The effect of financial development on economic growth and income distribution: an empirical evidence from lower-middle and upper-middle-income countries

Zaheer Abbasa, Gul Afshanb and Ghulam Mustifac

aGIFT Business School, Faculty of Business & Commerce, GIFT University, Gujranwala, Pakistan; bScholar in Economics at Gift Business School, Gift University, Gujranwala, Pakistan; cScholar, Pakistan Institute of Development Economics, Islamabad, Pakistan

ABSTRACT

Financial development and its relationships with economic growth and income inequality have recently received considerable attention. The present study investigates the relationships between financial development and (i) economic growth, using data from 44 countries; (ii) economic inequality, using data from 42 middle-income countries. Estimates are obtained through a panel Autoregressive Distributed Lag (ARDL) model for a period of 23 years (1995-2018). Results reveal that financial development contributes to economic growth in both groups of countries in the long run. However, the contribution financial development makes to economic growth is more noticeable in the case of upper-middle income countries. Additionally, Granger causality test based on Vector Error Correction (VEC) showed two-way Granger causality between financial development and economic growth. Findings disclosed an inverted U-shaped association between financial development and income inequality for both lower-middle income and upper-middle income countries. This study can aid policymakers in designing policies that can strengthen financial systems, thereby enhancing economic growth and reducing income inequality.

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1. Introduction

According to economic theory, financial development occurs through an organized financial system. An organized financial system allocates financial resources to manufacturing areas in such a manner that they contribute to economic growth, physical capital accumulation, and economic efficiency. While several papers argue that financial development facilitates economic growth, even in this age of financial globalization, the growing income inequality and impact of economic and financial development on income inequality in low-and high-middle income countries remain key topics. Literature on the topic highlights how financial progress can improve economic growth by amassing savings, diversifying risks, and assessing possible entrepreneurs (Smith and Bencivenga 1991; King and Levine 1993a). Levine (2005) later confirmed the hypothesis that financial development is key in economic growth.

Other salient studies on the topic explored whether all people equally benefited from development in their financial system (Greenwood and Jovanovic 1990). This study revealed an inverted U-shaped connection between income disparity and financial progress. Results of studies such as Banerjee and Newman (1993) and Zeira and Galor (1993) support the assertion that income inequality reduces with increased financial development. However, other studies have revealed that failures occurring in the financial sector led to inefficient distribution of funds among the poor (Bolton and Aghion 1997; Ray and Mookherjee 2003). Hence, the dynamic role of financial development in economic growth and the changing pattern of income distribution, caused by radical changes in various structures of middle-income countries, is an unexplored area. This study attempts to fill this gap by addressing the following three questions: (a) Does financial development affect economic growth? (b) Does a causal relationship exist between economic growth and financial development? (c) How does financial development influence income inequality?

The remainder of this paper is organized as follows. Section 2 provides the literature review. Section 3
provides the materials and methods. Section 4 examines the empirical results. Finally, Section 5 outlines the concluding remarks.

2. Literature review

2.1. Introduction

Financial development, economic growth nexus, and income distribution growth nexus have been separately explored in many studies. Hence, few studies explore relationships among these three areas simultaneously. This literature review then attempts to confirm the causal relationship between financial development, economic growth, and income distribution.

2.2. Financial development and economic growth

The relationship between financial development and economic progress has been reviewed Gurley and Shaw (1955). This topic was also explored in studies such as Davis (1965) and Sylla (1969), who examined the significance of the monetary system for economic development in countries such as England and the United States. Macroeconomics and development economics experts have studied the same hypotheses using more formal theoretical models. Their work suggests that countries achieve rapid growth by improving their financial systems and reducing credit market friction (Greenwood and Jovanovic 1990).

Shaw (1973) highlights the importance of financial intermediation in boosting economic growth. Shaw explains that firms must rely on external financing in the form of bank loans. This course of action causes bank deposits to grow and facilitate access to more credit capital. Thus, increased financial intervention can stimulate economic growth. The endogenous growth model – extensively explored by Lucas (1988), Romer (1986), and Rebelo (1991) – also established an association between economic growth and financial system development. These studies suggest that the financial system can alter capital accretion by changing the saving rates among different capital-producing technologies. Consequently, the economy’s growth rate has changed.

Saint-Paul (1992) further explains the concept of improved financial systems by arguing that demand increases production from risk fluctuations. Without a financial risk-sharing system, national manufacturers are inclined to hedge risk by choosing relatively less-specialized technologies. Thus, productivity is lowered, and economic growth is impaired. Levine, Loayza, and Beck (2000) employed a more advanced economic technique to examine association between banking sector progress and economic growth. Their study was the first to examine the significance of economic expansion through a phase of withdrawal using 1960–1995 medium data, and they confirmed that intermediary financial growth has a positive and statistically substantial effect on economic growth. Loayza and Ranciere (2004) found an empirical concurrence between the short-run negative impact and the long-run positive impact of financial expansion on economic development.

Al-Zubi, Al-Rjoub, and Abu-Mhareb (2008) argued that Arab countries have made significant progress in reforming the financial sector over the past decade. They further found that these countries have gained full recognition for the fact that economic growth is often accompanied by increased economic depth. Hassan, Sanchez, and Yu (2011) also explored the role of finance in economic growth by examining the economic progress of low- and middle-income nations. Results showed that a well-functioning financial structure is essential but not fully sufficient for sustainable economic progress in developing economies. Adu, Marbuah, and Mensah (2013) conducted an empirical investigation to determine whether financial development could stimulate economic growth in Tunisia. Researchers used the autoregressive distributed lag (ARDL) method to study the financial-growth nexus. Murari (2017) investigated the association between financial expansion and economic progress by applying a panel data technique to South Asian middle income economies. By analyzing 1980–2013 data, they revealed that domestic debt provided by the banking sector significantly impacted economic growth.

Kumar and Paramanik (2020) explored the connection between India’s economic progress and its financial development from Q1 1996 to Q3 2018. In their study, gross domestic product (GDP) and broad money (as a large proportion of GDP) were used as indicators of financial and economic growth. These results indicate that long-term financial development has positive effect on economic growth. Matei (2020) argues that the interaction between financial development and economic growth has been widely debated in the literature since the publication of Schumpeter’s original document in 1934. Schumpeter suggested that this interaction, discernible through its impact on innovative investments, is a driving force in economic growth. Despite the existence of extensive evidence provided and discussed above, recent empirical literature is skeptical of this relationship.
2.3. Financial development and income distribution

Recent studies advocate that capital market inadequacies might impact income differences during economic progress. Theoretical work on the topic by Greenwood and Jovanovic (1990) suggests that financial development affects the ongoing pattern of the country’s income distribution. The study’s findings show a reversed U-shaped relationship between financial development and income disparities. Income differences have grown and declined. Eventually, they become stable, and their relationship with financial development also stabilizes (the inverted U-shaped hypothesis).

Empirical work on this topic in studies such as Banerjee and Newman (1993) and Zeira and Galor (1993) also revealed salient findings. First, an opposing relationship seems to exist between income inequality and financial development. Second, the findings reported by these studies established that little evidence exists to confirm the results of the Greenwood–Jovanovic study, which reported the existence of an inverted U-shaped affiliation between income disparities and financial progress. Third, consistent with the Kuznets hypothesis (1955), the findings of the aforementioned studies also indicate that sectorial structures affect how financial mediators influence inequality. Particularly, the falling impact of the financial mediators is quite significant in economies with higher modern (i.e. nonagricultural) sectors. Thus, these studies provide diverse estimates on the relationship between financial mediators and income disparities. Furthermore, numerous inferences have been made on the connection between financial progress and income variation. However, little experimental research has matched their explanatory power. Clarke, Xu, and Zou (2006) analyzed the association between monetary expansion and income differences using 1960–1995 data from 83 nations. The results suggest a negative relationship between financial development and long-term income inequality.

Bittencourt (2010) examined the effect of financial growth on earnings disparities in Brazil, using 1980–1990 data. Their results revealed that a more dynamic financial sector could improve the significant differences in Brazil without needing distortionary taxation. Using the Pooled Mean Group (PMG), Chen and Kinkyo (2016) found that monetary expansion decreases variation in long-term income, while raising income differences in the short run. Younsi and Bechtini (2018) examined the causal link between economic progress, financial expansion, and income disparity in BRICS nations from 1995 to 2015. The results of this research, acquired using fixed effects valuation, show that GDP per capita development has a progressive effect on income variation. Conversely, the coefficient of the squared term has a significant negative effect on income inequality. Chiu and Lee (2019) explored the nonlinear impact of financial expansion and country threats on income differences. For this study, an extensive sample of 59 states was obtained from 1985 to 2015. The findings suggest that income differences in high-income states can be improved through financial growth under controlled economic and financial atmospheres. Shi, Paul, and Paramati (2020) studied the impact of financial development indicators on Australia’s income variation using data from 1980 to 2014. This study suggests that several other factors, such as trade openness, inflation, and per capita income, could also have an impact on income differences.

Numerous studies have been conducted to explore the association between financial growth and income differences. The results of these studies varied as they used different techniques and datasets. Part of the problem is that variables such as economic systems, political systems, legal environments, and growth levels have an everlasting impact on the factors under study. A final noteworthy fact is that few studies have investigated the relationship between financial development and economic growth, and income distribution simultaneously by focusing on lower-middle and upper-middle income groups. This study aims to fill this literature gap.

3. Materials and methods

3.1. Financial development and economic growth

The current study employed the same methodology used in previous studies (e.g. King and Levine 1993b; Levine and Zervos 1998; Rousseau and Wachtel 2000, 2002; Adu, Marbuah, and Mensah 2013) to measure the role that financial development plays in increasing economic activities. The relationship between economic growth and the other variables is presented in the following equation:

\[
\ln(PCY) = \alpha_0 + \alpha_1 \ln(FD) + \alpha_2 \ln(HK) + \alpha_3 GL \\
+ \alpha_4 \ln(GE) + \alpha_5 \ln(PK) + \alpha_6 INF + \alpha_7 \ln(OPEN) + \epsilon
\]  \tag{1}

In Equation 1, the dependent variable ‘PCY’ denotes real per-capita income, whereas ‘FD’ denotes financial development, ‘HK’ is human capital (i.e. enrollment of secondary schooling), ‘GL’ is growth rate of the labor force, ‘GE’ is government expenditures, ‘PK’ is physical capital (i.e. gross fixed capital formation), ‘INF’ is
inflation (i.e. annual percentage change of GDP deflator), ‘OPEN’ is trade openness, and \( \varepsilon \) denotes error term.

### 3.2. Financial development and income distribution

This study investigates the relationship between financial development and income inequality using an empirical model similar to that used by Galor and Zeira (1993) and Banerjee and Newman (1993). This model was primarily used in the Kuznetzian literature. Jauch and Watzka (2016) is a recent research study which also used this type of model. We present the relationship between income inequality and financial development, along with the relevant variables in the following equation:

\[
\ln(GINI) = \beta_0 + \beta_1 \ln(FD) + \beta_2 \ln(FD)^2 + \beta_3 \ln(HK) \\
+ \beta_4 GE + \beta_5 \ln(GE) + \beta_6 \ln(PK) + \beta_7 INF \\
+ \beta_8 \ln(OPEN) + \mu
\]

(2)

In Equation 2, the dependent variable ‘GINI’ (Gini coefficient) measures income inequality in the economy, whereas all the independent variables represent the same terms as in Equation 1 (See Section 3.1). \( \text{FD}^2 \) is used to measure existence of a non-linear relationship between financial development and income inequality. \( \mu \) is the random error term.

### 3.3. Data description

Data on financial development, control variables, and growth rates were obtained from the World Development Indicators dataset. The economic growth analysis dataset comprises 44 middle-income countries, 26 lower-middle income countries, and 18 upper-middle-income countries. The dataset for income inequality analysis comprises 42 middle-income countries, 21 lower-middle-income countries, and 21 upper-middle-income countries. Lists of countries included in both the models are provided in the appendix. The time frame used in this study is 1995–2018. The analysis panel is balanced and smooth; total observations in this model are \( 26 \times 24 = 624 \) and \( 18 \times 24 = 432 \) for lower and upper-middle income countries, respectively. On the other hand, the Panel is highly unbalanced and has been broken for income inequality analysis. Total observations used in estimation are 175 and 268 for upper-middle and lower-middle income nations, respectively.

Previously, work of many researchers has confirmed the fact that financial expansion has favorable consequences for economic progress of financially developed countries which fall into the high-income group. However, to observe the impact of financial development on economic growth and income differences, the current study has focused on countries which are less developed financially. These countries which are financially less developed fall into two different income groups, i.e. upper-middle income and lower-middle income economies. Lower-middle income economies have per capita annual income of US$ 1,036–4,045. Upper-middle income economies comprise of nations with per capita yearly income of US$ 4,046–12,535. The primary consideration in selection of countries was availability of the consistent data series required for analysis.

### 3.4. Estimation procedure

The study used different estimation procedures for financial development and economic growth models and financial development and income inequality models. This is because the nature of the data is different in the two models. In financial development and economic growth, the analysis panel is balanced, smooth, and long. Hence, stationarity of the series is a critical issue. Therefore, the panel ARDL was considered the most appropriate estimation procedure by researchers. However, the panel is highly unbalanced and has discontinuities in the data series of selected variables for financial development and income inequality analysis. Hence, both fixed and random effects models were considered more appropriate.

#### 3.4.1. Financial development and economic growth

This study used long-term data; hence, problems associated with using time-series data, such as stationarity, were likely to occur. To investigate stationarity, two types of tests were conducted in econometric literature: first and second-generation tests. However, the test which is typically used to check stationarity is rendered ineffective by the possible existence of cross-sectional dependence in various time-series data sets. Thus, a Cross-Sectional Dependence (CD) test had to be applied first.

#### 3.4.1.1. Cross-sectional dependence.

Pesaran (2007) recommended that cross-sectional dependence be used for panel unit-root testing. The Cross-Sectional (CD) data is based on pairwise correlation coefficients across all panels and is set by:

\[
CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{r}_{ij} \right)
\]

(3)
Wherever $N$, $T$ and $(p_{ij})^{\hat{}}$ are the volume of cross-sectional components (countries), the number of periods and sample correlation coefficient between counties $i$ and $j$. $CD$ is followed by Chi-square distribution. Not accepting the null hypothesis that the correlation coefficient across all pairs is equal to zero would imply existence of cross-sectional dependense.

### 3.4.1.2. Panel unit root tests

Two types of tests can be used to generate panel unit root statistics: first-generation tests that do not account for cross-sectional dependense, developed by Maddala and Wu (1999), and the second-generation test that permits cross-sectional dependense, proposed by Pesaran (2007), which is based on the following equation:

$$
\Delta X_{it} = \alpha_i + \beta_i X_{it-1} + \gamma_i \Delta X_{t-1} + \sum_{j=0}^{p} \delta_{ij} \Delta X_{t-j} + \sum_{j=1}^{p} \theta_{ij} \Delta X_{t-j} + \mu_i t
$$

(4)

Here, $\alpha_i$ is the drift term, and $p$ is the lag length to be determined with the help of some performance criteria like AIC or SBC. Pesaran used individual Cross-sectional Augmented Dickey-Fuller (CADF) and developed CIPS (Computer Integrated Process System) statistics by taking the average from the different CADF numeric:

$$
\text{CIPS} = \frac{\sum_{i=1}^{N} t_i}{N}
$$

(5)

Where $t_i$ is the t-statistic of the approximation of $\beta_p$, the null hypothesis of the test statics is that all individual series follow unit root process, i.e. all $\beta_i = 0$.

### 3.4.1.3. Panel ARDL

The former dynamic panel methods, that is, instrumental variables, fixed effects, and GMM employed by Arellano (1989), Anderson and Hsiao (1981), and Arellano and Bover (1995) can generate unreliable results for an average value of the parameters (except that the coefficients are the same across individuals). Thus, it is more appropriate to use an ARDL panel model, as Pesaran and Smith (1995) and Pesaran, Shin, and Smith (1999) suggested.

$$
\Delta (PCY_{it}) = \theta_0 ((PCY_{it-1}) - \delta (X_{it-1})) + \sum_{j=1}^{p-1} \pi_j PCY_{it-j} + \sum_{j=0}^{q-1} \lambda_i X_{it-j} + \mu_i + \epsilon_{it}
$$

(6)

Here, ‘$PCY$’ is per capita income growth rate, $X_{it-j}$ is vector of explanatory variables of a group ‘$i$’ and ‘$\mu_i$’ stands for fixed effect.

### 3.4.1.4. Granger causality test using vector error correction model (VECM)

The VECM approach based on the maximum likelihood technique provides more efficient error correction and cointegration results. It yields all short- and long-run dynamics in a single step. Additionally, it permits and provides more than one cointegrating vector. An additional feature of VECM is that it enables the analysis of the long run and short run causality among the variables. Short run causality is traced using the same concept as the simple Granger causality. One difference is that lagged variable terms are tested using the Wald test in VECM. Contrarily, Granger causality tests the lagged terms of variables using the F-test in the VAR (Vector auto-regression) model.

### 3.4.2. Financial development and income distribution

The panel is unbalanced, and the average number of observations in each country is low (175/21 = 8.3 and 268/21 = 12.7 for lower-and upper-middle-income countries, respectively). The strength of the periods per cross section was also low. Furthermore, the number of cross-sections, that is, 21 for both groups, was much greater than that of the time series. Additionally, many gaps can be found in the data series of the variables for each country, which are not similar across time and countries. Therefore, the pooled ordinary least squares (OLS), fixed effects, and random effects models are appropriate. However, the pooled OLS model completely ignores unobserved heterogeneity. To include unobserved heterogeneity, a redundant fixed effects test was applied. If unobserved heterogeneity between cross sections is significant, then the fixed and random effects models are preferred over the pooled OLS model. The fixed effects model allows each cross section to have its own intercept by creating a dummy variable. Conversely, the random effects model considers these cross-sectional differences as random and makes them a part of a cross-section-specific error term. Finally, the choice between both fixed and random effects models was made based on Hausman’s (1978) test.

### 4. Results and discussion

#### 4.1. Financial development and economic growth

The results presented in Table 1 reject the independence of cross-section (null hypothesis) at the 1% level of significance for all variables except government expenditure and physical capital in lower-middle-income countries. The cross-section dependense test reveals
that the selected series have shared dynamics in lower and upper-middle income countries.

For long-term relationships, having stationary variables is imperative; thus, all variables were checked for stationarity. Table 2 provides the results for the order of integration for all the variables. We applied second-generation panel unit root tests to check stationarity due to cross-sectional dependence, as recommended by Pesaran (2007). The CIPS test reveals that some series are stationary at the level and at the first level.

Furthermore, the data generation process for the same variables is different in each group of countries, that is, in lower-middle-income and upper-middle-income countries. For example, variables such as financial development and physical capital are stationary at the level in upper-middle-income countries. Moreover, they are integrated in order in one lower-middle-income country. By contrast, variables such as human capital and government are stationary in lower-middle-income states. Furthermore, they are integrated in order in one upper-middle-income country. The remaining variables had the same data-generating process in both groups of countries.

A panel ARDL model was used, as both groups had I (0) and I (1) variables. The panel ARDL model is equally applicable regardless of whether the variables have the same order of integration, that is, I (1) or a mixture of I (0) and I (1). However, the dependent variable should be I (1), and the order of integration of any variable under study should not exceed 1.

The short-and long-run dynamics were estimated using equation 1. Table 3 presents the results.

The results presented above reveal that the leading variable financial development (FD) has a positive and significant effect on economic progress in both groups, confirming the findings of earlier studies (e.g. Levine and Zervos 1998; Loayza and Ranciere 2005; Kalayc.ca and Özden 2020). Results also indicate that financial development plays a more prominent role in upper-middle-income nations. In the short run, FD contributes to economic progress only in upper-middle income states. Development in the financial system promotes growth by reducing the cost of borrowing and by providing sufficient credit to investors. As the market is large and more developed in upper-middle-income nations, financial development is more pronounced in these nations. The underlying reason for the significant impact of FD in upper-middle-income countries is that improvements in the financial sector motivate investors to benefit from improved financial markets.

Human capital, proxied by enrollment in secondary education, positively and distinctly promoted economic growth in both groups in the long run. However, this does not have an influence in the short run. This is because improvement in human capital promotes economic growth through different channels, such as by productivity of labor, by enabling the labor force to adopt new technologies, and by improving the process of research and development (Nelson and Phelps 1966; Lucas 1988; Romer 1990; Mankiw, Romer, and Weil 1992; Benhabib and Spiegel 1994). As there are more opportunities for improving technologies and production processes in lower-middle income countries, human capital influences growth in these countries. Contrarily by merely increasing labor force and keeping the other variables constant, existing capital per worker reduces. Hence, growth in output per capita hampers, and the growth in labor force has a negative and significant impact on economic growth in both groups.

The findings indicated that public expenditure does not have an influence in the long run for either group; however, it has a negative and noteworthy influence on growth in the short run. The underlying reason is that more extensive public spending could increase the cost of either private consumption or investment in conventional capital. If public expenditure increases capital spending, there will be a desire to reduce the growth rate (Landau 1983). This negative impact can be attributed to inefficient governments or inferior institutions (Wu, Tang, and Lin 2010).

Physical capital, proxied by gross fixed capital formation, significantly improves economic growth in both groups, corroborating earlier findings (e.g. Kanu and Ozurumba 2014; Uneze 2013; Chow 2017; Adebayo and Beton Kalmaz 2020; Meyer and Sanusi 2019). As capital per capita is low in lower-middle income countries, it results in increasing productivity in these lands; hence, physical capital plays a more dominant role in lower-middle income countries. It is worth noting that physical capital contributes to economic growth in two ways: first, by intensifying the output capacity; and second, by upgrading methods.

| Variables | Lower middle-income countries | Upper middle-income countries |
|-----------|-------------------------------|-------------------------------|
|           | CD – Stats | P – value | CD – Stats | P – value |
| PCY       | 4.60       | 0.00      | 11.23      | 0.00      |
| FD        | 42.01      | 0.00      | 11.94      | 0.00      |
| HK        | 78.17      | 0.00      | 45.89      | 0.00      |
| GL        | 8.58       | 0.00      | 31.26      | 0.00      |
| GE        | -0.31      | 0.75      | 2.45       | 0.01      |
| PK        | 0.20       | 0.84      | 5.58       | 0.00      |
| INF       | 14.21      | 0.00      | 9.91       | 0.00      |
| OPEN      | 4.10       | 0.00      | 6.74       | 0.00      |

Note: For the null hypothesis of cross-section independence, CD ~ N(0,1)
Currently being used in a country (as more efficient techniques require more capital).

Inflation has opposite impacts in both groups. It was seen that in upper-middle-income countries inflation significantly improves economic growth. Hence, Phillips curve holds true in these countries. Contrarily, inflation hampers the economic progress in lower-middle income countries substantially. Once inflation increases beyond a threshold level, it creates uncertainty in the economy that impedes growth (Ayyoub, Chaudhry, and Farooq 2011; Madurapperuma 2016). This negative impact supports the utility function models on consumption and real money balance, presented by Fischer (1979), De Gregorio (1993), and Bruno and Easterly (1998). In the short run, inflation is insignificant. Hence, it is neutral because policymakers try to achieve macroeconomic goals, i.e., enhance economic growth by keeping the inflation rate constant (Sidrauski 1967).

Trade openness in lower-middle and upper-middle income countries is different. In upper-middle-income nations, trade openness enhances economic growth because these countries can obtain innovative technologies from their business partners through trade and manufacture of high-quality goods (Yanikkaya 2003; Keho 2017; Munir and Ameer 2018). In the case of lower-middle-income states, trade openness is insignificant. It can even hamper economic growth if a country: (a) exports low quality or primary goods; (b) has high inflation; or (c) has less developed stock and financial markets (Kim and Lin 2011; Kim, Lin, and Suen 2012; Huang and Chang 2014; Were 2015).

The analysis above reveals long-and short-run relationships among the variables explored in this study. However, this does not indicate the direction of causation. The Granger causality test and VECM were used to determine the direction of causation between variables. The VECM requires all variables to have the same order of integration. In light of this requirement, some changes were adopted by the researchers: (1) using per capita income instead of growth of per capita income; (2) using labor force instead of labor growth rate; (3) dropping inflation variable because it is stationary at level; (4) these tests are jointly applied to the entire group of middle-income countries.

The unit root test results indicate that all variables are stationary at the first level (Table 4). Table 5 presents the Granger causality test performed using VECM.

Table 5 shows a bilateral relationship between financial development and economic activity (i.e., improvement in financial markets increases output per capita). Similarly, output growth leads to a more developed financial market. Human capital has a bidirectional relationship with output, but a unidirectional relationship with financial development. Education encourages people to use more financial facilities. Government expenditure has a unidimensional relationship with output per capita. More per capita income results in people paying more taxes, enabling the government to consume more. Government expenditures have a bidirectional relationship with financial development. As the government can
4.2. Financial development and income distribution

The results of Equation (2) are reported in Table 6. The Gini coefficient was taken as the dependent variable. The results presented above show that FD and income disparity are positively associated, confirming the findings of Chiu and Lee (2019), who suggested that financial improvement raises income differences. Financial deep can be a means of assistance only if a country has achieved FD. Beneath this critical value, FD narrows income inequality. Moreover, the speed of combating inequality increases with increased growth in the financial sector.

Human capital and income inequality were found to have a negative and significant relationship in both groups. This is because education increases labor productivity, resulting in higher wages in the labor market (Alves 2012). Ultimately, income inequality is reduced (Campos, Ren, and Petrick 2016). Labor growth significantly reduces inequality in both lower-middle- and upper-middle-income countries.

Our findings also revealed that government expenditure significantly reduces income disparity in both upper- and lower-middle-income datasets. Government expenditures include social protection, education, health, and housing, which are financed by income, cooperation, and other types of taxes. Government expenditure increases the productivity of the poor, raising their income levels. By contrast, progressive taxes positively affect income distribution and decrease income inequality (Martinez-Vazquez, Moreno-Dodson, and Vulovic 2012). These findings also indicate that a positive and vital relationship exists between income inequality and inflation; that is, higher inflation widens income inequality only in lower-middle-income countries. Simultaneously, this has insignificant impact on upper-middle-income countries. Inflation increases income differences by shifting employe income to profit (Laidler and Parkin 1975; Fischer and Modigliani 1978). Additionally, inflation tax will be higher for low-income individuals who have a higher proportion of their wealth in fiat money than for wealthy individuals who diversify their wealth in fiat money and capital. In other words, income inequality increases with an increase in inflation. These findings are reminiscent of those of previous studies (e.g. Desai, Olofsgård, and Yousef 2005; Albanesi 2007; Beetsma and Van Der Ploeg 1996; Thalassinos, Ugurlu, and Muratoglu 2012).

Trade openness has no impact on inequality in either lower-or upper-middle-income countries. The lack of

### Table 4. CIPS unit root test results.

| Variables | PCY | FD | HK | LAB | GE | PK | OPEN |
|-----------|-----|----|----|-----|----|----|------|
| Level     | Constant | 0.67 | 0.03 | 0.04 | 0.07 | 0.05 | 0.06 | 0.46 |
| Trend     | 0.99 | 0.06 | 0.08 | 0.94 | 0.96 | 0.74 | 0.22 | |
| Remarks   | I(1) | I(1) | I(1) | I(1) | I(1) | I(1) | I(1) | I(1) |

### Table 5. Granger causality test.

| Independent variables | PCY | FD | HK | GE | PK | OPEN |
|-----------------------|-----|----|----|----|----|------|
| PCY                   | 6.04** (0.04) | 6.40** (0.04) | 19.69* (0.00) | 17.98* (0.00) | 5.60*** (0.06) |
| FD                    | 13.76* (0.00) | 1.26 (0.53) | 5.78*** (0.05) | 6.09* (0.04) | 2.40 (0.30) |
| HK                    | 8.48** (0.01) | 5.25*** (0.07) | 0.64 (0.73) | 8.14* (0.01) | 5.06*** (0.07) |
| LAB                   | 59.4* (0.00) | 1.35 (0.51) | 0.34 (0.84) | 19.38* (0.00) | 4.26 (0.11) | 0.63 (0.73) |
| GE                    | 3.22 (0.20) | 5.97*** (0.05) | 1.01 (0.60) | 6.71* (0.03) | 0.67 (0.71) |
| PK                    | 36.67* (0.00) | 24.68* (0.00) | 6.07** (0.04) | 8.50** (0.01) | 4.62*** (0.09) |
| OPEN                  | 1.72 (0.42) | 17.46* (0.00) | 11.67*** (0.00) | 14.78* (0.00) | 18.42** (0.00) |

*,** & *** represents significance level of 1%, 5% & 10%
5. Conclusion

This study presents a thorough examination of the links between economic development, financial development, and income inequality. Our study used the following tests and procedures: (a) a panel ARDL model to estimate the short- and long-run relationships among determinants under study; (b) a causality test based on the VEC method to detect the long-run direction of causality among variables being examined; and (c) a non-linear inequality hypothesis (financial Kuznets curve) using the fixed effects model, as done by Greenwood and Jovanovic (1990), to examine income inequality.

The panel ARDL model findings reveal that financial development contributes to economic growth in both groups of countries in the long run. The contribution of financial development to growth is more noticeable in the upper-middle-income countries. Furthermore, an investigation of the financial curve hypothesis revealed an inverted U-shaped relationship between financial development and income inequality in lower-middle-income countries. However, in upper-middle-income countries, a U-shaped relationship exists. An inverted U-shaped relationship between financial development and income distribution in lower-middle-income countries exists as these countries are in the early stages of economic development. Here, few people use the services provided by financial intermediaries because of their high fixed costs relative to their income. This results in slower growth and equal income distribution. With time, financial intermediaries develop, economic opportunities expand, and finance recipients enjoy high returns, resulting in higher growth and income inequality.

Human capital formation was found to significantly contribute to economic growth and causes income inequality to plummet in both groups of countries. Trade openness benefits and enhances economic growth only in upper-middle-income countries; however, its impact on inequality is insignificant in both cases. Government expenditures do not contribute to economic growth in either group of countries; however, they significantly reduce income inequality in both groups. As middle-income countries have a large labor force, labor growth hampers per capita income growth. Furthermore, inflation not only inhibits economic growth but also widens income inequality in lower-middle-income countries. However, upper-middle-income countries neither widen nor narrow income inequality. Our findings can aid policymakers in developing policies that can strengthen the financial system, thereby enhancing economic growth and reducing income inequality in the long run and not just the short run, especially for lower-middle-income countries.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Table 6. Fixed effects model results for income inequality.

| Independent Variables | Lower middle-income countries | Upper middle-income countries |
|-----------------------|--------------------------------|-------------------------------|
|                       | Coefficients | p-value | Coefficients | p-value |
| FD                    | 0.074**      | 0.027   | −0.092***    | 0.078   |
| FD²                   | −0.013**     | 0.011   | 0.021**      | 0.031   |
| HK                    | −0.101*      | 0.000   | −0.043**     | 0.030   |
| GL                    | −0.274*      | 0.000   | −0.254       | 0.000   |
| GE                    | −0.056*      | 0.000   | −0.098*      | 0.004   |
| PK                    | −0.025       | 0.142   | −0.070*      | 0.001   |
| INF                   | 0.001*       | 0.004   | 0.0001       | 0.189   |
| OPEN                  | −0.015       | 0.354   | 0.017        | 0.455   |
| CONS                  | 7.740*       | 0.000   | 4.396**      | 0.022   |

Adj R²: 0.915, Redundant fixed Effects test: 174.8, Hausman test: 20.44, Jarque Bera Test: 1.094.

*,**, & *** represents significance level of 1%, 5% & 10%
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Appendices

Appendix A: List of Countries for Finance Growth Nexus

Upper Middle Income Countries
- Argentina
- Belize
- Botswana
- Brazil
- Bulgaria
- Jamaica

Upper Middle Income Countries
- China
- Colombia
- Gabon
- Guyana
- Paraguay
- Peru

Lower Middle Income Countries
- Jordan
- Malaysia
- Mexico
- Tonga

Appendix B: list of countries for Finance inequality nexus

Upper middle-income countries
- Albania
- Argentina
- Armenia
- Belarus
- Brazil
- Ecuador

Upper middle-income countries
- China
- Colombia
- Costa Rica
- Dominican Republic
- Georgia
- Indonesia
- Iran Islamic Rep.
- Kazakhstan
- Malaysia

Upper middle-income countries
- Mexico
- Peru
- Russian Federation
- South Africa
- Thailand

Lower middle-income countries
- Turkey

Lower middle-income countries
- Bangladesh
- Bolivia
- Côte d’Ivoire
- Egypt, Arab Rep.

Lower middle-income countries
- Benin
- Bhutan
- Côte d’Ivoire
- Ghana
- India
- Kenya
- Nepal
- Nigeria
- Pakistan

Lower middle-income countries
- Bangladesh
- Bhutan
- Côte d’Ivoire
- El Salvador
- Ghana
- Honduras
- Kyrgyz Republic
- Moldova

Lower middle-income countries
- Mongolia
- Nicaragua
- Nigeria
- Pakistan

Lower middle-income countries
- Philippines
- Senegal
- Sri Lanka
- Tanzania
- Tunisia

Lower middle-income countries
- Mongolia
- Sri Lanka
- Tanzania
- Tunisia
- Ukraine