Financial Development, Human Capital Development and Income Inequality: Evidence from Developing Countries

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Abstract

This study investigates the nexus between financial deepening and income equality in developing countries. Two indicators of income inequality, the Gini coefficient, and the income share of the bottom quintile of the population, are used for this analysis of 31 developing countries spanning the period 1996 to 2019. The system generalized method of moment (GMM) is used to tackle the problem of endogeneity. This study finds the inverted U-shaped relationship between gross domestic product (GDP) per capita and income inequality, while the non-linear relationship is observed between financial deepening and income inequality. This implies that at an early stage of financial development income inequality increases and as a certain threshold level of financial development is marked, income inequality decreases. Moreover educated and healthy human capital has negative impacts on income inequality in developing countries. Therefore this study infers to enhance human capital development in developing countries to crush down income inequality.

Keywords: Developing countries; financial development; Human capital; income inequality.

Introduction

The financial development-economic growth nexus has been extensively debated in economic discourse. A strand of research determines that there exists a positive and significant relationship between financial development and economic growth (Levine, 2005; Levine, 1997). The level of
Rising income inequality is a persistent problem that all countries of the world have been facing for a long time. It is pertinent that income distribution matters for economic growth and development (Dang et al., 2019). For instance, if the income share of the top 20 percent rises, its impact does not trickle down and gross domestic product growth deteriorates over time. However if the income share of the bottom 20 percent increases, then GDP growth increases (Dabla-Norris et al., 2015). Further income inequality hinders the poverty alleviation process (Ravallion, 2004) and it has resulted in social unrest and political instability in developing countries since the 1980s. Since 2000, trends of income inequality across countries are heterogeneous, for instance, income inequality has stabilized at a greater level in Asian and European countries, while it has declined a bit in the Middle East and Latin American countries. Moreover, China has made a miraculous economic growth and development in the past four decades and has witnessed declining income inequality. Similarly, economic development has slightly brought down income inequality in India, Vietnam, and Indonesia respectively (Klasen et al., 2016). Despite structural changes and rapid economic growth in South Korea and Taiwan, income inequality has increased in both these East Asian countries in the past few decades (Chi and Kwon). Too much research has been done to investigate causes, untapped sources, and socioeconomic consequences of income inequality and the detrimental effects of its persistence. It is always argued that a lack of access to finance is the reason that widens the gap between rich and poor.

Most of the developing countries have undergone the process of financial restructuring and liberalization to strengthen the fragile private sector to achieve sustained economic growth (Levine, 1995; Sabir and Qayyum, 2018). Financial reforms in developing countries allowing greater commercial discretion to banks have brought into focus the debate on the potential impact of reforms on income inequality. It would appear at first sight that allowing banks greater freedom in lending decisions, and reducing the share of government-determined allocation of credit to total bank credit should improve the prospect of a wider section of the population benefitting from the services of the financial sector. Reducing the role of government in lending decisions reduces the prospect of public choice capture of bank credit by politically powerful rent-seeking groups, and thus potentially increases the ability of a wider section of the population to access the services of the financial sector to establish businesses and develop human capital (Clarke et al., 2006). It is in the commercial interest of a liberalized financial sector to match entrepreneurial ability and borrowing opportunity to generate economic activities.

Financial reforms giving greater commercial independence to banks may not necessarily increase access to the poor if the transaction cost of collecting information about the creditworthiness of applicants without a credit history is not commercially attractive. Also, if the availability of credit to a wider segment of the population stimulates entrepreneurial behavior but only self-employment is the outcome for a few and only the latter prosper, inequality could
increase (Banerjee & Newman 1993) in the absence of countervailing redistributive policies of the government. Stein (2010) provides evidence from Zambia that larger companies have benefitted but small enterprises have been starved of credit following bank privatization in that country.

Pessimism over reform might prove unwarranted if the better allocation of finance in the economy contributes to greater productivity, and, crucially, if the fruits are distributed more widely. Then inequalities may even come down. It is also argued that financial reform decreases income inequality in countries where institutions are strong and able to invest in physical and human capital (Law et al., 2014; Rajan & Zingales, 2003). There are models constructed under different sets of assumptions exploring the types of functional relationships likely to arise amongst financial depth, human capital, and income inequality. The functional relationship between inequality and financial depth is linear, according to Golar and Zeira (1993) and Banerjee and Newman (1993). The model proposed by Greenwood and Jovanovic (1990) suggests a non-linear inverted U-shaped functional relationship between finance and income inequality. In the absence of strong institutions ensuring good governance, human capital investment is left in private hands. Access is denied to poorer segments of the population. The benefits of that investment may not reach out to all and thus contribute to an increase in inequality. What does happen to inequality when financial depth increases is an empirical matter. Numerous studies indicate that occupational choices are determined by credit (Banerjee & Newman, 1993) and human capital investment is also dependent on financial development in terms of credit (Greenwood & Jovanovic, 1990). However few studies find that financial development has increasing impacts on income inequality by denying poor people access to financial services to equip them with education (Nikoloski, 2012; Jauch & Watzka, 2016). A recent study by Sabir and Khan (2018) reveals that human capital decreases income inequality in developing countries without considering the role of financial development.

Echoing the previous research, this study explores the combined effect of financial development and human capital on income inequality in developing countries. Moreover, this study contributes to the literature by recognizing the direct channel of financial development and human capital development to study their effects on income inequality. This study uses dynamic measures of income inequality captured with the income share of the bottom and the Gini coefficient. This study disaggregates human capital into educated and healthy human capital. Average years of secondary and average years of tertiary schooling are used to measure educated human capital, while life expectancy is used to measure health human capital.

This study considers one particular aspect of financial liberalization or financial deepening (financial depth) through an increase in the ratio of private sector credit to GDP. The impact of financial depth and human capital on income inequality are examined in this study using data from 1996 to 2019 over a cross-section of 31 developing countries. Since human capital is also an explanatory variable of the income distribution, measures of human capital are educated human capital measured with average years of secondary and tertiary schooling and
health human capital measured with life expectancy. The econometric methodology takes onboard potential endogeneity problems, omitted variable bias, and heteroscedasticity while considering non-linearity in the estimation of coefficients of the model. To address these econometric problems, the system generalized method of moment (GMM) is employed to estimate the relationship between financial development, human capital, and income inequality in developing countries.

The study is organized as follows. Section 2 synthesizes a review of the literature on financial development and income inequality. Section 3 outlines the model and methodology of the study choice of variables in the econometric model, and the data sources are also mentioned in this section. Section 4 provides descriptive statistics of the data and tabulates the estimate coefficients of the model. Section 5 concludes the finding of the study.

Literature Review

Financial Development and Income Inequality

This study contributes to the literature on the financial development-income inequality nexus. Several studies have discussed the theoretical and empirical relationship between financial development and economic growth (Levine, 2005; Levine et. al., 2000; Roussean and Wachtel, 1998; King and Levine, 1993). Financial development leads to economic growth through efficient allocation of physical capital by slashing down financial constraints. However development discourse raises the question, does finance-led growth benefit the poor or lower segment of the society? Such type of growth may marginalize the poor by creating job opportunities but it can also favor business groups and their profit earnings. Kuznets (1955) obtained an inverted U-shaped relationship between income distribution and economic development. This finding is known as the Kuznets curve and this theory is based on the argument of rural societies which are more equal but have less income than urban areas at the start of industrialization, thus urbanization started and societies become more unequal. As cities get developed, people of rural areas migrate to urban areas to earn high wages, therefore their income increases, and overall income inequality brings down. There is a possibility that migrants may get benefit from the financial sector by borrowing money to develop their human capital and establish their businesses. In this way, financial development negatively impacts income inequality (Banerjee and Newman, 1993; Galor and Zeira, 1993). An inverted U-shaped association has been supported by the study of Greenwood and Jovanovic (1990). Bottom line is that at the early stage of economic development, financial development ramps up income inequality, but after achieving the threshold level of income, financial development reduces income inequality. If financial markets are not functioning well, it affects economic growth negatively and has a positive influence on income inequality. In the presence of imperfect financial markets, a lower segment of the population and small enterprises are being badly affected owing to asymmetric information, contract enforcement, and transaction costs (Galor and Zeira, 1993). As a result, financially constrained households, entrepreneurs, and small
businesses depend on their assets to finance projects, and thus remain poor, inflicting perpetuate income inequality. In economies with a mounting level of initial inequality, weak institutional quality leads to unequal access to the financial market and thus causes unequal opportunities which in turn perpetuates income inequality (Claessens and Perotti, 2007).

However several theoretical models suggest that financial development can reduce income inequality and poverty, enhance economic growth by improving the efficiency of physical capital allocation. Financial development can uplift funding constraints, improve collateral use, and credit histories to diminish income inequality (Aghion and Bolton, 1997; Golar and Moav, 2004). Several empirical studies have investigated the relationship between financial development and income inequality and found a negative relationship between both variables (Li, Squire, and Zou, 1998). Moreover, it has been observed that income inequality has decreased in 83 developed and developing countries from 1960 to 1995 when the financial market was liberalized and developed (Clarke et al., 2006). It has been found that financial development has improved the income of the poor quintile and thus reduced income inequality (Beck et al., 2007; Kappel, 2010; Hamori and Hashiguchi, 2012). However, Jaumotte et al. (2008) find a positive relationship between financial development and inequality for 51 developed and emerging countries. It has been observed that financial development decreases income inequality in a heterogeneous panel of 119 countries in the long run (Thornton and Di Tommaso, 2019). A study by Altunbas and Thornton (2019) reveals that finance widens greater inequality in high and lower-income countries while it decreases income inequality in upper-middle-income countries. Non-linear U shaped relationship has been observed by Tan and Law (2012) for 35 emerging countries. While the inverted U-shaped relationship is obtained for developed and emerging countries (Nikoloski, 2012; Jauch and Watzka, 2016).

Single country studies have come up with ambiguous results. For instance, commercial banks and stock market development are not significantly correlated with income inequality in Malaysia for the time period 1980-2000 (Law and Tan, 2009). Similarly, the lower segment of society gets to benefit from financial development in the United States of America (Beck et al., 2010). While it is claimed that less financial expansion has led to less income inequality in Thailand (Gine and Townsend, 2004). Another study finds that financial development exacerbates income inequality in both the short-run and long-run in India over the time 1982-2012 (Sehrawat and Giri, 2015).

**Human Capital and Income Inequality**

Income inequality is considered the most important economic problem in both developing and advanced countries. The data set shows that the aggregate economic growth has raised income inequality in many large counties from 1970 to 2000 (Sala-i-Martin, 2003). In the last two decades, income inequality has risen in many regions (IMF, 2013). Furthermore, the problem of rising income inequality has been more worsened, especially after the global financial crisis (Bordo and Meissner, 2012).
As it is a well-established fact that economic growth alone is not a sufficient tool to reduce income inequality. Therefore a large number of studies emphasize human capital development to decrease income inequality. Human capital development through education and health enhance both the learning capacities and capabilities of the workforce. Consequently, they become highly learned, experienced, and productive enough to earn higher wages. Consequently, this leads to a reduction in income inequality (Bloom et al., 2004; Balakrishnan et al., 2013; Anand et al., 2014).

Better and equal access to education along with quality education enables the workers to better understand the new technology. This raises the productivity of workers to earn more to eliminate income inequality (Andersen, 2015). Human capital development is essential to reduce income inequality and to accelerate the process of development. Human capital development through education enhances the productivity of the workers to earn more income by creating productive and decent employment. So the governments have to invest more in education to reduce the income inequalities and enhance the process of development (Ayodeji and Adebayo, 2015).

Human capital formation through educational attainment along with social expenditures improves the distribution of income in some countries. Moreover, the increased number of years of schooling allows the workforce to earn a high income by raising productivity (Gregorio and Lee, 2002). Human capital accumulation improves the process of development in the presence of a well-functioning financial market and also reduce income inequalities. As compared to physical capital formation, human capital development is more inclusive. It not only raises the productivity of the workers but also ensures the participation of a large number of workers. Thus more emphasis should be given to human capital accumulation to reduce income inequality (Galor and Moav, 2004). Educational attainment is important for the accumulation of human capital. It raises the competencies and the productive skills of the workers. As the result, they produce higher levels of output to earn more wages. This significantly reduces income inequality, particularly in developing countries (Checchi and Werfhorst, 2014; Sabir and Aziz, 2018). Financial development enables people to borrow money from financial markets to enhance human capital formation that increases their productivity and income, and thus reduces income inequality (Galor, 2012).

Our study adds to the finance-inequality nexus literature by including human capital development as an additional variable to see its impact on income inequality through financial development for 31 developing countries over the time span 1996-2019. This is the first study that establishes the link between human capital, financial development, and income inequality. To achieve the objectives of the study, the system generalized method of moment (GMM) of Arellano and Bover (1995) is used to tackle the problem of endogeneity.
Model and Methodology

We estimate the following data regression equation over the period 1996 to 2019 for a set of 31 developing countries listed in Appendix A.

\[ y_{it} = f(FD_{it}, H_{1it}, H_{2it}, X_{it}) + u_{it} \quad \ldots \ldots \quad (1) \]

\[ y_{it} = \alpha_0 + \alpha_1 FD_{it} + \alpha_2 FD_{it}^2 + \alpha_3 \ln GDP_{it} + \alpha_4 \ln GDP_{it}^2 + \beta_1 H_{1it} + \beta_2 H_{2it} + u_{it} \quad \ldots \ldots \quad (2) \]

In estimating the above equation, we allow for the nonlinear relationship between income inequality and financial development as in equation 3 below:

\[ y_{it} = \alpha_0 + \alpha_1 FD_{it} + \alpha_2 FD_{it}^2 + \alpha_3 \ln GDP_{it} + \alpha_4 \ln GDP_{it}^2 + \beta_1 H_{1it} + \beta_2 H_{2it} + \gamma X_{it} + u_{it} \quad \ldots \ldots \quad (3) \]

Where subscript ‘i’ denotes the countries in our dataset (i = 1, 2, ..., 31), and ‘t’ stands for the year (t = 1996, 1997, ..., 2019). The parameters \( \alpha, \beta, \) and \( \gamma \) are the vectors of unknown parameters to be estimated and \( u_{it} \) is the random term. If \( \alpha_1 \) is significant, and \( \alpha_2 \) is not significant, there is a linear relationship between financial development and inequality. If, on the other hand, \( \alpha_1 \) is found to be positive (\( \alpha_1 > 0 \)) and \( \alpha_2 \) is found to be negative (\( \alpha_2 < 0 \)), and both are statistically significant, then there is an inverted U-shaped relationship between inequality and financial development. To control the non-linear impact of economic development, we include the natural logarithm of GDP (\( \ln GDP \)) and its square term (\( \ln GDP^2 \)) (Kuznets, 1955). For the Kuznets curve, \( \alpha_3 \) must be positive and significant while \( \alpha_4 \) must be negative and statistically significant.

The variable \( y_{it} \) is a measure of income inequality. Discussions about liberalization and income distribution in developing countries often focus on the impact on poverty (Dollar & Kraay 2002, Dollar, Kleinberg & Kraay 2016). Inequality and poverty are not the same. The focus of this study is on inequality but one of the inequality measures used here, the share of the bottom quintile, \( Q_b \), of total income, also captures an aspect of poverty. The other measure is the Gini coefficient. The data on income distribution is taken from Solt’s Standardized World Income Inequality Database (SWIID) (2009)\(^{iii}\). \( H \) and \( FD \) denote the human capital and financial development variables, respectively. Human capital (\( H \)) is measured in the literature by the years of schooling. In this study, proxies of human capital, \( H_1 \), and \( H_2 \), are average years of secondary and tertiary school attendance, respectively, of those age 15 and above. The data and method of construction can be found in Barro and Li (2012).\(^{iv}\) Moreover, this study also uses life expectancy as a measure of health human capital. The literature on the impact of financial development on economies in the West is beginning to take note of the phenomenon of financialization which started there some 40 years ago, accelerating in the 1990s (Krippner 2011). In the US, a large if not the biggest component of profits now arises from trade in shares and other financial products even in non-financial, for example, manufacturing, companies (Orhangazi 2008). Since this study focuses on developing countries, financialization is not considered. Financial development for our purposes here is measured instead in a more traditional way, as the ratio of private sector credit to GDP.
Two such measures, $Q_b$ and Gini, are used in two separate regressions. $H$ and $FD$ denote the human capital and financial development variables, respectively. $X$ represents a vector of control variables commonly used in the determination of income inequality following the relevant literature. Controlled variables comprise real GDP per capita, rate of inflation, trade openness, government spending as a share of GDP, and value-added share of agriculture as a percentage of GDP respectively. Data life expectancy, $FD$, and the variables comprising the vector $X$ of control variable in our regression model for 31 developing countries over the time span 1996 to 2019 are taken from the World Development Indicators published by the World Bank. We consider the World Bank classification of lower middle income and low-income countries as developing countries. Moreover, 31 developing countries are chosen based on the availability of data.

First, we use a fixed-effect model to estimate equations (2) and (3). There is an endogeneity problem in the human capital and financial development variable (Beck et al., 2007; Haan and Sturm, 2017; Clarke et al. 2006) which is addressed by resort to the System Generalized Method of Moment, known as GMM or SGMM. This technique has recently been proposed by Arellano and Bover (1995) and Blundell and Bond (1998). System GMM is based on two equations; a level equation instrumented with the lagged difference of the variables and an equation with the first difference instrumented with the lagged level value of the variables. Therefore to address the problems of endogeneity, heteroscedasticity, and omitted variable bias, SGMM is used.

**Results and Discussion**

Results of baseline equation (2) and non-linear equation (3) using a fixed effect least squares dummy variable method both with and without control variables are reported in table 1 of columns 2 and 3 respectively where Income inequality is measured by Gini index. To tackle the potential problem of endogeneity in financial development and human capital variables, equations (2) and (3) are estimated using System GMM, and estimated coefficients are given in columns 3 and 4 in tables 1.

The coefficients of $FD$ and $FD$-squared are significant with FE and GMM estimates reported in Table 1. The coefficient for $FD$ is positive and for that $FD$-square is negative in these columns, indicating an inverted-U-shaped relationship between financial deepening and Gini index. This implies that financial development has non-linear impacts on income inequality across two different methodologies. Both measures of the human capital variables hurt the income inequality in terms of the Gini index in all the regressions, which is consistent with the hypothesis that human capital development is promoting income equality. Moreover, improvement in health human capital measured with life expectancy has decreasing impacts on income inequality. A longer life increases the productivity and income of the workers that reduces income inequality (Biggs et al., 2010; Sabir and Aziz, 2018). More interestingly, increasing GDP per capita increases the Gini index at initial stages of development but in the
later stage of development, income inequality slashes down. Therefore there exists an inverted U-shaped relationship between GDP per capita and income inequality.

**Table 1**: Financial Development, human capital, and income inequality

|                      | FE     | FE     | GMM    | GMM    |
|----------------------|--------|--------|--------|--------|
| **Gini(-1)**         | 0.906*** | 0.882*** | (0.000) | (0.000) |
| **Ln(GDP/capita)**   | 2.087*** | 2.250*** | 2.704*** | 2.067** |
|                      | (0.000) | (0.000) | (0.007) | (0.048) |
| **Ln(GDP/capita)**   | -0.889*** | -0.799*** | -0.207*** | -0.159** |
|                      | (0.000) | (0.000) | (0.003) | (0.029) |
| **FD**               | 0.032** | 0.035** | 0.014* | 0.030*** |
|                      | (0.032) | (0.027) | (0.058) | (0.000) |
| **FD**               | -0.001* | -0.001* | -0.016** | -0.003*** |
|                      | (0.074) | (0.085) | (0.037) | (0.000) |
| **H1(Secondary Education)** | -0.748*** | -0.767*** | -0.011** | -0.020** |
|                      | (0.000) | (0.000) | (0.020) | (0.021) |
| **H2 (Secondary Education)** | -1.193*** | -1.371*** | -0.168*** | -0.014** |
|                      | (0.000) | (0.002) | (0.002) | (0.022) |
| **Life Expectancy**  | -0.089** | -0.164*** | -0.020*** | -0.021*** |
|                      | (0.023) | (0.000) | (0.007) | (0.005) |
| **Ln(Govt. spending)** | 0.910*   | 0.171*   | (0.100) | (0.100) |
| **Inflation(CPI)**   | 0.021* | 0.015** | (0.064) | (0.019) |
| **Trade Openness**   | 0.013* | 0.020* | (0.085) | (0.074) |
| **Share of Agriculture Value Added** | -0.023** | -0.013** | (0.038) | (0.015) |
| **Constant**         | -5.282*** | -3.215*** | -4.985*** | -1.608*** |
|                      | (0.003) | (0.000) | (0.006) | (0.002) |
Of the control variables, the value-added share of agriculture in the GDP reduces inequality with both FE and GMM estimations. Whereas government, inflation, and trade openness seem to stimulate larger income inequality, and their coefficients are statistically significant.

We change the dependent variables Gini index with the income share of the bottom quintile (Qb) and re-estimate equations 2 and 3 using FE and system GMM techniques, and results are displayed in table 2 of columns 2, 3, 4, and 5 respectively. Focusing on the GMM estimates with control variables, we can compare and contrast the impact on this measure of inequality to policy variables in our equation. Note that, unlike the Gini index, an increase in Qb means a decrease in inequality. Thus the sign of the coefficients in Table 2 has a different interpretation than those in the aforementioned Table.

**Table 2: Financial Development, human capital and Income share of Poor**

|                | FE   | FE   | GMM  | GMM  |
|----------------|------|------|------|------|
| Qb(-1)         |      |      | 0.873*** | 0.749*** |
|                |      |      | (0.000) | (0.000) |
| Ln(GDP/capita) | -1.635*** | -1.002*** | -1.712** | -1.529** |
|                | (0.000) | (0.000) | (0.013) | (0.029) |
| Ln(GDP/capita)^2 | 0.118*** | 0.279*** | 0.048** | 0.137** |
|                | (0.000) | (0.000) | (0.015) | (0.027) |
| FD             | -0.027** | -0.041*** | -0.012* | -0.056* |
|                | (0.033) | (0.000) | (0.074) | (0.089) |
| FD2            | 0.004*** | 0.001*** | 0.003** | 0.019* |
|                | (0.003) | (0.000) | (0.046) | (0.068) |
| H1 (Primary education) | 0.105* | 0.207*** | 0.291* | 0.367** |
|                | (0.066) | (0.000) | (0.058) | (0.028) |
| H2 (Secondary education) | 0.506*** | 0.484*** | 0.051** | 0.282** |
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|                                | (0.001) | (0.003) | (0.014) | (0.045) |
|--------------------------------|---------|---------|---------|---------|
| **Life expectancy**            | 0.121***| 0.127***| 0.003** | 0.109****|
|                                | (0.000) | (0.000) | (0.037) | (0.046) |
| **Ln(Govt. Spending)**         | -0.157  | -0.059  |         |         |
|                                | (0.137) | (0.769) |         |         |
| **Inflation**                  | -0.008***| -0.036**|         |         |
|                                | (0.003) | (0.024) |         |         |
| **Trade openness**             | -0.004* | -0.001* |         |         |
|                                | (0.085) | (0.081) |         |         |
| **Agriculture’s share in value-added** | 0.024** | 0.014* |         |         |
|                                | (0.017) | (0.061) |         |         |
| **Constant**                   | 5.802***| 4.445***| 2.625***| 2.052** |
|                                | (0.000) | (0.000) | (0.000) | (0.023) |
| **Sargan**                     | 87.070  | 89.308  |         |         |
| **AR(1)**                      | 0.618   | 0.518   |         |         |
| **AR(2)**                      | 0.000   | 0.000   |         |         |
|                                | 0.258   | 0.249   |         |         |

*, ** and *** indicates level of significance at 10%, 5% and 1% respectively.

Contrarily the GMM estimates in the case of the Gini index, this alternative measure of inequality declines sturdily as GDP per capita increases but after achieving a threshold level of income, an increase in GDP per capita boosts up the income of the bottom twenty percent of the population. Thus this study reveals the U-shaped relationship between GDP per capita and income of the poorest twenty percent of the population. This means that a share of income accruing to the bottom quintile of the income group in society goes up as GDP per capita rises. So far, this measure of inequality focuses on the poor, our estimates are consistent with the claim that sustained growth is good for the poor segment of the society (Dollar & Kraay 2001) The functional relationship of this alternative measure to financial deepening is similar to that in the case of Gini index. Share of the bottom quintile is a U-shaped function and the implied inequality is thus an inverted U. The poor do not benefit much from financial deepening at the initial stages of the policy allowing greater commercial freedom to banks. Then the impact on inequality is reversed as the ratio of private sector credit to total credit continues to increase. As for the impact of the human capital variables, both measures of educated human capital, for
instance, average years of secondary schooling and average years of tertiary schooling have a positive and statistically significant influence on the income of the bottom twenty percent of the population. Therefore as human capital increases, it benefits the poor, and the share of the bottom quintile goes up. Moreover health human capital has also an increasing impact on the share of the bottom quintile.

Inflation decreases this measure of inequality $Q_b$ contrary to the Gini measure considered in Table 1. The coefficient though significant is very small for both the measures of inequality. Opening up the economy to trade reduces the share of income to the bottom 20 percent of the population, but the impact is very small for both measures of income inequality. Moreover, government spending has a negative and statistically insignificant effect on the income share of the bottom quintile while an increase in agriculture value-added has a rising influence on income inequality.

**Conclusion**

There is considerable discussion in the literature on the impact of financial development on income inequality by allowing greater commercial freedom to banks. Models are attempting to capture not only the impact but also the mechanism through which the impact occurs. In our view, the questions raised are matters which call for empirical examination of how inequality is measured, and how income dispersion develops. Pursuing the second issue would entail an examination of income changes of a representative of the population, individually identified on the dataset over some time. Our dataset is enriched by data on a cross-section of 31 developing countries overtime the period 1996-2019.

Restricting ourselves to snapshot measures, ignoring lifetime income as in the literature, of inequality, we approach two different ways of measuring income inequality, the Gini coefficient and the share of the bottom 20 percent of the population. Keeping in mind that inequality and poverty are not the same, the latter measure of inequality nonetheless allows us to put a clearer focus on poverty. We regress these two separate measures of inequality over a set of policy variables including financial deepening, human capital, GDP per capita controlled with various macroeconomic variables. This study has found that human capital in terms of education and health decreases income inequality while financial development has inverted U-shaped impacts on income inequality. Therefore this study urges to enhance human capital in developing countries to develop the skill and capabilities of workers to increase their productivity and income. Therefore human capital development would sustainably reduce income inequality. Additionally, there is a need to create competition in the financial sector competitive to overcome financial constraints that decrease the borrowing capacity of the poor that widens income inequality. Whilst we find commonalities in control variables, we can also highlight some interesting differences.

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### Appendix A: List of Developing Countries

**Table A1: List of Developing Countries**

|   | Bangladesh |   | India |   | Pakistan |
|---|------------|---|-------|---|----------|
| 1 |            |   |       |   |          |
| 2 | Benin      | 13| Kenya | 24| Philippines |
| 3 | Bolivia    | 14| Lesotho| 25| Rwanda |
| 4 | Cambodia   | 15| Malawi | 26| Senegal |
| 5 | Cameroon   | 16| Mali | 27| Sierra Leone |
| 6 | Costa Rica | 17| Mauritania | 28| Sri Lanka |
| 7 | Egypt      | 18| Moldova | 29| Togo |
| 8 | El Salvador | 19| Morocco | 30| Tunisia |
| 9 | Gambia     | 20| Mozambique | 31| Ukraine |
|10 | Ghana      | 21| Namibia |   |          |
|11 | Honduras   | 22| Nepal |   |          |

### A2: Descriptive Statistics

|                  | Obs.  | Mean     | Std. Dev. | Min   | Max    |
|------------------|-------|----------|-----------|-------|--------|
| Gini             | 744   | 43.549   | 5.661     | 25.700| 61.600 |
| Q₀               | 744   | 6.289    | 1.893     | 1.100 | 10.500 |
| Ln(GDP/capita)   | 744   | 7.037    | 0.674     | 5.447 | 8.391  |
| FD               | 744   | 26.867   | 18.235    | 1.384 | 114.159 |
| H₀               | 744   | 4.437    | 2.364     | 0.06  | 7.7605 |
| H₁               | 744   | 0.243    | 0.474     | 0.000 | 2.720  |
| Life expectancy  | 744   | 60.465   | 13.896    | 0.260 | 78.348 |
| SAV*             | 744   | 21.599   | 11.163    | 3.762 | 60.284 |
| Ln(Govt, Spending)| 744  | 21.578   | 1.556     | 18.236| 26.521 |
| Trade Openness   | 744   | 69.516   | 29.656    | 21.930| 161.894 |
| Inflation (CPI)  | 744   | 6.671    | 6.845     | -9.620| 80.326 |

*SAV: Share of agriculture in the total value-added*
Table A3: Correlation Matrix

|                | Gini  | Ln(GDP/cap) | FD   | H1   | H2   | Life Expectancy | SAV  | Ln(Govt. Spending) | Trade Openness | Inflation |
|----------------|-------|-------------|------|------|------|-----------------|------|-------------------|----------------|-----------|
| Gini           | 1.000 |             |      |      |      |                 |      |                   |                |           |
| Ln(GDP/capita) | 0.040 | 1.000       |      |      |      |                 |      |                   |                |           |
| FD             | 0.061 | 0.608       | 1.000|      |      |                 |      |                   |                |           |
| H1             | 0.061 | 0.142       | 0.028| 1.000|      |                 |      |                   |                |           |
| H2             | 0.052 | 0.324       | 0.302| 0.579| 1.000|                 |      |                   |                |           |
| Life Expectancy| -0.137| 0.411       | 0.457| -0.745| 0.428| 1.000           |      |                   |                |           |
| SAV            | -0.173| -0.802      | -0.506| -0.126| -0.251| -0.301          | 1.000|                   |                |           |
| Ln(Govt. Spending) | -0.060| 0.552       | 0.549| -0.033| 0.204| 0.428           | -0.499| 1.000             |                |           |
| Trade Openness | 0.125 | 0.308       | 0.169| 0.095| 0.122| 0.012           | -0.324| -0.133            | 1.000          |           |
| Inflation      | 0.041 | -0.068      | -0.159| 0.016| 0.041| -0.044          | 0.110 | 0.029             | 0.134          | 1.000     |

Table A4: Correlation Matrix

|                | Qb   | Ln(GDP/cap) | FD   | H1   | H2   | Life Expectancy | SAV  | Ln(Govt. Spending) | Trade Openness | Inflation |
|----------------|------|-------------|------|------|------|-----------------|------|-------------------|----------------|-----------|
| Qb             | 1.000|             |      |      |      |                 |      |                   |                |           |
| Ln(GDP/cap)    | 0.054| 1.000       |      |      |      |                 |      |                   |                |           |
| FD             | 0.103| 0.608       | 1.000|      |      |                 |      |                   |                |           |
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|        | $H_1$        | $H_2$        | SAV        | **Ln(Govt. Spending)** | Trade Openness | Inflation |
|--------|--------------|--------------|------------|-------------------------|----------------|-----------|
|        | -0.098       | 0.098        | 0.028      | 0.016                  | -0.068         | 0.0057    |
|        | 0.142        | 0.324        | 0.301      | -0.159                 | 0.308          | -0.068    |
|        | 0.028        | 0.301        | 0.016      | 0.041                  | 0.169          | -0.159    |
|        |              |              | -0.068     |                        |                |           |

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1. The positive externalities of education are also not fully realized to help economic growth investment in a public good such as schooling is decided by purely private calculation of gains and losses.
2. List of countries is given in Appendix A
3. https://www.wider.unu.edu/data
4. Barro and Lee divide population of 15 and above into thirteen age groups to find out number of years of schooling. For example, $a=1$ for age group 15-19, $a=2$ for 20-24, $a=3$ for 75 and above. They calculated the share of each group in the population of 15 and above with respect to each education level. Then multiplied this share with each group ‘$a$’ attended level of education (primary, secondary) and corresponding durations in years. At the end, sum up for each group to get average years of schooling for each level of education (Barro and Lee, 2012, pp. 5).
5. http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators