

The Role of Financial Development in Reducing Income Inequality in Selected Asian Countries

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Abstract The present study investigated the effects of financial development on income inequality for three income level groups across 12 Asian countries (areas) from 1980-2020. The three groups comprised countries with low, moderate, and high economic development. Using the Quantile-on-Quantile (QQ) approach, The findings showed that the impact of financial development on income inequality differed across the income level groups of the 12 selected Asian countries. The results suggested that financial development exacerbated income inequality in underdeveloped countries, while for moderately developed countries, financial development promoted income equality. Except for South Korea, the other countries in the high economic development group showed that financial development exacerbated income inequality. Therefore, the impact of financial development on income should be examined by groups, in which moderately-developed countries could devote more attention to promoting income equality through reforms focusing on the development of financial diversification and the enhancement of financial depth.

Keywords: financial development, income inequality, GINI, QQR

JEL Classifications: O15, O40, O53, G10, G20

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I. Introduction

As the fastest-growing economies in the world, Asian countries have achieved rapid development in the past decades. The economic status of some Asian countries has undergone a radical change in a few decades. For example, the Ganghan Miracle created by South Korea and the rapid

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GDP growth achieved by China's reform and development. At the same time, in Asian countries within the stage of rapid economic development, there are some problems, such as the financial crisis that swept through Asia in 1997. Asia stands out as the globe's swiftest-expanding economic hub. With its economy on a steady ascent, the trajectory of the Asian economy will shape global dynamics. Hence, directing attention towards matters like the economy and equality within the Asian domain holds significant worth. Focusing on the financial development and income situation of Asian countries can help Asian countries narrow the gap between the rich and the poor and achieve the goal of stable and sustainable development.

A prevailing belief has been that an elevated level of economic development corresponds to an improved state of financial development. Many scholars have held the view that financial development and economic growth are intricately linked, mutually dependent, and mutually supportive (Sinha & Macri, 2001; Tiwari, 2017; Fathima Rinosha & Majeed Mohamed Mustafa, 2021). Financial development has stood as a fundamental pillar within the contemporary world economy. Within this realm, banks, bonds, insurance, trust funds, and various other sectors have collectively underpinned the overarching framework of the financial domain. Factors such as the configuration of financial markets, their breadth, the velocity of the financial sector's advancement, and the calibre of its services have collectively influenced societal and economic trajectories. In prior research, the assessment of financial development has frequently centred on two methodologies: one entails gauging the proportion of private credit to the GDP, while the other involves evaluating the ratio of stock market capitalisation to the GDP (Anton & Afloarei Nucu, 2020; Osei & Kim, 2020; Destek & Sarkodie, 2019; Mtar & Belazreg, 2021; (Lee & Chang, 2009); Omar & Inaba, 2020).

Nevertheless, according to the IMF, these dual approaches for assessing financial development have lacked comprehensiveness. They have overlooked the profoundness and efficacy inherent in financial development and its multifaceted character, presenting certain constraints. Recognising the need to encompass the depth of financial expansion, the challenges tied to market entry, and the efficiency of financial growth, the IMF has introduced the Financial Development, Financial Institutions, and Financial Markets Indices. These indices have aimed to provide a more precise and all-encompassing evaluation of financial development. In the present study, the metric employed to assess financial development was the IMF's Financial Development Index. According to the International Monetary Fund's interpretation of the Financial Development Index (FDI): it is the sum of the Financial Structure Index (FSI) and the Financial Market Index (FMI).¹⁾ Meanwhile, Concerning the previous study by Altunbaş & Thornton (2019), we take the IMF-related financial development index to measure the independent variable. Some countries

1) The explanation from the IMF financial development index database website - 'FD home' and 'About FD' (<https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b>) (<https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b&sid=1480712464593>)

may have slow financial development while economic growth is much faster. Different phenomena may occur in different countries during economic growth and financial development. The differences lie between developed and developing countries and between developing countries.

It has been proven that some countries have experienced significant financial development. However, that does not mean that things have gone well for all their citizens. Unequal income distribution has been a persistent global social stability and overall welfare concern. The imbalanced allocation of societal assets, including educational and medical resources, stemming from income volatility, can initiate a cycle of inequality. This situation, in turn, can contribute to solidifying social classes, potentially influencing crime rates and the populace's happiness index. Since the 1990s, almost every Asian country has experienced rapid economic growth, especially South Korea, China, Cambodia, India, Malaysia, Bangladesh, Indonesia, Sri Lanka, Singapore, Thailand and Vietnam. However, around four-fifths of Asians live in societies with growing income inequality between the rich and poor. Some Asian countries, including India, Japan, and China, have shown significant growth. However, at the same time, income inequality has also risen significantly.

Due to the different depths and perspectives of financial development and the different policies adopted by different countries, there have been substantial economic differences among Asian countries over just a few decades. It is generally acknowledged that economic growth does not guarantee benefits to all economies and individuals. Hence, exploring whether rapid financial development can effectively enhance societal equity holds considerable importance and profound implications, particularly within the swiftly progressing Asian region of the past few decades. Figure 1 below shows how the GINI coefficient (as estimated by the World Bank) has changed for Asian countries. A GINI coefficient of 0 is perfect equality, while a GINI coefficient of 100 is perfect inequality. The country's colour in Figure 1 below corresponds to the indicator's level. The darker the colour, the higher the value.

The greater the financial development in some areas, the wider the gap between the rich and poor. For example, Rajan & Zingales (2003) presented a hypothesis of widening financial inequality and argued that the development of the financial sector had increased income inequality. Their hypothetical theory suggested that financial intermediaries were closely associated only with the rich, while the poor were excluded from financial markets due to conditionalities. Even with the development of the financial sector, low-income people still have access to financial products and financial markets. However, the rich retain an overwhelming advantage in financial transactions, widening the gap between the rich and the poor. Paulson & Townsend (2004), in their study regarding income inequality in Thailand, found that less expansion in the financial sector led to lower income inequality. In India, globalisation and financial development have exacerbated income inequality. (Sethi, Bhattacharjee, Chakrabarti, & Tiwari, 2021) and Jauch & Watzka (2016) used the fixed effects and generalized method of moments technique (GMM)

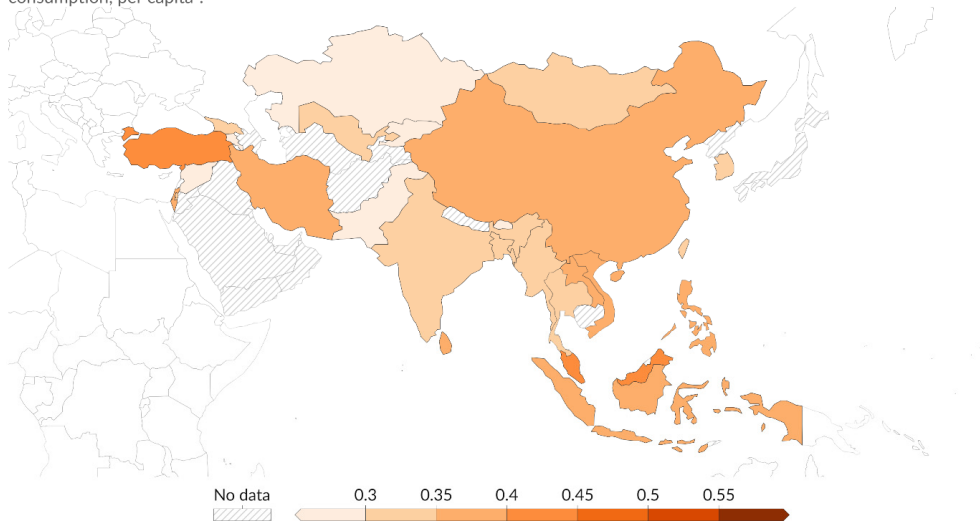
to investigate the relationship between financial development and income inequality. Their results showed that financial development significantly positively affected income inequality. An analysis of 138 developed and developing countries from 1960 to 2008 using credit to the GDP as a measure of financial development found that financial development led to increased income inequality. This result was similar to the findings of previous research by Jauch & Watzka (2016b), who argued that financial development brought more possibilities to people with low incomes to raise their income levels. However, people who already had an income advantage benefited from the financial sector in a faster and better manner. The gap between the rich and poor will thus grow more expansive as the poor and rich accumulate wealth. At the same time, Jauch & Watzka (2016b) also believed that financial development should be tilted towards the poorest in society. Financial development should be moderate to ensure efficiency and equity.

Figure 1. GINI index by country in Asia

Income inequality: Gini coefficient, 2021

The Gini coefficient¹ measures inequality on a scale from 0 to 1. Higher values indicate higher inequality. Depending on the country and year, the data relates to income measured after taxes and benefits, or to consumption, per capita².

Our World
in Data



Data source: World Bank Poverty and Inequality Platform (2024)

OurWorldInData.org/economic-inequality | CC BY

Note: Income and consumption estimates are available separately in this [Data Explorer](#).

1. Gini coefficient: The Gini coefficient is the most commonly used measure of inequality. It is typically used as a measure of income inequality, but it can be used to measure the inequality of any distribution – such as the distribution of wealth, or even life expectancy. It measures inequality on a scale from 0 to 1, where higher values indicate higher inequality. This can sometimes be shown as a percentage from 0 to 100%, this is then called the 'Gini Index'. A value of 0 indicates perfect equality – where everyone has the same income. A value of 1 indicates perfect inequality – where one person receives all the income, and everyone else receives nothing. Read more in our article: [Measuring inequality: What is the Gini coefficient?](#)

2. Per capita: 'Per capita' here means that each person (including children) is attributed an equal share of the total income received by all members of their household.

(Source) Our World in Data

<https://ourworldindata.org/grapher/economic-inequality-gini-index?time=latest®ion=Asia>

Between the 1960s and the 1990s, economic growth in many Asian countries (areas), particularly Taiwan, Hong Kong, South Korea, and Singapore, quickly outpaced that of many other countries. Following on the heels of these countries, regarding economic growth, were countries such as China and Malaysia. At the bottom of the list for economic growth were countries such as Bangladesh and Myanmar, whose economic growth was sluggish. The present study separated Asian countries (areas) into three groups (refer to Appendix), primarily according to their GDP per capita. This study aimed to discern whether the impact of financial development on economic growth remained consistent across diverse economic tiers within the selected Asian nations. Furthermore, it sought to identify the appropriate financial policies that nations (areas) at varying economic stages across Asia should adopt. Such policies may reduce wealth disparities, enhance economic growth frameworks, and attain societal fairness.

The remainder of the present study is structured as follows: Section 2 discusses the relationship between financial development and income inequality in groups, Section 3 describes the data, the construction of the variables, and the operationalisation of the Quantile-on-Quantile Regression technique (QQR), and Section 4 summarises the empirical results of the QQR regression. Section 5 provides the conclusion and recommendations of policy implications.

II. Literature Review

Previous studies examining financial development on income inequality have followed three common strands of theories. Firstly, the hypothetical theory of the unequal expansion of financial development, which holds that the development of the financial industry worsens income inequality, was proposed by (Rajan & Zingales, 2003). They assumed that financial intermediaries only dealt with the rich, while the poor were excluded due to collateral constraints. (Jauch & Watzka, 2016a) studied the relationship between financial development and income inequality in 138 developing and developed countries between 1960 and 2008 using the fixed effects and generalized method of moments techniques (GMM). The results showed that financial development had a significant positive effect on income inequality. It was not difficult to understand that financial development was more beneficial to the rich because they had more opportunities and advantages to access financial products and understand financial trends. As a result, the gap between the rich and the poor has grown. Similarly, since countries were classified according to four different levels (i.e., low, lower-middle, upper-middle and high income), the empirical results for a sample that included different countries also confirmed that there appeared to be a positive relationship between financial development and income inequality. Jaumotte et al. (2013) proposed that the growth of income inequality was related to the growth of financial globalisation, which occurred in twenty developed countries and thirty-one developing countries during their research

period from 1981 to 2003.

Some research studies have shown that countries with higher levels of financial development have experienced lower levels of income inequality (Kappel, 2012; Hamori & Hashiguchi, 2012). Banerjee & Newman (1993) argued that when financial markets were imperfect, collateral was often required for financing. Low-income people tended to have more significant credit constraints because they lacked assets. High-income groups have experienced better access to financing due to their capital and higher incomes, thus widening the income gap. Financial development continuously develops various financial instruments, easing low-income people's financing constraints, helping them to participate in investment activities, and narrowing the income gap. Financial development can not only improve the efficiency of capital allocation and accelerate economic growth but also relax credit constraints for people with low incomes and reduce income inequality, thus helping such individuals. Kappel (2012) used a sample of data from 78 developing and developed countries from 1960 to 2006 to examine the effects of financial development on income inequality. They suggested that enhancing the loan market and developing the stock market could help countries reduce income inequality and poverty. Shahbaz (2013), taking Pakistan as an example, applied the ARDL approach and discovered that financial development would reduce income inequality, contrary to the traditional view that economic growth worsened income distribution and that appropriate reforms to encourage financial development in Pakistan would help reduce income inequality. The same view was shared by Khan et al. (2005), who also used Pakistan as an example and found that income inequality was reduced along with economic growth from the long-term and short-term perspectives of financial development. In other words, in Pakistan, financial development helped to release the pressure of income inequality.

Jalilian & Kirkpatrick (2005) examined the contribution of financial development to poverty reduction in low-income countries. Their findings supported the argument that financial sector development policies could contribute to achieving poverty reduction goals in developing countries. Nasreddine & Mensi (2016) established a model covering 138 countries from 1980 to 2012. Their results showed that financial development narrowed the social gap between the poorest and wealthiest classes. In other words, financial development and income inequality had a linear negative correlation. The updated research from Thornton & Tommaso (2020) used heterogeneous panel cointegration techniques to examine the long-term impact of financial development on income inequality in a panel of 119 countries from 1980 to 2015. Their results demonstrated that, on average, financial development reduced income inequality in the long run and was robust to different financial measures and country income groups. Financial development negatively affected income inequality in the long run for large sample sizes.

There has also been the view among scholars that the relationship between financial development and income inequality cannot be described simply. However, it should be nonlinear. Such a view has also provided some possible explanations for the Kuznets curve. Greenwood &

Jovanovic (1990), from the perspective of costs and benefits, believed that operating costs were high in the early stages of financial institutions' development. Therefore, financial service fees would be high. When financial institutions reach a particular stage of development, with the decline in operating costs, the cost of financial services would also decrease. At this point, all groups can enjoy the benefits of financial services and improved incomes; financial development helps improve equality. Lloyd-Ellis & Bernhardt (2000) concluded that the relationship between financial development and income inequality could be characterized as an inverted U-shaped model based on production activities and individual characteristics. They built a skills interaction model of heterogeneous entrepreneurs, considering the distribution of wealth and credit constraints. They found that when efficient entrepreneurs were the majority in society, income inequality was in the form of a Kuznets inverted U-shaped curve. If the majority were less efficient entrepreneurs, the income distribution changed periodically.

Some recent research has also pointed out that the results must be divided into two parts for analysis. Financial development usually promotes income equality in upper-middle-income countries and income inequality in low and high-income countries. The impact of the level of financial development varies in different regions. Areas with higher-than-average incomes tend to increase income inequality due to financial development. The relationship between financial development and income inequality has been represented as an inverted U shape for regions with lower-than-average incomes. (Altunbaş & Thornton, 2019; Bittencourt et al., 2019).

Most earlier studies have adopted traditional regression models. Many studies on financial development and income inequality have also used traditional regression methods (Zhang & Ben Naceur, 2019; Madsen et al., 2018; Ratnawati, 2020; Omar & Inaba, 2020). Traditional regression methods analysing the relationship between independent and dependent variables have arrived at linear or nonlinear conclusions. The current paper adopted the more recent QQR research method, which performs well in asymmetric setup samples and achieves upgrading based on quantile regression (QR). The relationship between the independent and dependent variables can be comprehensively shown between low and high quantiles, making the regression results more concrete and precise.

In prior research, examinations of the correlation between financial development and income inequality predominantly relied on conventional regression techniques. However, these methods are encumbered by drawbacks like cross-sectional dependence and homogeneity, potentially compromising research precision. Recent investigations have favoured time series regression or dynamic panel estimation methods to explore this association (Jauch & Watzka, 2016a; de la Cuesta-González, Ruza, & Rodríguez-Fernández, 2020; Cetin, Demir, & Saygin, 2021). Nonetheless, in this paper, we employ the more sophisticated and new QQR estimation method, which can fully explain the potential asymmetric response of the dependent variable between the explanatory variables and the distribution of the dependent variable. And it is more robust

to the analyses of the data. The QQR method is not limited to the linear model assumption of the traditional regression method, moreover, it can adapt to the potentially existing nonlinearity between the explanatory variables and the dependent variable. It is also possible to analyse how the explanatory variables affect the conditional quantile of the dependent variable at different quantiles (Sim & Zhou, 2015).

Secondly, As previously indicated, previous research tends to concentrate on a specific country or a select few member states. Alternatively, researchers often categorize the sample countries into developing and developed countries (Jauch & Watzka, 2016b; Altunbaş & Thornton, 2019; Destek, Sinha, & Sarkodie, 2020; Q. Zhang & Chen, 2015, etc). For a more in-depth analysis, we did a more detailed subgroup study. Asian countries are grouped differently according to their economic levels. We try to reveal whether the impact of financial development on equality is different for countries (areas) at different economic levels. If there is a difference, countries (areas) should adopt appropriate financial countermeasures according to their economic level. It is important not to develop finance blindly and cause a crisis.

III. Data and Methodology

The dataset employed in the present paper comprised the GINI index, which is the most common index to measure income inequality, as a proxy for the dependent variable income inequality and the financial development data from the latest financial development index measurement of the IMF database. Most past empirical studies on financial development and economic growth have used the ratio of private credit to GDP or the ratio of stock market capitalisation to GDP as a proxy measure of financial development. However, there is a one-sidedness to this measurement and to measure the index more accurately, the IMF has developed a financial development index for its staff discussion topic, "Rethinking Financial Deepening: Stability and Growth in Emerging Markets". The index summarises the degree of sophistication of financial institutions and financial markets in terms of depth (size and liquidity), the ability of individuals and firms to access financial services, and efficiency (the ability of institutions to provide financial services at low cost and with sustainable revenue, and the level of capital market activity). The index provides a comprehensive and scientific measure of financial development and provides reliable data support for empirical research. The yearly data spanned from 1995-2020, between the end of the twentieth century and the beginning of the twenty-first century for 12 selected Asian countries. This analysis explored whether financial developments played an important role in balancing income equality in the selected Asian countries.

Table 1. *The Impact of Financial Development on Income Inequality: Variables used for Estimation and Sources of Data*

Variable	Definition	Sources of Data
Income inequality	Gini coefficient	Standard World Income Inequality Database (SWIID) 9.0 edit
Financial development	The index of financial development	IMF

The QQ method combines quantile regression and nonparametric estimation techniques, a mixture of traditional quantile regression (QR) and nonparametric estimation. The QQ method developed by (Sim & Zhou, 2015) performs well in an asymmetric setting sample, considering structural breaks while examining the integrated relationship between the lower and upper bounds of the data series. This approach has more realistic features than the traditional quantile regression (QR) technique. The QQ method analyses the effect of different magnitudes of the independent variable on different magnitudes of the dependent variable. It can show the integrated relationship between low and high magnitudes.

The nonparametric quantile regression in this study can be written as follows:

$$IE_t = \beta^\theta(FD_t) + \mu_t^\theta \tag{1}$$

In the above equation, IE_t represents the value of income inequality in period t ; FD_t is financial development in time t , which includes total financial development, financial institutions and financial markets; θ denotes the θ th quantile of the conditional distribution of IE ; μ_t^θ refers to the quantile residual term, and its conditional θ th quantile is supposed to be zero.

Using Equation 1 as an example, the QQ technique depends on the overall behaviour of the structure when testing the relationships between the variables. When there is any positive or negative shock to the FD , the effect of FD on the IE will be average.

To assess the impact of the θ th quantile of IE versus the τ th quantile of FD , denoted as FD^τ , Equation (1) is evaluated together with FD^τ using linear regression.

$$\beta^\theta (FD_t) \approx \beta^\theta(FD^\tau) + \beta^{\theta'}(FD^\tau)(FD_t - FD^\tau) \tag{2}$$

Equation 1, $\beta^{\theta'}$ illustrates the partial derivative of $\beta^\theta (FD_t)$ concerning FD_t , defined as the partial effect. $\beta^\theta (FD^\tau)$ and $\beta^{\theta'}(FD^\tau)$ in Equation 2 are functions of θ and τ . Besides, $\beta^\theta (FD^\tau)$ can be represented by $\beta_0(\theta,\tau)$, $\beta^{\theta'} (FD^\tau)$ can be represented by $\beta_1(\theta,\tau)$ while $\beta^\theta (FD^\tau)$ and $\beta^{\theta'} (FD^\tau)$ can be denoted by $\beta_0(\theta,\tau)$ and $\beta_1(\theta,\tau)$. Accordingly, the revised form of Equation 1 can be expressed as follows:

$$\beta_{\theta} (FD_t) \approx \beta_0(\theta, \tau) + \beta_1(\theta, \tau)(FD_t - FD^{\tau}) \tag{3}$$

Now, by substituting Equation 3 into Equation 1, Equation 4 was obtained for the Quantile-on-Quantile (QQ) methodology as follows:

$$IE_t = \frac{\beta_0(\theta, \tau) + \beta_1(\theta, \tau)(FD_t - FD^{\tau})}{(*)} + \mu_t^{\theta} \tag{4}$$

Equation 4 shows the functional form of the QQ methodology. The part (*) shows the θ th conditional quantile of the IE. Equation 4 represents the true impact of the θ th quantile of FD on the τ th quantile of IE. The quantile association between FD and IE is defined by the parameters 0 and 1, which are twice indexed in θ and τ . The values of these parameters may change due to the values of the quantiles of the dependent and independent variables. The overall structural dependence of the independent and dependent variables is established in Equation 4 by connecting the respective distributions of the independent and dependent variables.

The QQ method is a bivariate regression method that does not allow the inclusion of other control variables or independent variables in the model. Bandwidth is used for minimisation problems that capture the effects of independent variables, depending on the dependent variable, estimated by δ_0 and δ_1 shown as follows:

$$Min_{\delta_0, \delta_1} \sum_{t=1}^n \sigma_{\varnothing} \left[DV_t - \delta_0 - \delta_1 (IV_t) - IV^{\tau} \right] L \left[\frac{M_n(IV_t) - \tau}{h} \right] \tag{5}$$

In Equation (5), σ_{\varnothing} represents the quantile loss, $L(.)$ represents the Gaussian kernel function, which is used for the minimal weighting criterion to improve the estimation efficiency, and h represents the bandwidth parameter of the Gaussian kernel function. The Gaussian kernel function was used in this study to assign weights to the observations in the neighbourhood of IV_{τ} . The Gaussian kernel is considered symmetrical around zero and gives lower weights to those observations that are further away. These weights are inversely correlated to the distance between the empirical distribution function of IV_t , denoted by $M_n(IV_t) = \frac{1}{n} \sum_{k=1}^n I(IV_k < IV_t)$, and the value of the distribution function that corresponds to the quantile of IV_t , denoted by τ . The choice of bandwidth is critical in nonparametric estimation techniques. Bandwidth in covariance regression is a smoothing parameter because it controls the variance and bias of the output. Large bandwidths lead to biased estimates, while small bandwidths produce higher variance values (Sim & Zhou, 2015). A bandwidth parameter of 5% ($h = 0.05$) was chosen as the bandwidth parameter for the quantile distribution in this study, following the works

of Sim & Zhou (2015), Shahbaz et al. (2018) and Haseeb et al. (2021).

IV. Results and Discussion

The present paper analysed the relationship between financial development and income inequality in selected Asian countries (areas). The study used data from 1995-2020 and divided the 12 selected countries (areas) into three income groups: underdeveloped, moderately, and highly developed. The GINI coefficient was used to measure income inequality, while the IMF's Financial Development Index was used to measure financial development.

Table 2 shows that countries (areas) with better economic development levels generally had higher financial development indexes. However, there was no consistent pattern regarding income inequality across the sampled countries (areas). After examining the subgroups in Table 1, it was evident that countries (areas) in the higher-income group tended to have higher financial development indices. However, income inequality did not affect countries (areas) similarly. Bangladesh had the lowest mean value of financial development with an index of 0.21, while Japan had the highest mean value with an index of 0.78. The minimum value of the financial development index was also in Bangladesh, with an index of 0.14, and the maximum value was in Japan, with an index of 0.92. The large gap between the highest and lowest means highlighted the need for further grouping.

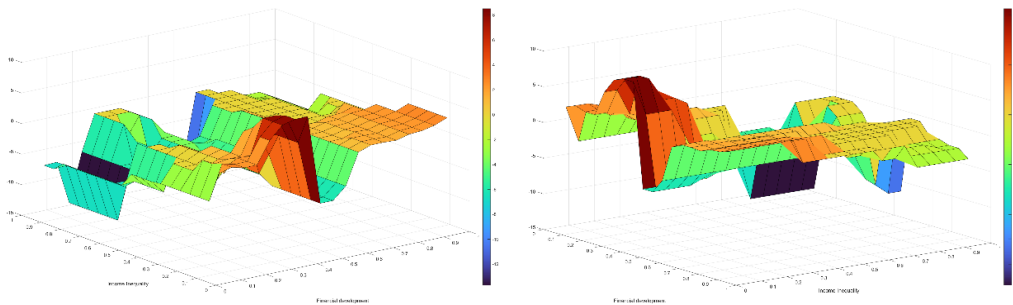
Table 2. *Descriptive Statistics*

Countries (areas) Economic Level by Groups	Countries (areas)	Variables	Mean	Standard Deviation	Minimum	Maximum
Under-Development Countries	Bangladesh	IE ²⁾	33.53	0.61	32.38	34.2
		FD ³⁾	0.21	0.04	0.14	0.28
	Indonesia	IE	44.47	2.35	41.5	47.4
		FD	0.32	0.04	0.25	0.39
	Pakistan	IE	34.5	0.18	34.2	34.7
		FD	0.26	0.07	0.12	0.37
Vietnam	IE	36.64	0.63	35.8	37.8	
	FD	0.36	0.05	0.27	0.45	
Moderately-Development Countries	China	IE	40.33	2.04	35.8	42.4
		FD	0.49	0.10	0.35	0.67
	Malaysia	IE	41.16	1.15	39.8	43
		FD	0.61	0.06	0.46	0.73
	Thailand	IE	41.34	1.97	38.4	43.9
		FD	0.58	0.11	0.33	0.74
Turkey	IE	40.74	1.01	39.5	42.3	
	FD	0.44	0.78	0.30	0.54	

Table 2. *Continued*

Countries (areas) Economic Level by Groups	Countries (areas)	Variables	Mean	Standard Deviation	Minimum	Maximum
Highly-Development Countries (areas)	Hong Kong (China)	IE	40.19	0.43	39.2	40.6
		FD	0.73	0.05	0.57	0.79
	Japan	IE	31.32	0.97	29	32.85
		FD	0.78	0.10	0.57	0.92
	Korean	IE	31.3	1.00	29.5	32.9
		FD	0.77	0.09	0.58	0.85
	Singapore	IE	39.17	0.35	38.5	39.6
		FD	0.71	0.05	0.56	0.79

Figure 2. Quantile on quantile plot for Bangladesh

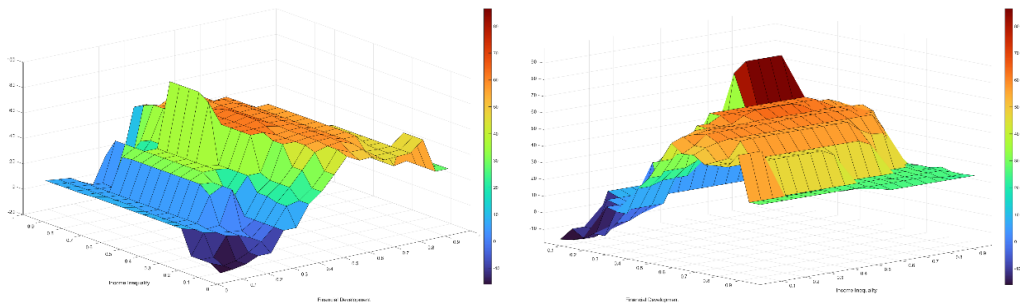


Bangladesh: Figure 2 shows the QQR result of Bangladesh. The low quantile X (0.05-0.45) corresponded to the low quantile Y (0.05-0.25), where financial development had a mildly adverse effect on narrowing the gap between the rich and poor and was more significant in the X quantile range (0.3-0.45), and in the Y quantile (0.05-0.2). However, financial development effectively contributed to income equalisation in the X quantile (0.1-0.6) and Y quantile (0.55-0.95). At the high quantile X (0.6-0.95) and low to middle quantile Y (0.05-0.65), financial development caused slight income inequality. At high quantile X (0.85-0.95) and high quantile Y (0.85-0.95), financial development, in turn, contributed slightly to income equality. Thus, for Bangladesh, in the initial stage of financial development, in the short run, it caused an increase in the domestic income gap between the rich and poor. However, financial development was still conducive to narrowing the gap between the rich and poor in the long run. In the initial stage of financial development, the increase in the gap between the rich and the poor may have been due to rich people, with accumulated capital entering the financial market first and receiving dividends from the financial market. However, with the breadth and depth of financial development, more

2) IE: Income Inequality- measured by Gini coefficient
 3) FD: Financial Development-measured by the index of financial development (IMF)

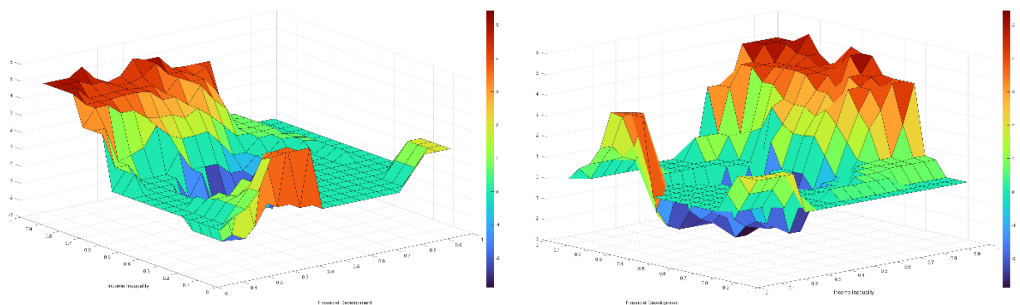
and more people have entered the financial market, and financial development has stabilised. Hence, the gap between the rich and poor gradually narrowed. This result was similar to the findings of Abdin (2016), where financial development provided people experiencing poverty with credit and saving opportunities, thus reducing income inequality. However, unstable financial development may, in turn, cause the gap between the rich and poor to increase. Overall, the present study's findings showed that financial development did not significantly impact income inequality in Bangladesh. This outcome was because the interval value of the regression results for both was at [-12, 8].

Figure 3. Quantile on quantile plot for Indonesia



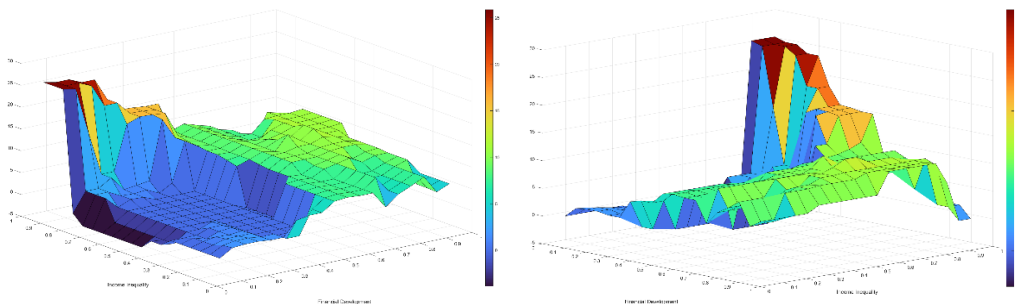
Indonesia: Figure 3 shows the QQR result of Indonesia. The low quantile X (0.05-0.2) corresponded to the low quantile Y (0.05-0.2), and financial development slightly contributed to income equality. However, as the X quantile increased, X (0.2-0.9) had a significant positive correlation for almost the full range of stages Y (0.25-0.9). Financial development seriously increased income inequality in Indonesia, especially in X (0.35- 0.85) and Y (0.4-0.8). Similarly to the present study's results (Ridzuan et al., 2021) found that income inequality in Indonesian society worsened with higher financial development. The positive correlation between financial development and income inequality was significant, and the value of the regression interval between the two was in the range of [-10, 80].

Figure 4. Quantile on quantile plot for Pakistan



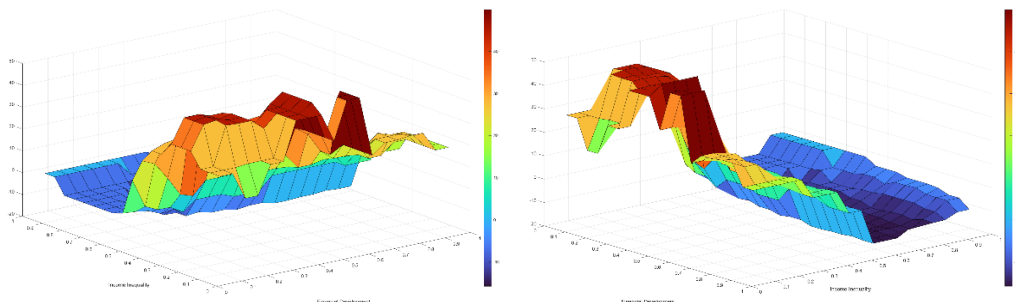
Pakistan: Figure 4 shows the QQR result of Pakistan. Apart from the fact that financial development contributed very marginally to income equality in the low and middle quantiles X (0.25-0.65) corresponding to the low and middle quantiles Y (0.25-0.65) and that financial development increased income inequality very marginally in X (0.05-0.75) and in the high quantiles Y (0.7-0.9). The (Q. Zhang & Chen, 2015) had a significant impact as the regression interval values were at [-2, 5]. Therefore, this analysis inferred that financial development in Pakistan did not significantly impact income inequality and reducing the gap between rich and poor did not depend on financial development.

Figure 5. Quantile on quantile plot for Vietnam



Vietnam: Figure 5 shows the QQR result of Vietnam. Low and medium quantile X (0.05-0.5) corresponded to Y (0.05-0.85), the impact of financial development on income inequality was almost zero, quantile X (0.5-0.95) corresponded to full stage quantile Y (0.05-0.95) and the full stage quantile was significantly positively correlated. Regression interval values [0, 25]. Thus, this analysis judged that financial development increased income inequality within Vietnam. The results were consistent with earlier findings (Hoi & Hoi, 2012).

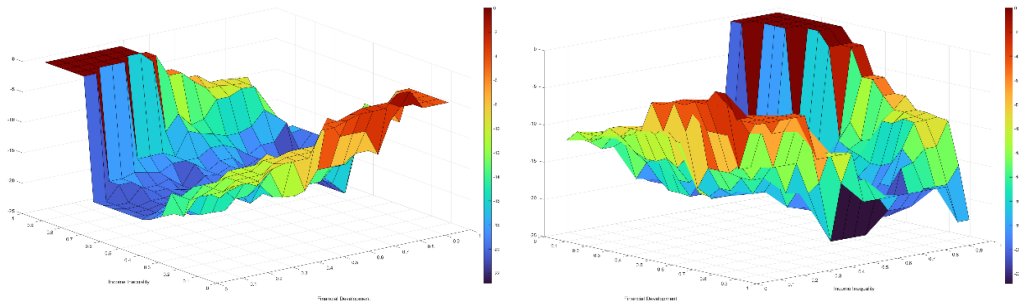
Figure 6. Quantile on quantile plot for China



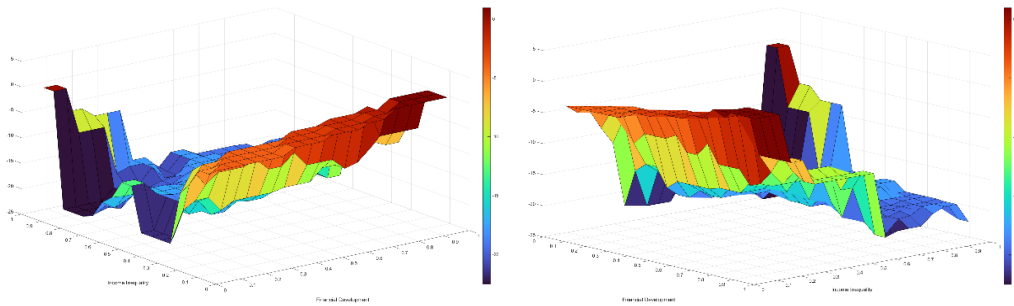
China: Figure 6 shows the QQR result of China. X (0.05-0.9) for all quantiles showed a

significant positive correlation corresponding to Y (0.05-0.5) for the low and middle quantiles and a mild negative correlation corresponding to Y (0.55-0.95) for the high and middle quantiles. The range of regression result values was [-10, 40]. For China, in the early stages, financial development negatively impacted income distribution and exacerbated social income inequality. The depth and diversity of financial development gradually reduced the gap between the rich and the poor. The research findings of (Q. Zhang & Chen, 2015) supported that there was a somewhat inverted U-shaped relationship between the impact of financial development on income equality in China. Accelerating financial reform and encouraging financial diversity narrowed the gap between the rich and poor and promoted equality.

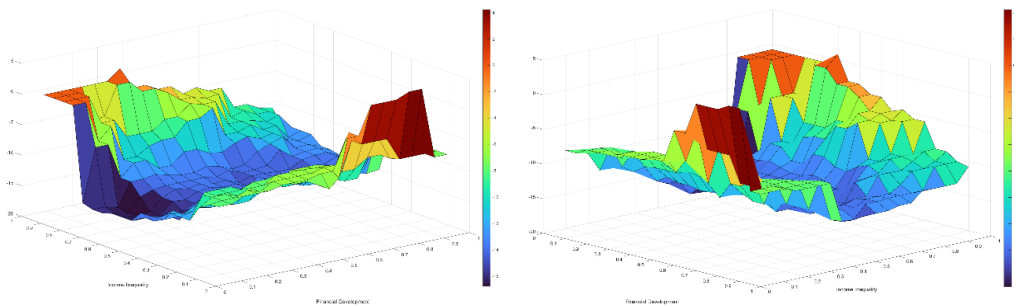
Figure 7. Quantile on quantile plot for Malaysia



Malaysia: Figure 7 shows the QQR result of Malaysia. The full-stage quantiles X and Y showed a significant negative correlation, especially in quantiles X (0.05-0.9) and Y (0.35-0.75), which were the most significant. The result of the study in the interval of [-22, 0] indicated that financial development significantly contributed to reducing income inequality. However, the effect tended to level off in the later stages of development. For Malaysia, however, financial development was an effective means to reduce income inequality. Unlike the studies of Law & Tan (2009), Rosemy (2017) and Ridzuan et al. (2021) on financial development and income inequality in Malaysia, which concluded that financial development did not have a significant effect on income inequality in the country, the present paper argues that financial development can help to reduce the gap between the rich and poor in Malaysia.

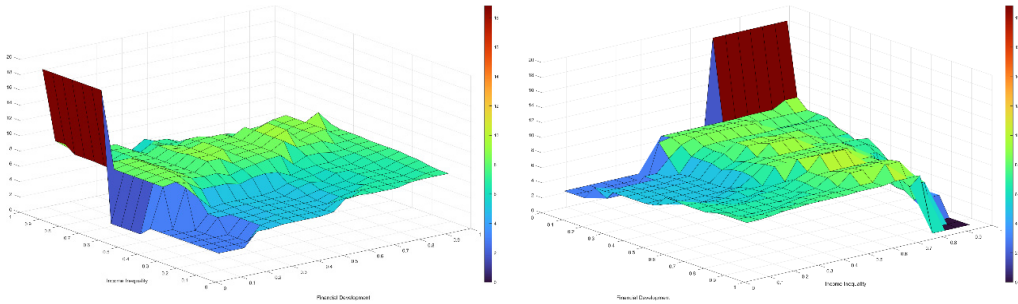
Figure 8. Quantile on quantile plot for Thailand

Thailand: Figure 8 shows the QQR result of Thailand. Interestingly, the results of the studies in Thailand and Malaysia were very similar, with the values of the outcome intervals at $[-20, 0]$. For Thailand, the full-stage quantile of X corresponded to the full-stage quantile of Y, which was favourable to narrowing the gap between the rich and poor. It was especially significant between quantile Y (0.3-0.9). Similarly to Malaysia, financial development was also an effective means of promoting social equality in Thailand.

Figure 9. Quantile on quantile plot for Turkey

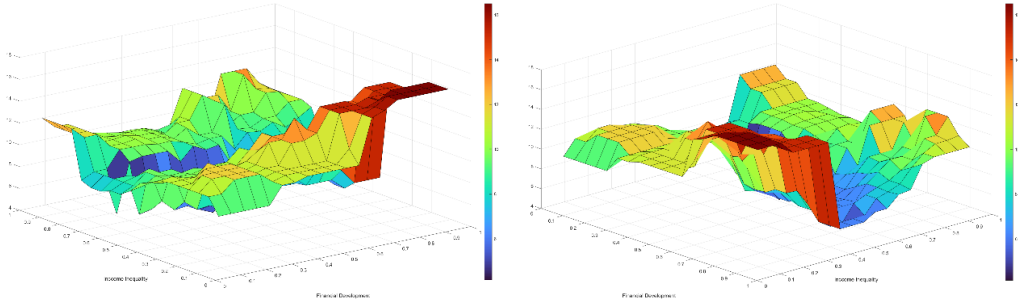
Turkey: Figure 9 shows the QQR result of Turkey. Except for X (0.65-0.9) in the higher order quantile and Y (0.05-0.1) in the lowest quantile, which showed a slight positive correlation, there was a significant negative correlation between X and Y in the full-stage quantile. The regression result values were at $[-16, 4]$. Unlike the recent studies conducted by (Ozdemir, 2019) and (Destek et al., 2020) on the relationship between financial development and income inequality in Turkey, the present paper argues that financial development significantly reduced the gap between the rich and poor in Turkey. A significant negative correlation was shown in both full-stage quantiles X (0.05-0.9) and almost full-stage Y (0.2-0.8), indicating that financial development helped reduce income inequality in Turkey.

Figure 10. Quantile on quantile plot for Hong Kong (China)



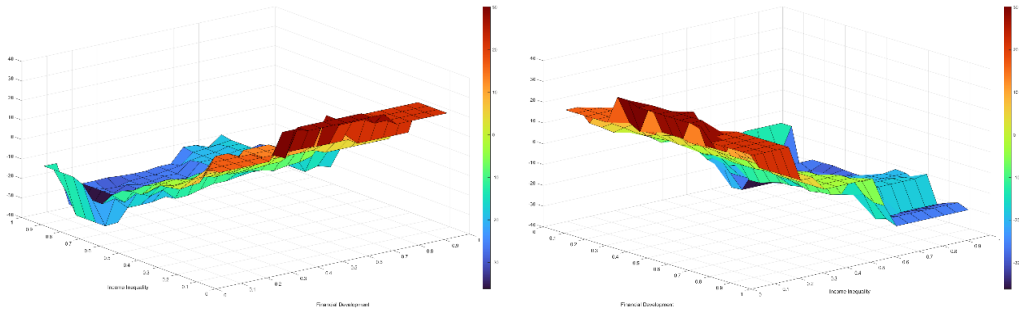
Hong Kong (China): Figure 10 shows the QQR result of Hong Kong (China). For Hong Kong (China), financial development was a factor that led to income inequality and the uneven distribution of social wealth. The result value [0, 18] showed that the full-stage quantile X (0.05-0.95) corresponded to the full-stage quantile Y (0.05-0.95) and had a significant positive correlation. Financial development increased income inequality in Hong Kong.

Figure 11. Quantile on quantile plot for Japan



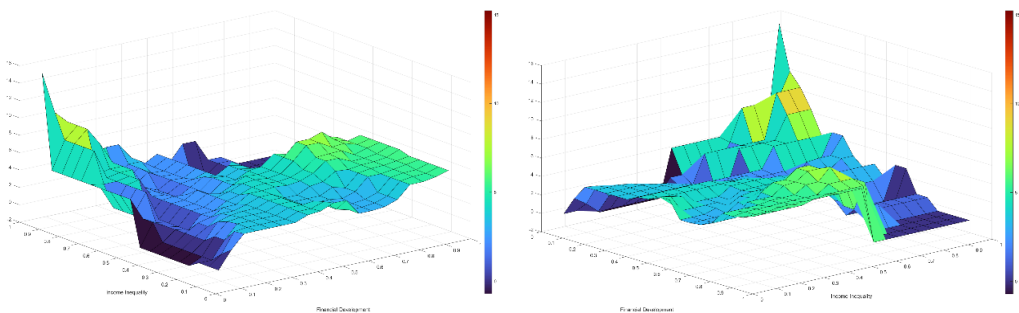
Japan: Figure 11 shows the QQR result of Japan. It is worth noting that, similarly to Malaysia and Thailand, the relationship between financial development and income inequality was very similar in Japan and Hong Kong (China). The regression results were [0, 16], and full-stage quantiles X and Y correlated significantly positively. Financial development in Japan was also one of the factors leading to social inequality, and too much financial development in Japan would only widen the gap between the rich and poor.

Figure 12. Quantile on quantile plot for South Korea



South Korea: Figure 12 shows the QQR result of Korea. Unlike the other selected countries, the relationship between financial development and income inequality in South Korea demonstrated an average at both ends of the spectrum, with regression results in the range of $[-30, 30]$, with significant positive correlations for the full-stage quantile X (0.05-0.95) and the low-stage quantile Y (0.05-0.35). However, for the middle and high-stage quantile Y (0.4-0.95) there was a significant negative correlation shown. Therefore, for South Korea, financial development and economic growth had a symmetrical inverted U-shaped relationship, where financial development exacerbated social income inequality in the early stages of financial development. However, in the middle and late stages, financial development has effectively helped to narrow the gap between the rich and poor in South Korean society and achieve further equality.

Figure 13. Quantile on quantile plot for Singapore



Singapore: Figure 13 shows the QQR result of Singapore. The regression result values for Singapore $[0, 15]$ showed that the full-stage quantile X (0.05-0.95) corresponded to a significant positive relationship with the full-stage quantile Y (0.05-0.95). The regression results for Singapore were also very similar to those for Hong Kong, China and Japan, where financial development increased income inequality.

The above threshold analyses for each country showed similarities and differences between clusters. For low-income countries, financial development was biased towards increasing inequality, or financial development did not significantly affect income inequality. For middle-income countries, the relationship between financial development and income inequality tended to promote equality or exhibited an inverted U-shaped relationship that begins to promote equality after a particular stage of financial development. Therefore, for middle-income countries, financial development is a suitable means to achieve social income restructuring, which can help middle-income countries or rapidly developing countries narrow the gap between the rich and poor and achieve further social equality. However, for high-income countries (areas), except in the case of South Korea, which showed a symmetrical inverted U-shaped relationship, the other countries in the sample were surprisingly unanimous in showing the negative impact of financial development on increasing social inequality. It was easy to see from the results that it was reasonable to discuss the relationship between financial development and income inequality by grouping countries according to their income levels.

V. Conclusion

According to the empirical results discovered in this paper, the impact of financial development on income inequality was not the same in countries with different levels of economic development. Therefore, subgroup studies are necessary to examine this issue. The results proved that in low-income countries, overall, a significant positive relationship existed between financial development and income inequality. When a country's economy is underdeveloped, people with low incomes do not have extra savings to invest or use financial products and do not have access to banking, credit, insurance and other services. At this time, financial markets have a high threshold for people with low incomes. The rich get the dividend of preferential access to financial markets, which increases the gap between the rich and the poor. This view was consistent with (Rajan & Zingales, 2003), where financial products and services are just tools for the rich to add to their wealth.

As economic development reaches the middle and high stages, for the middle and high-income countries (areas), the standard of living of the people generally improves, the middle-income group continues to expand, and more and more people begin to enter the financial market for savings, investment, credit and other activities, thus narrowing the gap between the rich and the poor.

As for economically developed regions and countries, the problem of social stratification has arisen. A large amount of capital is in the hands of a few rich people, so financial products and services have become tools for capital gain, and the threshold of the financial market has been raised. Therefore, vigorous financial development will only lead to the growing problem

of social wealth inequality.

Based on the above conclusions, it is suggested that middle-developing countries should emphasise financial development to narrow the gap between the rich and the poor. Financial market reforms should be implemented by lowering the threshold of the financial market, innovating financial products, and enriching financial diversification to expand the coverage of financial services. Through the promotion of microcredit, diversified savings, and the establishment of a risk assessment system for financial products, the threshold of the financial market has been lowered so that people from all walks of life can enter the financial market, and financial development can benefit more people, thus further realising social equity. However, at the same time, governments should also pay attention to regulating the financial market and reducing all kinds of risks. Low-income countries should rely on their pillar industries to improve their national economic level rather than unquestioningly developing finance. This analysis suggests deepening financial reform and implementing inclusive finance for high-income countries (areas).

This paper explores the impact of financial development on income inequality in countries with different economic levels by adopting a dynamic quantile regression research methodology. This paper adopts the indicator of financial development in the IMF database; in fact, there are other indicators of financial development, such as depth of financial development and financial institutions, which can be introduced in future research to measure the indicator of financial development comprehensively. In addition, this paper only selected 12 Asian countries (areas) as a sample, and more countries can be expanded in future research to enrich the resources in this research area.

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Appendix

Table A1. *Selected Asian countries grouping details*

Under-Development Countries	Moderately-Development Countries	Highly-Development Countries (areas)
Bangladesh	China	Hong Kong (China)
Indonesia	Malaysia	Japan
Pakistan	Thailand	Korean
Vietnam	Turkey	Singapore