

FINANCE AND INEQUALITY: FRESH EVIDENCE FROM SELECTED COUNTRIES

FINANZAS Y DESIGUALDAD: NUEVA EVIDENCIA DE UNA SELECCIÓN DE PAÍSES

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ABSTRACT

It is noteworthy that a relationship exists between increasing income inequality and global financial development. The primary objective of this study is to challenge the validity of the financial Kuznets curve by employing the panel data method for high-income, upper-middle-income, lower-middle-income, and all countries from 2010 to 2021. Empirical findings suggest that the invalidity of the relevant curve for these markets may vary after accounting for the effects of additional control variables. The literature identifies several key factors contributing to income inequality, typically including levels of growth, education, openness, public spending, foreign direct investment, urbanization, structural transformation, and technological development. These factors are also considered in this study as control variables. This study demonstrates the importance of examining the heterogeneous effects of financial development on income inequality across different country groups.

Keywords: Financial Development, Inequality, High-Income Countries, Upper Middle-Income Countries, Lower Middle-Income Countries, Panel Data Analysis.

RESUMEN

Existe una relación entre el aumento de la desigualdad de ingresos y el desarrollo financiero global. El objetivo principal de este estudio es poner a prueba la validez de la curva de Kuznets financiera mediante el uso de un modelo de datos de panel para países de altos ingresos, ingresos medio-altos, ingresos medio-bajos y para el conjunto de países en el período 2010-2021. Los resultados empíricos sugieren que la invalidez de dicha curva puede variar en estos mercados una vez que se consideran los efectos de

variables de control adicionales. La literatura identifica varios factores clave que contribuyen a la desigualdad de ingresos, entre los que normalmente se incluyen los niveles de crecimiento, educación, apertura comercial, gasto público, inversión extranjera directa, urbanización, transformación estructural y desarrollo tecnológico. Estos factores también se incorporan en este estudio como variables de control. Este trabajo demuestra la importancia de analizar los efectos heterogéneos del desarrollo financiero sobre la desigualdad de ingresos en los distintos grupos de países.

Palabras clave: Desarrollo financiero, Desigualdad, Países de renta alta, Países de renta media-alta, Países de renta media, Análisis de datos de panel.

JEL Classification / Clasificación JEL: C23, D63, G10, O16.

1. INTRODUCTION

The current state of the global economy can be summarized as “increasing inequality and financial development.” As Piketty (2014) notes, there is growing concern about the distribution of income inequality worldwide, and these issues have been analyzed by the OECD (2015) and Dabla-Norris et al. (2015) from a global perspective. According to Kumhof et al. (2015) and Stockhammer (2015), this inequality contributed to the 2008 global financial crisis. While the growth of financial markets and financial globalization is expected to lead to “higher growth and lower consumption volatility,” various factors—including information asymmetries, incomplete markets, and the irrational behavior of intermediaries—can lead to macroeconomic instability and financial crises that adversely affect capital. Moreover, the capital accumulation and growth of developing countries are particularly impeded by this process (Rodrik, 1998; Stiglitz, 2000, 2004, 2010; Rodrik and Subramanian, 2009). It is understood that certain threshold conditions, including the extent of financial development, institutional quality, and foreign trade, must be met, or the structural features of the economy must be established for financial openness to produce better macroeconomic outcomes regarding greater macro stability and growth (Kose et al., 2010).

Demirguc-Kunt and Levine (2009) broadly addressed this issue by examining the relationship between inequality and financial development. As financial development increases, it is expected that economic opportunities to reduce inequality will also improve, enabling relatively less privileged groups in society to access education and health services. However, since higher-income individuals have better access to financial services, enhancing these services can yield significant benefits for this income group, thereby increasing income inequality further.

Although the relationship between growth and financial development has been widely discussed in the literature, it has been observed that this development can finance investments for people living in poverty by promoting growth—either by facilitating borrowing or by providing access to affordable loans—or by reducing income inequality through the effective distribution of capital (Agnello et al., 2012; Jauch and Watzka, 2016; Haan and Sturm, 2017; Younsi and Bechtini, 2018). A robust financial system can influence growth and income distribution through two channels: (i) A well-functioning financial system can prevent disadvantaged investors from accessing credit, enhance

productivity, create job opportunities, and increase a country's wealth. (ii) Such a system can improve income distribution by facilitating investments in education or human capital (Shahbaz and Islam, 2011; Martínez-Turégano and García-Herrero, 2018).

Kuznets (1955) introduced the traditional Kuznets curve hypothesis by linking economic growth to income inequality, proposing an inverted U-shaped relationship. Initially, income inequality rises in the early stages of development; however, after reaching a certain threshold, it gradually declines while economic development continues. The primary reason for this is the shift from agriculture to industry in later developmental stages, which reduces income inequality as the agricultural sector contracts and wages rise.

The relationship between financial structure, economic growth, and the resulting inequality is grounded in the work of Greenwood and Jovanovic (1990). Their study presents a model where financial intermediation promotes growth by facilitating a higher rate of return on capital and pooling risks among many investors. From this, the authors derive a dynamic development process that aligns with the Kuznets (1955) hypothesis. In this context, financial markets are often lacking, leading to sluggish growth in the early stages of an economy's development. As income levels increase, the financial structure starts to develop, which results in faster growth and greater income inequality between the wealthy and the poor. In the final stage of development, the economy showcases a mature financial structure, the income distribution among financial intermediaries stabilizes, and the growth rate exceeds that of the initial stage. This inverted U-shaped relationship between financial development and income inequality is known as the "financial Kuznets curve."

Our aim will be analysing the relationship between financial development and income inequality. Our sample includes recent years, when the time period of most of the available evidence stops at the mid-2000s (i.e., before the start of the global financial crisis); see above. We will make use of a homogeneous framework for both developed and emerging countries, obtaining separate results for both groups of countries. In other words, this study utilizes panel data analysis to investigate the relationship between financial development and income inequality across selected high-income, upper-middle-income, and lower-middle-income countries, as well as all countries during the 2010-2021 period, depending on data availability. Unlike existing literature, this research can simultaneously evaluate the financial Kuznets curve hypothesis for homogeneous country groups and illustrate the impact of various macroeconomic variables—such as growth, foreign direct investment, urbanization, structural transformation, technological development, education, government size or public consumption, and globalization or openness—that affect income inequality. The study will include a selected literature review, followed by data, models, theoretical expectations, empirical results, conclusions, and policy recommendations.

2. SELECTED LITERATURE REVIEW

A closer look at the traditional and financial Kuznets curve hypotheses reveals that the relationship between inequality and growth was initially articulated by Kuznets (1955). His study, which measured income inequality using the Gini coefficient, found that inequality rises (the Gini coefficient approaches one) in low-income countries as per capita income increases during the early stages of growth. However, in the later stages of development, as the labor force transitions from rural to urban areas (Goudie and Ladd, 1999), he suggested that this inequality would decrease (the Gini coefficient approaches zero). According to Kuznets, this occurs because inequality first rises and then falls throughout the processes of industrialization and economic development. More specifically, while inequality increases in the early stages of industrialization and development (where only a minority benefits from the wealth created), it gradually diminishes in the later stages as a significant portion of the population begins to share in the development.

This concept proposed by Kuznets stimulated both theoretical and empirical research in the literature. One notable study is by Robinson (1976), who argued that the “inverted U hypothesis” does not apply to developing countries. According to Robinson, these nations will experience increased income inequality in a two-sector model as the growth rate rises in the long term. Goudie and Ladd (1999) rejected the notion that income inequality may grow with economic expansion in both low-income and high-income countries, thereby contesting Kuznets’ claim that income inequality is more pronounced in the low-income group during the early stages of development. Essentially, they argued that the impact of economic growth on inequality remains unclear, especially in developing countries. Deininger and Squire (1996) found no consistent relationship between income inequality and growth.

Greenwood and Jovanovic (1990) proposed a non-linear inverted U-shaped hypothesis linking financial development to inequality. The reasoning behind this is as follows: access to financing and levels of competition decline because of the limited opportunities for interest groups with greater political power to access financial markets, combined with their efforts to maintain these advantages. In such circumstances, improved access to financing and relaxed credit restrictions can disproportionately generate profits by enabling the poor to obtain funds more easily. This, in turn, reduces income inequality. In other words, while financial development lessens inequality by lowering barriers to accessing financial markets and easing credit restrictions created by information asymmetries and transaction costs for the poor, it can also increase income inequality by significantly benefiting the wealthy through improved access to collateral and credit. Essentially, financial development promotes the distribution of capital, facilitating growth at all stages of economic development and supporting the poor. Thus, financial development has distributional effects, and its overall impact on the poor fluctuates depending on the stage of economic development. During the early stages of economic

growth, only the wealthy engage with and profit from financial services. However, in later stages, the number of individuals utilizing these services rises significantly due to financial development. This expansion empowers the low-income group to invest in education while also lowering borrowing costs and collateral requirements (Kavya and Shijin, 2020; Mookerjee and Kalipioni, 2020; Minetti et al., 2021; Bime and Ndjokou, 2023; Mikek, 2023; Coccoresse and Dell'Anno, 2024).

The studies affirming the validity of the financial Kuznets curve hypothesis for groups of developed and developing countries include Bulir (2001), Canavire-Bacarreza and Rioja (2008), Shahbaz and Islam (2011), Agnello et al. (2012), Hamori and Hashiguchi (2012), Nikoloski (2012), Baiardo and Morana (2016), Jauch and Watzka (2016), Park and Shin (2017), Younsi and Bechtini (2018), Altunbaş and Thornton (2019), Bittencourt et al. (2019), Nguyen et al. (2019), Chakroun (2020), Boukraine (2023), and Mikek (2023). These studies illustrate that the Greenwood and Jovanovic (1990) hypothesis, which proposes an inverted U-shaped relationship between financial development and inequality, holds for different country groups categorized by income levels. Financial development reduces income inequality up to a certain point; however, over time, it can eventually lead to greater inequality as this development continues. In other words, a U-shaped relationship exists, as noted by Park and Shin (2017). Financial development allows a larger portion of the population to access financial services and fosters more equitable income distribution. Additionally, it contributes to economic growth by promoting the accumulation of improved physical and human capital, along with technological innovations. Furthermore, financial development enhances income equality by lowering the per capita income threshold (Baiardo and Morana, 2016). Studies that found the financial Kuznets curve hypothesis invalid for both developed and developing countries include Clarke et al. (2006), Rehman et al. (2008), Jalil and Feridun (2011), Hoi and Hoi (2013), Baek and Shi (2016), Kratov and Goaved (2016), Azam and Raza (2018), Thornton (2019), Makhoulouf et al. (2020), and Khatatbeh and Moosa (2022). These studies revealed a U-shaped relationship between financial development and inequality. Studies with mixed results include Kavya and Shijin (2020).

The available empirical evidence on the relationship between financial development and income inequality is not always clear-cut. We will review in the next paragraphs some of the most recent studies on the subject. We will start with the paper by Clarke, Xu and Zou (2006). These authors examined the relationship between finance and income inequality for 83 countries over the period 1960- 1995, obtaining that inequality decreases as financial markets develop. Also, although they found some weak evidence of the inverted U-shaped relation between financial development and income inequality suggested by Greenwood and Jovanovic (1990), this result was not too robust. Later on, some results on these lines, i.e., the development of the financial system leading to lower income inequality, with no evidence on a financial Kuznets curve, was found using data covering until the mid-2000s in, e.g.,

Rehman, Khan and Ahmed (2008) or Agnello, Mallick and Sousa (2012), in multi-country studies; or for some particular emerging countries, as in Jalil and Feridun (2011) for China, Shahbaz and Islam (2011) for Pakistan, or Hoi and Hoi (2013) for Vietnam. On the other hand, some other papers found evidence on a financial Kuznets curve, i.e., inequality first increasing and then decreasing, following the development of the financial sector. This is the case, for a set of developed and developing countries, of Nikoloski (2013) and Chakroun (2020); or, for particular groups of countries, of Baiardo and Morana (2016) (the 19 member countries of the eurozone), Azam and Raza (2018) (the five founding members of ASEAN), Younsi and Bechtini (2018) (Brazil, Russia, India, China, and South Africa), and Nguyen et al. (2019) (21 emerging countries).

However, the opposite result, i.e., that financial development increases, rather than decreases, income inequality, has been obtained in later studies using wide samples of both developed and developing countries. This is the case of Jauch and Watzka (2016) or de Haan and Sturm (2017), using data until the mid-2000s; and Khatatbeh and Moosa (2022), where the time period extends to 2016. As an additional result, de Haan and Sturm (2017) noticed that the impact of financial liberalization on inequality seemed to be conditioned by the level of financial development and the quality of political institutions. Even more, Park and Shin (2017) found that financial development led initially to lower inequality up to a point, and then to higher inequality (i.e., a U-shaped relationship between both variables, the opposite to that suggested by the financial Kuznets curve), for a sample of 162 countries over the period 1960-2011. In a similar vein, and in a long term perspective, Makhoul, Kellard and Vinogradov (2020) obtained, for 21 OECD countries in the period 1870-2011, that, in the short run, financial development reduced income inequality by allowing the poor to enter into the financial market; however, in the long run, more finance led to more inequality.

The previous results have been qualified in other studies. Christopoulos and McAdam (2017), using a panel of 29 countries in 1975-2005, found that gross Gini coefficients (i.e., those computed with gross income) were not stabilised by financial reforms, unlike net measures (i.e., those computed with disposable income, hence taking taken into account redistribution by the public sector). Accordingly, financial reforms implemented in the presence of a strong safety net would be preferable. In turn, Martínez-Turégano and García-Herrero (2018) concluded, for a sample of a wide set of countries (developed and emerging) over the first decade of the 21st century, that the variable that contributes to reducing income inequality to a significant degree, is financial inclusion, rather than the size of the financial sector in itself. Finally, Altunbaş and Thornton (2019) have investigated the effects of financial development on income inequality for 121 countries during the 1980-2015 period, finding that the results changed depending on the income levels of the countries. Specifically, while financial development increased income inequality for high and low-income countries, it led to more equality for upper-middle income countries.

Studies on variables that commonly affect income inequality include real per capita income, urbanization, public spending, education, population, openness, foreign direct investment, industrialization, agriculture, and technology. Research suggests that income inequality initially increases and then decreases as real per capita income rises, supporting the traditional Kuznets curve hypothesis. This is backed by findings from Choi (2006), Clarke et al. (2006), Rehman et al. (2008), Agnello et al. (2012), Nikoloski (2012), Younsi and Bechtini (2018), Bittencourt et al. (2019), and Nguyen et al. (2019). However, Park and Shin (2017) and Mikek (2023) argue that the hypothesis is invalid. A review of other control variables reveals mixed results in the literature regarding their effects on income inequality.

The literature identifies several key factors contributing to income inequality, typically including education, openness, public spending, foreign direct investment, urbanization, structural transformation, and levels of technological development. These factors are also included in the empirical section of this study as control variables. The rationale for how these variables influence income inequality lies in the significant impact that education level (or investment in knowledge) has on income disparities. Furthermore, as financial development progresses, educational attainment in countries generally improves, potentially leading to a reduction in inequality in this context (Tchamyau, 2020).

The effects of increased openness on income inequality can be mixed. This is based on the Stolper-Samuelson theorem (1941), which argues that countries with relatively abundant factors of production benefit from free trade, while those with scarce factors face negative outcomes. This theorem suggests that developing nations with abundant labor may experience lower levels of inequality, and that the wealthy stand to gain more from the liberalization of foreign trade as openness increases (Mah, 2003). Conversely, greater openness boosts the income of unskilled labor in developing countries following the liberalization of foreign trade, potentially helping to address income inequality. Therefore, as openness among countries rises, technological competition between sectors intensifies, leading to a decline in labor wages. When labor is unskilled in these sectors, foreign trade may result in worsening income distribution (Çelik and Başdaş, 2010).

Theoretically, public spending aimed at addressing income inequality primarily targets lower-income groups. Consequently, funding for relevant social transfer programs is expected to help balance income distribution to some extent. With increased public spending, income distribution may become more equitable. Conversely, if public spending mainly benefits certain groups—such as when higher education is only accessible to upper-income groups—then income distribution may deteriorate, and inequality may escalate due to public funding in higher education. In other words, if public spending reflects government welfare programs that assist the poor, it will have a positive influence on income distribution. However, if these programs also enhance the

power of the wealthy, they will negatively affect income distribution (Rehman et al., 2008; Mehic, 2018; Kavva and Shijin, 2020; Durongkaveroj, 2024).

The traditional viewpoint on the effects of foreign direct investment (FDI) on inequality suggests that increased FDI inflow leads to capital accumulation, enhances the marginal product of labor, and ultimately raises wage levels. In this context, promoting such investments can exacerbate income inequality (Çelik and Başdaş, 2010; Mah, 2012). The theoretical framework concerning the impact of urbanization on income inequality indicates that urbanization can reduce income inequality by creating more job opportunities in economies (Kavva and Shijin, 2020).

The presence of structural transformation influencing income inequality is also noteworthy in the literature. The basis of the traditional Kuznets hypothesis suggests that as the agricultural sector contracts and the industrial sector grows, or as workers move from low-income to high-income roles, wages initially increase, leading to greater income inequality. However, later on, with this transformation, a smaller percentage of workers earn higher wages in the industrial sector. Thus, under these circumstances, inequality decreases in the subsequent stages of structural transformation due to the movement of workers between sectors (Rehman et al., 2008; Durongkaveroj, 2024).

Finally, an examination of theories regarding the effects of technological development on income inequality suggests that such advancements may shift labor demand toward higher-paid, skilled workers, leading to a wage gap or increased income inequality. However, technological progress, such as the broader use of the Internet, could create new economic opportunities for low-skilled or unskilled workers. As a result, greater internet use is expected to lessen income inequality (Chan et al., 2020).

Among the selected empirical studies on the determinants of income inequality, those that found a decrease in inequality with increases in inflation, public spending, the shares of the manufacturing and agricultural sectors, and openness include Clarke et al. (2006), Rehman et al. (2008), Jalil and Feridun (2011), Shahbaz and Islam (2011), Hamori and Hashiguchi (2012), Nguyen et al. (2019), Kavva and Shijin (2020), Bime and Ndjokou (2023), Boukraine (2023), Chisadza (2023), and Durongkaveroj (2024). In contrast, studies showing that inequality increases alongside these variables include Agnello et al. (2012), Kratov and Goaved (2016), Naceur and Zhang (2016), Park and Shin (2017), Azam and Raza (2018), Mehic (2018), and Younsi and Bechtini (2018). Meanwhile, Çelik and Başdaş (2010), Mah (2012), Bittencourt et al. (2019), Chan et al. (2020), and Mikek (2023) examined the effects of education, foreign direct investment, urbanization, and technological development on inequality, reaching mixed results. Selected empirical studies indicate that, in addition to testing the traditional and financial Kuznets curves, some studies also examine the factors that determine income inequality. While certain studies confirm the relevant hypotheses, others reject them, demonstrating that various economic variables can influence income inequality either positively or negatively.

3. DATA, MODEL, AND METHODOLOGY

3.1. DATA

In addition to the factors influencing income inequality during the 2010-2021 period, the study examined the validity of the financial Kuznets curve using panel data analysis for four distinct groups: high-income countries, upper-middle-income countries, lower-middle-income countries as classified by the World Bank, and all countries combined, representing these three groups. Details of the dataset and a list of countries used in the study are provided in Appendices 1 and 2. Most of the data were sourced from the World Development Indicators (WDI) of the World Bank. The Gini index and school completion rates were obtained from Solt (2024) and the United Nations (UN) Sustainable Development Goals (SDG) Database. Descriptive statistics are displayed in Table 1, while Table 2 presents the yearly averages of variables for each country. These values indicate that, compared to high-income countries, middle-income countries generally exhibit higher income inequality, economic growth, and agricultural employment but lower levels of foreign direct investment inflows, trade openness, government size, industrial employment, education, internet usage, and financial development. Additionally, on average, Spain has the highest number of commercial bank branches per 100,000 adults, while the United States records the highest domestic credit to the private sector as a percentage of GDP; conversely, the lowest values are reported for Vietnam and Argentina, respectively. While the Slovak Republic boasts the most equitable income distribution, Colombia experiences the highest income inequality.

TABLE 1. DESCRIPTIVE STATISTICS

Variable	Mean	Std. dev.	Min	Max
gini	35.068	7.239	22.3	50.9
growth	2.68	3.847	-11.167	24.475
bank	21.781	14.662	2.91	96.135
credit	73.934	42.501	11.242	221.129
education	90.685	10.41	49.98	100
trade	92.471	46.326	22.486	252.495
govcons	17.231	4.693	5.039	27.366
fdi	3.856	9.345	-40.086	106.499
urban	70.262	14.898	30.417	98.117
industry	23.128	5.67	10.602	38.453
agriculture	12.879	12.425	0.915	48.707
internet	67.288	21.24	3.7	98.866

3.2. MODEL AND METHODOLOGY

In the model, the Gini coefficient serves as a dependent variable and an indicator of income inequality. The independent or explanatory variables comprise education, domestic credit, bank branches, economic growth,

TABLE 2. YEARLY AVERAGES OF VARIABLES FOR EACH COUNTRY

Country	gini	growth	bank	credit	education	trade	govcons	fdi	urban	industry	agriculture	internet
High-income	30.8	2.1	27	88.2	97	109.2	19.6	4.4	73.5	25.1	5.7	78.7
AT	27.8	1.1	12.9	89.9	98	104.3	20.1	-1.1	57.9	25.5	4.4	83.9
BE	26.2	1.5	36.1	63.2	88.7	160.5	23.7	3.3	97.9	21.4	1.2	85.8
BG	35.8	2	60.4	56.8	96.2	122.4	16.7	3.4	74.2	30.6	6.7	59.4
CL	46.1	3.2	15.1	111	96.1	62.6	13.9	6.5	87.4	23.1	9.1	71.7
CZ	25	1.9	22	50.3	95.8	144.8	19.8	3.8	73.6	37.8	2.9	76.5
DK	26.9	1.9	26.5	171.1	99.2	103.6	25.3	0.6	87.6	19.3	2.4	95.2
EE	32	3.5	12.1	69	98.7	153.9	19.3	7.5	68.6	30.1	3.7	84.7
FI	25.8	1	9.4	93.9	99.4	75.8	23.8	2.9	85.1	22.3	4	89.1
FR	30.1	1.1	37	102.6	98.5	60.6	23.9	1.6	79.8	20.8	2.7	81.4
DE	29.4	1.6	12.9	81.6	94	85.6	20.1	2.4	77.3	27.7	1.4	85.7
GR	32.7	-1.8	27.4	101.7	97.6	68.7	21.2	1.4	78.2	16	11.9	65.4
HU	27.5	2.6	17.3	41.7	98.6	163.2	20.3	16.1	70.6	31	4.8	75.9
IE	29.7	7	21.9	69	98.2	213.9	14.7	23.6	62.7	18.1	5.2	82.9
IT	33.1	0.2	47.6	85.3	98.9	56.7	19.5	0.9	69.7	26.8	3.8	62.3
KR	33	3.1	16.4	140.4	100	85.4	15.7	0.8	81.6	24.9	5.5	90.7
LV	34.6	2.2	18.6	51.9	98.7	122.9	18.5	3.6	68.1	23.6	7.7	79.3
LT	35.3	3.5	15.5	43.1	98.8	145.1	17.4	3.4	67.4	25.2	7.8	74
NL	26.9	1.4	13.9	109.8	89.2	150.3	25.4	12.9	90.2	16.4	2.4	92
PL	30.2	3.5	30.4	51.4	97.9	96	18.3	3.1	60.3	31.1	10.9	71.6
PT	32.3	0.5	46.2	122.1	93.7	79.5	18.4	4.3	63.8	24.9	7.8	68.3
RO	31.1	2.8	28.7	30.4	96.4	81.6	15.6	2.4	54	29.5	25.1	59.6
SK	23.9	2.7	26.1	55	99	177.9	19	2.3	54	36.6	3	80.6
SI	24.8	2	31.4	56.5	99	148	19.5	2.1	54	32.3	6.6	76.3
ES	33.4	0.5	65.7	126.2	93.3	62.9	19.9	2.7	79.7	20.5	4.2	79.9
SE	28.1	2.5	18	129.7	98.2	85.2	25.8	2.1	86.7	18.8	1.9	92.5
US	38.1	2.3	32.2	190.2	98.6	27.7	14.8	1.7	81.8	19.5	1.7	81.6

(Continue)

Country	gini	growth	bank	credit	education	trade	govcons	fdi	urban	industry	agriculture	internet
Lower-middle income	36.7	5.8	6.9	59.2	73.1	82.1	9.1	2.5	38.4	20.8	37.3	36.4
BD	34	6.4	8.5	41	59.4	37.1	5.6	1	34.7	20.3	42.5	17.9
PH	39.9	5	8.6	40.7	73.6	62.5	11.7	2	46.4	17.1	28.1	39.5
VN	36.1	5.9	3.6	95.8	86.3	146.6	10.1	4.6	34.2	25	41.5	51.8
UM	43.3	3.2	14.8	48.8	82.1	61.4	14.3	3.1	71.1	19.7	21.6	51.6
Upper-middle income	38.3	1.2	13.2	13.8	75	29.9	16.6	1.8	91.6	21.3	7.9	68.3
BR	46.1	1.3	19.4	62.7	83.4	27.2	19.4	3.5	85.9	22	9.7	61.1
CO	48.5	3.4	14.9	44.8	76.2	37.2	14.8	3.8	79.9	19.8	16.9	56.5
CR	46.3	3.5	20.5	53.9	69.8	65.3	16.8	5.2	77	18	14.5	61.5
DO	41.4	5.2	11.6	25.9	84.5	53.3	10.6	3.6	78.8	18.8	10.1	59.5
EC	42.8	3.1	11	34.7	87.9	54.4	14.8	0.8	63.5	18.2	28.3	49.8
SV	38.6	2.4	11.8	55.4	71.7	76.1	16.6	1.7	70	21.8	18.4	33.3
GE	39.2	4.8	30.6	51.6	98.4	96.9	14.6	8	57.7	12.2	43.9	52.8
ID	47.1	4.7	15.7	36.1	83.4	43	9.3	2	53.6	21.3	32.9	29.4
MX	43.8	1.7	14.2	30.5	86.4	71.1	11.5	2.7	79.4	23.9	13.9	53.3
PY	46.7	3.9	11	39.7	77.4	71.5	11.3	1.5	60.9	19.1	21.9	50.2
PE	45.4	4	7.3	41.3	88.6	49.2	12.6	3.6	77.5	17	27.3	48
TH	39	2.7	11.2	143.5	86.1	123.3	16.7	2	48.1	22.1	34.7	46.9

globalization, public consumption, foreign direct investment, urbanization, industrial employment, agricultural employment, internet usage, and the squares of growth. Two distinct models, shown in Equations (1) and (2), are developed to assess the robustness of results across various measures of financial development. These equations illustrate the shapes of the traditional and financial Kuznets curves:

$$gini = f(growth, growth^2, bank, bank^2, education, trade, govcons, fdi, urban, industry, agriculture, internet) \quad (1)$$

$$gini = f(growth, growth^2, credit, credit^2, education, trade, govcons, fdi, urban, industry, agriculture, internet) \quad (2)$$

where *gini* is income inequality, *growth* is economic growth, *growth*² is square of growth, *bank* is commercial bank branches, *credit* is domestic credit, and *bank*² and *credit*² are squares of these variables. As the control variable in the study, *education, trade, govcons, fdi, urban, industry, agriculture* and *internet* represent school completion rate, openness or globalization, public consumption or government size, foreign direct investment, urbanization, industrial employment, agricultural employment, and internet usage. The models can be rewritten in panel data form as follows:

$$gini_{1,i,t} = \beta_{1,0} + \beta_{1,1}growth_{i,t} + \beta_{1,2}growth^2_{i,t} + \beta_{1,3}bank_{i,t} + \beta_{1,4}bank^2_{i,t} + \beta_{1,5}education_{i,t} + \beta_{1,6}trade_{i,t} + \beta_{1,7}govcons_{i,t} + \beta_{1,8}fdi_{i,t} + \beta_{1,9}urban_{i,t} + \beta_{1,10}industry_{i,t} + \beta_{1,11}agriculture_{i,t} + \beta_{1,12}internet_{i,t} + \varepsilon_{1,i,t} \quad (3)$$

$$gini_{2,i,t} = \beta_{2,0} + \beta_{2,1}growth_{i,t} + \beta_{2,2}growth^2_{i,t} + \beta_{2,3}credit_{i,t} + \beta_{2,4}credit^2_{i,t} + \beta_{2,5}education_{i,t} + \beta_{2,6}trade_{i,t} + \beta_{2,7}govcons_{i,t} + \beta_{2,8}fdi_{i,t} + \beta_{2,9}urban_{i,t} + \beta_{2,10}industry_{i,t} + \beta_{2,11}agriculture_{i,t} + \beta_{2,12}internet_{i,t} + \varepsilon_{2,i,t} \quad (4)$$

In equations (3) and (4), the dependent variable is *gini*, *i* is the country index (1, 2, 3, 4, ..., N), *t* denotes the time period (2010-2021), β_0 is the intercept, and ε is the error term. The coefficients from $\beta_{j,1}$ to $\beta_{j,12}$ pertain to the explanatory variables indicated for model $j = 1, 2$. In the study, there is an inverted U-shaped curve for the financial Kuznets curve hypothesis when $\beta_{1,3} > 0$ and $\beta_{1,4} < 0$ in addition to $\beta_{2,3} > 0$ and $\beta_{2,4} < 0$. Likewise, $\beta_{j,1} > 0$ and $\beta_{j,2} < 0$ indicate the existence of a U-shaped curve for the traditional Kuznets curve hypothesis (Kılıç and Balan, 2018, p. 84). Conversely, $\beta_{j,8}$ may be positive or negative since the effect of foreign direct investments on income inequality is unclear in the literature.

Considering the other control variables used in the study, when public expenditures are better distributed among low-income groups through taxes

and the transfer system, income inequality may increase ($\beta_{j,7} > 0$) (Clarke et al., 2006, pp. 584, 585). Finally, $\beta_{j,6}$ may be positive or negative, as expectations for the impact of globalization or increases in openness on income inequality are mixed in the literature. The effects of all other factors are not clear.

This study employs well-established panel data estimation techniques to examine the impact of financial development on inequality. Based on the results of diagnostic tests, including heteroscedasticity, autocorrelation, and Pesaran (2021) cross-sectional dependency tests, the Feasible Generalized Least Squares (FGLS) estimation method was applied.

4. EMPIRICAL RESULTS

The results in Tables 3 and 4 highlight the statistical significance of fixed effects that are specific to both country and time period. Consequently, these effects were incorporated into the estimations.

TABLE 3. TESTS FOR THE PRESENCE OF COUNTRY-SPECIFIC (FE) AND TIME PERIOD (TE) FIXED EFFECTS (MODEL 1)

	Whole Sample	High Income	Upper Middle Income	Lower Middle Income
FE	225.97169*** [0.000]	137.16687*** [0.000]	93.748296*** [0.000]	26.061223*** [1.575 × 10 ⁻⁹]
TE	1.1958 [0.28696722]	1.8893435** [0.04040547]	0.45250734 [0.92870973]	6.8018713*** [0.0008922]
FE and TE	236.41655*** [0.000]	161.27973*** [0.000]	99.073192*** [0.000]	1402.6055*** [8.882 × 10 ⁻¹⁵]
FE TE	215.5926*** [0.000]	129.90044*** [0.000]	84.216513*** [0.000]	12.005597*** [0.00171602]
TE FE	0.22866819 [0.99556635]	1.404014 [0.17077554]	0.20732976 [0.99688458]	5.3817555*** [0.00476989]

p-values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

TABLE 4. TESTS FOR THE PRESENCE OF COUNTRY-SPECIFIC (FE) AND TIME PERIOD (TE) FIXED EFFECTS (MODEL 2)

	Whole Sample	High Income	Upper Middle Income	Lower Middle Income
FE	225.29777*** [0.000]	141.64067*** [0.000]	81.256557*** [0.000]	48.903329*** [8.005 × 10 ⁻⁹]
TE	1.2600938 [0.24469869]	1.9662562** [0.03156003]	2.9192905*** [0.00175771]	11.779898*** [0.00004887]
FE and TE	237.12659*** [0.000]	165.54478*** [0.000]	87.276517*** [0.000]	1189.4032*** [2.331 × 10 ⁻¹⁵]
FE TE	215.91934*** [0.000]	133.61366*** [0.000]	58.941424*** [0.000]	13.063685*** [0.00124263]
TE FE	0.45946637 [0.92740297]	1.3804639 [0.18186062]	0.14593239 [0.99939028]	5.797592*** [0.00351274]

p-values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

In Tables 5 and 6 for Models 1 and 2, the diagnostic tests indicate the presence of heteroscedasticity, autocorrelation, and cross-sectional dependency. Consequently, the FGLS estimation method was utilized, with results presented in Tables 7 and 8 for the entire sample and various country groups.

TABLE 5. RESULTS OF ESTIMATIONS AND DIAGNOSTIC TESTS

Variable	Whole Sample	Whole Sample	High Income	High Income
<i>growth</i>	0.01965 (1.00000)	0.01459 (0.81000)	0.001293 (0.05)	0.006637 (0.27)
<i>growth</i> ²	-0.00072 (-0.64000)	-0.00050 (-0.46000)	0.000192 (0.19)	0.000218 (0.23)
<i>bank</i>	-0.05744*** (-3.54000)		-0.01437 (-0.97)	
<i>bank</i> ²	0.00023 (1.45000)		-3 × 10 ⁻⁵ (-0.33)	
<i>credit</i>		-0.03486*** (-7.54000)		0.009386 (1.46)
<i>credit</i> ²		0.00015*** (6.14000)		-3.4 × 10 ⁻⁵ (-1.19)
<i>education</i>	-0.03732*** (-3.61000)	-0.01793* (-1.76000)	-0.1387*** (-4.31)	-0.12686*** (-6.33)
<i>trade</i>	-0.02079*** (-5.74000)	-0.01725*** (-6.49000)	-0.03067*** (-8.61)	-0.02831*** (-7.35)
<i>govcons</i>	-0.06640 (-1.30000)	-0.05778 (-1.08000)	0.004126 (0.07)	-0.00861 (-0.14)
<i>fdi</i>	0.00303* (1.97000)	0.00078 (0.56000)	-0.0035 (-1.61)	-0.00437* (-1.78)
<i>urban</i>	0.05389* (1.89000)	0.04073 (1.49000)	0.249776*** (3.89)	0.296434*** (4.75)
<i>industry</i>	-0.05803 (-1.24000)	-0.12940*** (-2.84000)	0.04132 (0.49)	0.034022 (0.41)
<i>agriculture</i>	-0.01466 (-0.92000)	-0.03287* (-1.78000)	0.078799** (2.69)	0.076213** (2.32)
<i>internet</i>	-0.05700*** (-5.34000)	-0.06099*** (-5.81000)	-0.01577** (-2.43)	-0.00963* (-1.89)
<i>constant</i>	43.93285*** (15.26000)	45.05935*** (12.78000)	28.83341*** (3.79)	23.01035*** (3.19)
Autocorrelation	-0.83 [0.405]	-0.69 [0.493]	0.08 [0.940]	-0.08 [0.933]
Heteroscedasticity	9929.78*** [0.000]	8215.39*** [0.000]	14779.66*** [0.000]	81804.90*** [0.000]
CD Test	-2.025** [0.0429]	-1.637 [0.1015]	-1.406 [0.1598]	-1.495 [0.1348]

Estimates of coefficients on country specific and time period dummy variables were excluded to save space, but they are available upon request. T-values were given in parentheses. p values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

TABLE 6. RESULTS OF ESTIMATIONS AND DIAGNOSTIC TESTS

Variable	Upper Middle Income	Upper Middle Income	Lower Middle Income	Lower Middle Income
<i>growth</i>	-0.01685 (-0.46)	-0.00164 (-0.04)	0.008895 (0.63)	0.002623 (0.2)
<i>growth</i> ²	0.004384 (1.65)	0.003758 (1.24)	0.003165 (1.28)	0.002047 (1.15)
<i>bank</i>	-0.16279 (-0.48)		-0.59972* (-3.16)	
<i>bank</i> ²	0.000404 (0.07)		0.058146 (2.55)	
<i>credit</i>		-0.08975*** (-5.26)		0.047638* (3.52)
<i>credit</i> ²		0.000482*** (4.02)		-0.00019 (-2.52)
<i>education</i>	0.087557** (2.76)	0.134885*** (6.46)	-0.02803** (-6.87)	-0.01808 (-2.68)
<i>trade</i>	-0.01961* (-1.84)	-0.01255 (-1.14)	-0.01441 (-2.17)	-0.02443** (-8.24)
<i>govcons</i>	-0.30911** (-2.34)	-0.26096* (-1.84)	-0.04678 (-1.29)	-0.04992 (-1.48)
<i>fdi</i>	-0.0315 (-1.51)	-0.03212 (-0.83)	0.250205** (5.18)	0.153623 (2.21)
<i>urban</i>	0.039916 (0.57)	-0.0892* (-1.83)	0.628522** (6.03)	0.649308*** (12.08)
<i>industry</i>	-0.42946*** (-3.42)	-0.3149*** (-4.37)	0.085929 (2.35)	0.089523 (1.78)
<i>agriculture</i>	-0.13291** (-2.84)	-0.04224 (-1.42)	0.119476** (7.22)	0.104827** (4.87)
<i>internet</i>	-0.05825** (-2.34)	-0.05617* (-1.85)	0.002056 (0.67)	-0.00864 (-1.84)
<i>constant</i>	56.32782*** (14.12)	56.34342*** (27.67)	12.46822 (2.78)	9.788172** (4.84)
Autocorrelation	0.24 [0.811]	0.38 [0.703]	3.96*** [0.000]	0.96 [0.338]
Heteroscedasticity	1089.70*** [0.000]	1894.31*** [0.000]	4.31 [0.2299]	4.91 [0.1782]
CD Test	-2.330** [0.0198]	-2.312** [0.0208]	1.295 [0.1954]	-2.872*** [0.0041]

Estimates of coefficients on country specific and time period dummy variables were excluded to save

space, but they are available upon request. *t* values were given in parentheses. *p* values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

Findings for the whole sample, including upper-, middle-, and lower-income countries, show that inequality increases with economic growth. For the whole sample, including high-income and lower-middle-income countries, results indicate a U-shaped relationship between bank branches and income inequality. For domestic credits to the private sector, authors find U-shaped relationships with inequality for all except high-income and lower-middle-income countries, which have an inverse U-shaped relationship and do not have any statistically significant effect, respectively.

Internet usage is demonstrated to reduce income inequality. However, in lower-middle-income countries, this effect of internet usage on inequality reduction is statistically insignificant. The findings indicate a reduction in inequality associated with education for the whole sample, high-income countries, and lower-middle-income countries. In contrast, upper-middle-income countries show an unfavorable impact. Trade effects are statistically significant and negative. *fdi* have a statistically significant effect on lower-middle-income countries, increasing income inequality. *govcons* contributes to inequality reduction for the whole sample, upper and lower-middle-income countries, according to the results. For upper-middle-income countries, results indicate that urbanization reduces inequality; however, for the entire sample, high-income and lower-middle-income countries, urbanization increases inequality. While industrial employment reduces inequality for the whole sample and in upper-middle-income countries, it increases inequality in lower-middle-income countries. Agricultural employment is shown to increase inequality in the overall sample, high-income and lower-middle-income countries, but reduces it in upper-middle-income countries.

TABLE 7. FGLS ESTIMATION RESULTS FOR WHOLE SAMPLE AND HIGH-INCOME COUNTRIES

Variable	Whole Sample	Whole Sample	High Income	High Income
<i>growth</i>	0.02026**	0.00436	-0.01231	0.000627
	(2.32000)	(0.68000)	(-0.89)	(0.05)
<i>growth</i> ²	-0.00094	-0.00014	0.000651	0.000781
	(-0.80000)	(-0.17000)	(0.93)	(1.23)
<i>bank</i>	-0.06085***		-0.02751**	
	(-3.06000)		(-1.96)	
<i>bank</i> ²	0.00032*		0.000217*	
	(1.84000)		(1.69)	
<i>credit</i>		-0.02933***		0.01933***
		(-5.37000)		(3.38)
<i>credit</i> ²		0.00014***		-5 × 10 ⁻⁵ **
		(5.31000)		(-2.04)

(Continue)

Variable	Whole Sample	Whole Sample	High Income	High Income
<i>education</i>	-0.04284*** (-3.75000)	-0.01969** (-2.24000)	-0.1011*** (-4.59)	-0.09833*** (-5.18)
<i>trade</i>	-0.02083*** (-7.14000)	-0.00574 (-1.63000)	-0.01926*** (-4.08)	-0.01129** (-2.41)
<i>govcons</i>	-0.07089** (-2.22000)	-0.00586 (-0.22000)	0.039569 (1.01)	0.03013 (0.83)
<i>fdi</i>	0.01113 (0.84000)	0.00005 (0.04000)	-0.00107 (-0.52)	-0.0023 (-1.13)
<i>urban</i>	0.04715 (1.35000)	0.15934*** (4.90000)	0.218719*** (4.07)	0.236346*** (4.73)
<i>industry</i>	-0.07679*** (-2.87000)	-0.13883*** (-5.20000)	-0.0328 (-0.85)	0.001122 (0.03)
<i>agriculture</i>	-0.01934 (-0.91000)	0.03681* (1.78000)	0.111848*** (3.1)	0.105413*** (3.16)
<i>internet</i>	-0.04942*** (-11.54000)	-0.05447*** (-13.49000)	-0.02857*** (-4.29)	-0.02355*** (-4.06)
<i>constant</i>		32.26598*** (10.11000)	28.95628*** (5.75)	23.98672*** (5.25)

Estimates of coefficients on country specific and time period dummy variables were excluded to save space, but they are available upon request. t values were given in parentheses. p values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

TABLE 8. FGLS ESTIMATION RESULTS FOR UPPER MIDDLE AND LOWER MIDDLE INCOME COUNTRIES

Variable	Upper Middle Income	Upper Middle Income	Lower Middle Income	Lower Middle Income
<i>growth</i>	0.003047 (0.24)	0.011518 (1.2)	0.013371 (1.42)	-0.10888 (-1.22)
<i>growth</i> ²	0.003308** (2.15)	0.004131*** (3.2)	0.004583*** (3.52)	0.015539 (1.45)
<i>bank</i>	-0.01129 (-0.1)		-0.59281*** (-4.99)	
<i>bank</i> ²	-0.00151 (-0.42)		0.050679*** (3.46)	
<i>credit</i>		-0.07943*** (-6.86)		0.006777 (0.03)
<i>credit</i> ²		0.000425*** (7.7)		0.000295 (0.22)
<i>education</i>	0.063952*** (5.74)	0.100032*** (7.25)	-0.03117*** (-5.17)	0.021577 (0.86)
<i>trade</i>	-0.01288*** (-3.35)	-0.0087** (-2.16)	-0.01582*** (-4.02)	0.024908 (0.85)

(Continue)

Variable	Upper Middle Income	Upper Middle Income	Lower Middle Income	Lower Middle Income
<i>govcons</i>	-0.15795*** (-3.59)	-0.17089*** (-4.75)	-0.05624 (-1.64)	-1.92725* (-1.78)
<i>fdi</i>	0.029954 (1.14)	0.006205 (0.24)	0.267494*** (6.75)	0.784325 (1.16)
<i>urban</i>	0.014224 (0.44)	-0.07819** (-2.41)	0.62232*** (10.06)	-0.06283 (-0.09)
<i>industry</i>	-0.29027*** (-7.26)	-0.24423*** (-8.04)	0.092665*** (3.37)	-0.05956 (-0.32)
<i>agriculture</i>	-0.05903*** (-2.66)	-0.0136 (-0.75)	0.125034*** (5.57)	1.058662 (1.52)
<i>internet</i>	-0.03773*** (-4.46)	-0.05018*** (-6.68)	-0.00335 (-0.71)	-0.08504 (-1.32)
<i>constant</i>	45.83136*** (16.56)	51.16498*** (21.84)	11.01983*** (5.02)	

Estimates of coefficients on country specific and time period dummy variables were excluded to save space, but they are available upon request. T-values were given in parentheses. p values were provided in square brackets. *, **, *** show the statistical significance at 10%, 5%, and 1%, respectively.

A detailed interpretation of the empirical findings from the study, categorized by country group for the first model, revealed that the traditional Kuznets curve for the entire sample was an inverted U-shape. In contrast, the financial Kuznets curve exhibited a U-shape. While both the traditional and financial Kuznets curves were U-shaped for the high-income country group, neither hypothesis held true for the upper middle-income country group. Furthermore, the hypotheses concerning the traditional and financial Kuznets curves were deemed invalid for the lower middle-income country group; however, the financial Kuznets curve still exhibited a U-shape.

Regarding control variables, income inequality decreases as education levels rise, except for the upper-middle-income group. In contrast, income inequality declines with increased openness across all country groups. While income inequality falls with rising public spending, this trend does not apply to high-income countries. Additionally, income inequality decreases as the employment share of the industrial sector increases, although this does not hold for the lower-middle-income group. For both the entire sample and the upper-middle-income group, income inequality drops as the employment share of the agricultural sector grows; however, it increases for high-income and lower-middle-income groups. While income inequality declines across all country groups with greater internet use, it rises with higher foreign direct investments, except for high-income countries. Finally, income inequality rises for all groups as urbanization rates increase. These findings remain consistent in the first model, which uses banking as an indicator of financial development.

The results of the second model, which includes the credit variable, confirm that the traditional and financial Kuznets curve hypotheses for the entire sample take on inverted U and U shapes, respectively. Regarding control variables, the signs of the other variables remain consistent with those in the first model, except for the positive sign of the employment share in the agricultural sector. In the alternative model for high-income countries, it is determined that the opposite financial Kuznets curve hypothesis holds true for this income group, while the traditional Kuznets curve hypothesis does not. The signs of all other control variables, apart from the employment share in the industrial sector, are also consistent with the first model. Although the traditional Kuznets curve hypothesis is invalidated in the alternative model for the upper middle-income country group, and the financial Kuznets curve hypothesis is also deemed invalid—since the level and square of the credit variable are negative and positive, respectively—a U-shaped relationship is identified between financial development and inequality. The signs of all other control variables, except urbanization, also align with the first model. In the alternative model for the lower middle-income country group that includes the credit variable, all other variables were found to be statistically insignificant, except for the result that increasing public expenditures reduces income inequality.

5. DISCUSSION

The primary factor influencing income inequality is economic growth, but its impact on inequality remains uncertain. The inverted U-shaped relationship between economic growth and income inequality is referred to as the “traditional Kuznets curve” hypothesis. The argument for reverse causality (from inequality to growth) suggests that income inequality may promote economic growth by lowering the cost of mobilizing capital. However, this inequality could also hinder economic growth due to the obstacles faced by the poor in financial markets (Rehman *et al.*, 2008). The relationship between growth and inequality can be negative, as an increase in the per capita growth rate is expected to decrease income inequality (Mah, 2003; Rehman *et al.*, 2008; Jalil and Feridun, 2011; Mah, 2012). The literature indicates that high income inequality impedes growth in low-income countries while encouraging growth in wealthier nations (Barro, 2000). Empirical findings show no correlation between upper- and lower-middle-income countries and the traditional Kuznets curve. While an inverted U-shaped relationship is noted for the overall sample, a U-shaped relationship is identified for high-income countries. For the entire sample, as growth increases, income inequality initially rises, but inequality declines as growth continues.

Financial markets can influence income inequality. Some theories suggest that the growth of financial intermediaries benefits the poor. Conversely, others argue that access to financial services is limited for residents, which may cause their incomes to rise relative to those of the poor during the initial stages of financial deepening. Research indicates a negative and linear

relationship between financial development and inequality. In this context, further deepening and expansion of the financial sector can occur through the initiation of entrepreneurial activities, enabling low-income individuals to borrow and invest in human capital. However, capital markets, despite their imperfections, can incur high costs. This situation results in a wider gap between the rich and the poor, leading to higher growth rates. Notably, Greenwood and Jovanovic (1990) proposed a non-linear, inverted U-shaped relationship between financial development and income inequality, suggesting that this may impact income distribution (Rehman *et al.*, 2008; Nikoloski, 2012; Kavya and Shijin, 2020; Mookerjee and Kalipioni, 2020; Minetti *et al.*, 2021; Bime Ndjokou, 2023; Mikek, 2023; Coccoresse and Dell'Anno, 2024).

On the other hand, there may be a positive linear relationship between financial development and inequality. For instance, Rajan and Zingales (2003) noted that only the wealthy could benefit from the growth of the financial sector in the absence of strong institutions. Even as the financial sector continues to advance, the affluent may restrict firms' access to credit and influence the financial sector to direct resources toward themselves. Income inequality is expected to rise, further widening the gap between high-income and low-income individuals (Nikoloski, 2012). As mentioned earlier, empirical findings suggest that the "financial Kuznets curve" is either invalid or that a U-shaped curve exists, except for the upper middle-income country group. Therefore, while income inequality initially decreases as financial development rises, it subsequently increases as development continues.

An examination of the effects of the control variables used in the study on income inequality reveals that foreign direct investment tends to increase income inequality when it is not evenly distributed across all segments of the economy. Conversely, it can be argued that foreign direct investment might reduce such inequality based on the results obtained for high-income groups (Mah, 2012; Çelik and Başdaş, 2010; Alam and Paramati, 2016; Raza and Shah, 2017). Furthermore, the findings indicate that the rise in foreign direct investment positively influences income inequality for all country groups except for high-income group. Foreign direct investment is a key driver of growth and can help decrease income inequality by providing employment opportunities for those in poverty within recipient countries (Kratov and Goaved, 2016). However, the relatively low labor costs in low-income countries, discussed in north-south models in the literature, may motivate firms in wealthier nations to pursue cost-oriented vertical FDI. In this respect, FDI may worsen income inequality by increasing the skill premium in low-income countries, as vertical FDI often stems from substantial wage differentials between high-income and low-income nations. In contrast, horizontal FDI generally occurs in developed countries, where it can raise the demand for skilled labor and heighten income inequality since multinational corporations tend to be more skill-intensive than domestic firms (Herzer and Nunnenkamp, 2011). According to the study's findings, the observation that surges in foreign direct investment lead to increased income inequality across all country groups, except for high-income groups, aligns

with Choi (2006). Conversely, these investments tend to lessen income inequality within the high-income country group.

In the literature, it is argued that government expenditures or the size of government increases income inequality because the wealthy have easy access to financial institutions through their political connections. At the same time, the poor may be deprived of these services. It can also be said that in a pluralistic democracy, an increase in government size can reduce income inequality since governments can support various sectors by targeting the transfer system and taxation or by increasing employment opportunities (Shahbaz and Islam, 2011; Nikoloski, 2012; Durongkavoroj, 2024). This is because the redistribution of income through the tax and transfer system generally benefits the poor, and public spending is expected to diminish income inequality (Rehman *et al.*, 2008). Empirical findings suggest that government spending decreases income inequality in all country groups except for high-income countries, where such expenditures tend to increase income inequality. The notion that an increase in government size reduces income inequality has been posited by Rehman *et al.* (2008), Agnello *et al.* (2012), and Nguyen *et al.* (2019). However, it contrasts with the findings of Shahbaz and Islam (2011), Park and Shin (2017), and Martínez-Turégano and García-Herrero (2018).

According to the literature, openness can enhance growth. Openness, or globalization, has the potential to increase growth and reduce income inequality (Rehman *et al.*, 2008). As noted in the Stolper-Samuelson theorem, liberalizing foreign trade creates job opportunities in the labor-intensive sector. This development allows unskilled labor to benefit more from such openness. In this context, a country's exports consist of products that utilize abundant and inexpensive factors of production, while imports rely on scarce factors. Additionally, it is important to note that low-income countries specialize in producing less skill-intensive (or labor-intensive) products, while high-income trading partners focus on high-skill (or capital-intensive) products. Consequently, foreign trade helps reduce the income gap between workers with varying skill levels in developing countries. While globalization tends to benefit owners of abundant factors, the same cannot be said for those possessing scarce factors. In both developing and developed countries, labor and capital (or technology) are considered abundant factors; however, deeper trade integration can lead to increased inequality in developed nations while reducing it in developing countries (Hoi and Hoi, 2013; Baek and Shi, 2016). Globalization impacts income inequality by widening the wage gap between high-skilled and low-skilled workers. Skill-based technological advancements tend to elevate the wages of high-skilled workers relative to those of low-skilled workers (Richardson, 1995; Park and Shin, 2017). Empirical findings suggest that globalization or openness typically decreases income inequality across all country groups. The conclusion that globalization reduces income inequality aligns with the findings of Jalil and Feridun (2011), Shahbaz and Islam (2011), and Agnello *et al.* (2012). However, this conclusion is not supported by Rehman *et al.* (2008), Zhou *et al.* (2011), Kratov and Goaved (2016), and Martínez-Turégano and García-Herrero (2018).

When evaluating empirical findings regarding the effects of urbanization on income inequality, it has been observed that income inequality tends to rise across all country groups as urbanization increases. This rise is accompanied by an increase in average income among earners due to the development of financial sectors and the creation of various job opportunities within the economy (Kavya and Shijin, 2020). A closer examination of empirical findings related to education reveals that, in addition to investment in high technology, the creation and dissemination of knowledge also impact income inequality. As financial development progresses, education levels generally increase, which can lead to a reduction in income inequality (Tchamyou, 2020). The study indicates that this theoretical expectation holds for all country groups except upper middle-income countries. Furthermore, this research, which measures the level of technological development through internet usage, demonstrates that an increase in internet use can decrease income inequality across all country groups. While the literature suggests that technological development can elevate income inequality by intensifying the demand for skilled labor, it also posits that rising internet usage can alleviate income inequality by generating innovations or new economic opportunities for both skilled and unskilled workers. Consequently, the second theoretical idea was empirically supported in this study (Chan *et al.*, 2020).

Finally, when analyzing the empirical findings regarding the effects of structural transformation on income inequality, an increase in the employment share of the industrial sector corresponds with a decrease in income inequality, except for the lower middle-income country group. Conversely, as the employment share of the agricultural sector rises, income inequality generally decreases for the overall sample and upper middle-income country groups. However, for the high-income and lower-middle-income groups, income inequality increases. This observation aligns with the traditional Kuznets curve, which posits that individuals move from low-income to high-income positions as the industrial sector expands. As the agricultural sector contracts and wages increase, income inequality diminishes. On the other hand, in the country groups experiencing rising income inequality due to structural transformation (high-income and lower-middle-income), the potential increase in income inequality from the shift from agriculture to industry is significant. This happens because a smaller proportion of workers earn higher wages in the industrial sector during this transformation, leading to potential inequality (Rehman *et al.*, 2008; Durongkaveroj, 2024).

6. CONCLUDING REMARKS

Greenwood and Jovanovic (1990) examined a non-linear, inverted U-shaped relationship between financial development and income inequality, suggesting that this relationship might impact income distribution. In this context, after analyzing the effects of various control variables (growth, foreign direct investment, trade, industry, agriculture, government size, and internet) across the entire sample, as well as high-income, upper-middle-income, and lower-middle-income countries, the influence of financial development on income

distribution appears mixed based on the panel data analysis conducted from 2010 to 2021. For example, without strong institutions, the divide between the rich and the poor may widen, potentially increasing income inequality since only high-income individuals can benefit from financial development. On the other hand, the growth and advancement of the financial sector can positively affect income distribution by primarily enabling low-income individuals to borrow and invest in human capital.

This study examined the validity of the financial Kuznets curve hypothesis across different groups of countries from 2010 to 2021. Empirical findings reveal a distinction between developed and emerging markets regarding the impact of financial development on income inequality. The behavior of macroeconomic control variables differs between the two market types due to their economic structures and aligns with theoretical expectations. In other words, this study also showed that the behavior of macroeconomic determinants of income inequality can vary depending on the countries' level of development.

It can be argued that the progressive taxation system is an effective fiscal policy tool for addressing income inequality in these groups of countries (Stiglitz, 2014; Piketty, 2014). Furthermore, countries should promote inclusive development policies, such as income tax reforms, public finance services, and rural development initiatives. Additionally, gradually redistributing wealth ownership and implementing strategies to reduce the income gap between high- and low-income individuals—especially by enhancing education for low-skilled compared to high-skilled individuals—are crucial for mitigating income inequality. Lastly, it is essential to strengthen financial systems gradually, maintain low inflation rates, and improve institutional quality to ensure sustainable economic growth in these groups of countries and to effectively combat inequality within the designated timeframe. For future research, it may be valuable to explore the impacts of trade, automation, artificial intelligence, and other macroeconomic factors on income distribution and to propose policy recommendations.

In addition, the findings of this study should be used cautiously in policy formation as it is difficult to generalize the results to all countries. One limitation of the study is data availability. In future studies, this analysis should be performed by using much more recent data including a higher number of countries. Based on features of data, more sophisticated methods, such as panel generalized method of moments can be used. In addition, endogeneity issues should be considered by implementing instrumental variable-based approaches but taking into account weak instrument problems. This issue is also left for future studies as it is very difficult to find appropriate instruments.

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APPENDIX 1. COUNTRY LIST

High-Income Countries	Upper Middle-Income Countries	Lower Middle-Income Countries	All Countries
Austria	Argentina	Bangladesh	Argentina
Belgium	Brazil	Philippines	Austria
Bulgaria	Colombia	Vietnam	Bangladesh
Chile	Costa Rica		Belgium
Czechia	Dominican Republic		Brazil
Denmark	Ecuador		Bulgaria
Estonia	El Salvador		Chile
Finland	Georgia		Colombia
France	Indonesia		Costa Rica
Germany	Mexico		Czechia
Greece	Paraguay		Denmark
Hungary	Peru		Dominican Republic
Ireland	Thailand		Ecuador
Italy			El Salvador
Korea, Rep.			Estonia
Latvia			Finland
Lithuania			France
Netherlands			Georgia
Poland			Germany
Portugal			Greece
Romania			Hungary
Slovak Republic			Indonesia
Slovenia			Ireland
Spain			Italy
Sweden			Korea, Rep.
United States			Latvia
			Lithuania
			Mexico
			Netherlands
			Paraguay
			Peru
			Philippines
			Poland
			Portugal
			Romania
			Slovak Republic
			Slovenia
			Spain
			Sweden
			Thailand
			United States
			Vietnam

APPENDIX 2. DATA

Data	Description	Source
<i>gini</i>	Estimate of Gini index (inequality in equivalized household disposable income)	Solt (2020) SWIID Version 12.0
<i>education</i>	Lower secondary school completion rate (%)	UN SDG Database
<i>credit</i>	Domestic credit to private sector (% of GDP)	WDI
<i>bank</i>	Commercial bank branches (per 100,000 adults)	WDI
<i>growth</i>	GDP growth (annual %)	WDI
<i>trade</i>	Trade (% of GDP)	WDI
<i>govcons</i>	General government final consumption expenditure (% of GDP)	WDI
<i>fdi</i>	Foreign direct investment, net inflows (% of GDP)	WDI
<i>urban</i>	Urban population (% of total population)	WDI
<i>industry</i>	Employment in industry (% of total employment) (modeled ILO estimate)	WDI
<i>agriculture</i>	Employment in agriculture (% of total employment) (modeled ILO estimate)	WDI
<i>internet</i>	Individuals using the Internet (% of population)	WDI