000>
- [25] Kebalo, L., & Zouri, S. (2024). Income inequality in developing countries: fiscal policy's role amid uncertainty. *Journal of Applied Economics*, 27(1), Article 2316969. <https://doi.org/10.1080/15140326.2024.2316969>
- [26] Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. London: Macmillan.
- [27] Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, 45(1), 1-28. <https://www.jstor.org/stable/1811581>
- [28] Law, S. H., Sabri, M. F., Damayanti, S. M., Trinugroho, I., & Putri, A. M. (2025). Economic uncertainty, financial inclusion, and income inequality in developing countries: Evidence from a dynamic panel threshold analysis. *Borsa Istanbul Review*. <https://doi.org/10.1016/j.bir.2025.11.002>
- [29] Magwedere, M. R., & Marozva, G. (2025). Policy uncertainty, inflation, and income inequality nexus: Does financial development matter? *Prague Economic Papers*, 34(2), 250–277. <https://doi.org/10.18267/j.pep.890>
- [30] Milanovic, B. (2016). Income inequality is cyclical. *Nature*, 537(7621), 479–482. <https://doi.org/10.1038/537479a>
- [31] Nguyen, T. C. (2022). The effects of financial crisis on income inequality. *Development Policy Review*, 40(6), e12600. <https://doi.org/10.1111/dpr.12600>
- [32] Obiakor, R. T., Akpa, E. O., & Okwu, A. T. (2022). Economic size, uncertainty, and income inequality in Nigeria. *Journal of Economics and Allied Research*, 7(2), 250–264.
- [33] Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press. <https://doi.org/10.4159/9780674369542>
- [34] Reinhart, C. M., & Rogoff, K. S. (2009). The aftermath of financial crises. *American Economic Review*, 99(2), 466–472. <https://doi.org/10.1257/aer.99.2.466>
- [35] Saez, E., & Zucman, G. (2016). Wealth inequality in the United States since 1913: Evidence from capitalized income tax data. *The Quarterly Journal of Economics*, 131(2), 519–578. <https://doi.org/10.1093/qje/qjw004>
- [36] Schultz, T.W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17. <https://doi.org/10.1257/aer.51.1.1>

- [37] Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65-94. <https://doi.org/10.2307/1884513>
- [38] Stiglitz, J. E. (2012). *The price of inequality: How today's divided society endangers our future*. W.W. Norton & Company.
- [39] Sweidan, O. D. (2023). The effect of geopolitical risk on income inequality: Evidence from a panel analysis. *Social Indicators Research*, 169(1), 47–66. <https://doi.org/10.1007/s11205-023-03093-x>
- [40] Theil, H. (1971). *Principles of Econometrics*. New York, NY: Wiley. Retrieved from <https://www.wiley.com>
- [41] Thye, W. Y., Lee, C., & Tan, H. B. (2021). Internal and external shocks and income inequality in ASEAN-5. *Asian Economic Journal*, 35(3), 295–315. <https://doi.org/10.1111/asej.12229>
- [42] Uzar, U. (2023). Income inequality, institutions, and freedom of the press: potential mechanisms and evidence. *Sustainability*, 15(17), 12927. <https://doi.org/10.3390/su151712927>
- [43] Wu, D. M. (1973). Alternative tests of independence between stochastic regressors and disturbances. *Econometrica: Journal of the Econometric Society*, 733-750. <https://www.jstor.org/stable/1914093>
- [44] Wu, W., Wang, L., Erzurumlu, Y. O., Gozgor, G., & Yang, G. (2022). Effects of country and geopolitical risks on income inequality: Evidence from emerging economies. *Emerging Markets Finance and Trade*, 58(15), 4218–4230. <https://doi.org/10.1080/1540496X.2022.2070002>