Chisadza, Carolyn; Biyase, Mduduzi

Book

Financial development and income inequality : evidence from advanced, emerging and developing economies

University of Pretoria
Department of Economics Working Paper Series

Financial Development and Income Inequality: Evidence from Advanced, Emerging and Developing Economies

Carolyn Chisadza
University of Pretoria
Mduduzi Biyase
Economic Development and Well-being Research Group and University of Johannesburg
Working Paper: 2022-21
April 2022

Department of Economics
University of Pretoria
0002, Pretoria
South Africa
Tel: +27 12 420 2413

Financial Development and Income Inequality: Evidence from Advanced, Emerging and Developing Economies

Carolyn Chisadza[1] *Mduduzi Biyase*[2]

Abstract

Using a broad-based index of financial development, this paper investigates the effects of financial development on income inequality for 148 countries between 1980 and 2019. The findings indicate that in general, financial development reduces inequality across emerging and least developed countries, but is not statistically significant for advanced countries. However, when we disaggregate the financial development index into its sub-components (financial institutions and financial markets), we find different effects on inequality, based on the levels of development. Further investigation on the dimensions under financial institutions and financial markets (depth, access and efficiency) reveals that banking sector development under financial institutions has income inequality-reducing effects in emerging and least developed countries, while stock market development under financial markets widens inequality in least developed countries. The findings in our paper firstly highlight the nuances in financial development depending on the level of development in countries, and secondly that policies focussed on financial inclusion of the poor can mitigate inequality.

Keywords: financial development, financial markets, inequality, financial institutions
JEL Codes: C22, D63, G20, O55

[1] *Corresponding author*. Department of Economics, University of Pretoria, Private Bag X20, Hatfield, 0028, South Africa; e-mail: carolyn.chisadza@up.ac.za
[2] Director of the Economic Development and Well-being Research Group (EDWRG) and senior lecturer at the School of Economics, University of Johannesburg, mbiyase@uj.ac.za

1. Introduction

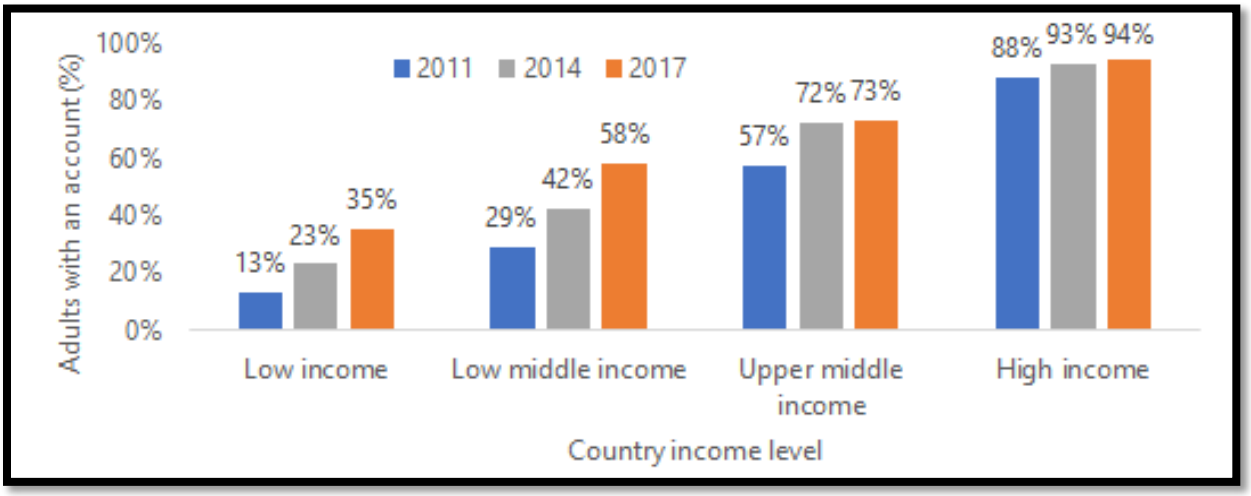
Kuznets' hypothesis suggests that the problem of inequality can be resolved with economic growth (Kuznets, 1955), however this has not necessarily corresponded with reality. Widening income inequality continues to be a challenge for not only emerging and developing countries, but advanced countries as well, with nearly two-thirds of advanced countries facing rising inequality over the past two decades (OECD, 2008; 2015). In addition, according to the most recent World Inequality Report "On average, an individual from the top 10% of the global income distribution earns €87,200 (USD122,100) per year, whereas an individual from the poorest half of the global income distribution makes €2,800 (USD3,920) per year" (Chancel et al., 2022). The far-reaching consequences of inequality are also well documented—inequality promotes instability (Berg & Ostry, 2011, Acemoglu & Robinson, 2001), and worsens health, education and well-being (Pickett & Wilkinson, 2015). Understanding the dynamics of inequality has therefore received a great deal of attention among policy-makers and economists (such as Piketty, 2014, Alvaredo et al., 2018a and Alvaredo et al., 2017; 2018b), not to mention combating inequality is critical for achieving sustainable economic development (Sustainable Development Goal 10).

Economists are recognizing the potential of financial sector reform to boost financial development, which in turn ameliorate economic growth and reduce income inequality gap between the rich and poor. Perhaps reassuringly, global estimates on financial access reveal sizable increase for the past number of years. For example, the portion of adults having a bank account increased globally from 51 percent in 2011 to 69 percent in 2017, amounting to an extra 515 million people. The increase in account ownership varied from one income group to another, with low income registering the biggest increase from 13 percent to 35 percent, low middle-income from 29 percent to 58 percent, upper middle income from 57 to 73 percent, and upper income ranging from 88 to 94 percent (see Figure 1), (World Bank Group, 2021). This raises an interesting question about the degree to which the financial sector development can affect income inequality.

The financial development-economic growth nexus has received a great deal of attention in this field (Lucas, 1988; King & Levine, 1993). The most widely held view is that financial development eases access to credit and other financial products that can stimulate economic growth, such as mobilization of savings for physical and human capital accumulation, and provision of capital to

businesses that generate employment (Biyase & Chisadza, 2022; Tchamyou & Asongu, 2017; Tchamyou, 2020). Although studies on the financial development-economic growth link have been well documented, less is well known however about the effect that financial development has on income inequality (Adams & Klobodu, 2016). Moreover, inequality trends in countries tend to be different, based on their level of development. Innovations over the years have also seen the financial sector evolve with a wider variety of financial instruments now available. It is within this context that we make our contribution. First, we investigate the impact of financial development on inequality across advanced, emerging and least developed countries, which accounts for the varying levels of development. Second, we use a relatively novel financial development index that measures various dimensions of the financial sector from 1980 to 2019 (Sahay et al., 2015), which takes into account the financial developments that have occurred in this sector. Most empirical studies tend to rely on one or two measures of financial development such as the ratio of private credit to GDP or broad money to GDP. We explore various sub-dimensions of financial development, such as financial markets' depth, access and efficiency, as well as financial institutions' depth, access and efficiency. The rationale for exploring the sub-dimensions of financial development is that they may affect income inequality differently. Finally, we explore the quadratic specifications to establish whether there are non-linear effects between financial development and inequality across advanced, emerging and least developed countries.

Figure 1: Account ownership by country income group



Source: Demirguc-Kunt et al. 2018.

The findings indicate that in general, financial development reduces inequality across emerging and least developed countries. However, when we disaggregate the financial development index into its sub-components, we find different effects on inequality, based on the levels of development. The rest of the paper proceeds as follows: Section 2 sheds light on theoretical background and empirical literature review. Section 3 describes the data and empirical methodology. Section 4 discusses the empirical results. Section 5 concludes the analysis.

2. Literature review

Since the influential contributions of Banerjee and Newman (1993), Galor and Zeira (1993) and Greenwood and Jovanovich (1990), the association between financial development and income inequality has been broadly studied with mixed findings. Various hypotheses (partly derived from the above-mentioned studies) concerning financial development and inequality have been offered in this field. The most commonly cited hypotheses of financial development and income inequality are "the inequality-widening hypothesis, the inequality-narrowing hypothesis and the inequality inverted U-shaped hypothesis" (Shahbaz et al., 2017: 5339).

Crucial to the inequality-widening hypothesis is the assertion that there exists rich-based preferences owing to their alleged credit-worthiness in the financial institutions. Rich-based preferences practiced by financial institutions (such as banks) only serve to widen the gap between the rich and the poor (De-Gregorio, 1996). According to the inequality-narrowing hypothesis, as the financial sector grows more people (especially the historically excluded or disadvantaged sections of the population) will participate in the financial sector, thereby facilitating financial inclusion and even creating new opportunities for the financial sector (Aghion & Bolton, 1997; Banerjee & Newman, 1993; Galor & Moav, 2004; Galor & Zeira, 1993). The finance–income inequality inverted U-shaped hypothesis proposed by Greenwood and Jovanovich (1990), postulates that the distributional effect of financial development on the low-income households depends very much on the level of financial development. At the initial stages of financial development, only the affluent individuals stand to benefit from the financial institutions. At higher levels of development, even the low-income households may gain access to financial institutions and therefore stand to benefit from it, which in turn reduces the gap between the rich and low-income households.

Empirical investigations on the finance-inequality nexus have so far yielded mixed findings, with some studies finding a strong support for inequality-widening hypothesis while other studies fail to reject the inequality-narrowing hypothesis or the finance–income inequality inverted U-shaped hypothesis. Empirical findings that confirm the inequality-narrowing hypothesis come from Bittencourt (2010) who focuses on Brazil for the period 1985–1994. He employs the M2, M3, credit to private sector and personal credit as measures of financial development and finds evidence to suggest that financial development reduces the inequality gap between the rich and poor in Brazil. Reaching a similar conclusion, Shahbaz and Islam (2011) employed an Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration for long-run relationship and the error correction model (ECM) for the short run relationships in Pakistan. The authors find evidence to suggest that financial development (proxied by banking credit) also lessens the inequality gap between the rich and poor. Similarly, Omar and Inaba (2020), using a fixed effects model for the period 2004 to 2016, find that financial development reduces inequality and poverty in developing countries. Weychert (2020) reaches a similar conclusion for 59 countries with data over the years 2004–2014.[3]

On the other hand, evidence in favour of inequality-widening hypothesis has been found in a number of studies. Investigating the relationship between financial development (measured by ratio of private credit to GDP) and inequality for unbalanced panel of 84 countries from 1975 to 2014, de Haan et al (2021) find a positive relationship between financial development and income inequality. Consistent with de Haan et al (2021), Jauch and Watzka (2016) also find evidence that financial development is positively associated with income inequality in a sample of 138 countries comprising both developed and developing. By the same token, Bolarinwa et al. (2021) also observes a similar finding (positive association between financial development and income inequality) across high, middle-low and low-income African countries. Sehrawat and Giri (2015) fail to reject the income inequality-widening hypothesis for India, as well as Dollar and Kraay

[3] For other studies with evidence related to the inequality-narrowing hypothesis, please see Batuo et al. (2010) for a sample of 22 African countries, Li et al. (1998) for a sample of 40 developing and developed countries, Clarke et al. (2006) for 83 developing and developed countries; Liang (2006) for China, Law and Tan (2009) for Malaysia; Ang (2010) for India and Baligh and Piraee (2013) for Iran.

(2003) for a sample of 92 countries; and Gimet and Lagoarde-Segot (2011) for 49 countries in the European Union.

Support for the finance–income inequality inverted U-shaped hypothesis is established by Lin and Ali (2009) who examine the relationship between financial development (proxied by overall financial development index, banking sector development index, stock market development index, and bond market development index) and income inequality in Turkey from 1990-2015. Using the Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration the authors confirm an inverted U-shaped association between income inequality and overall financial development and banking sector development. Destek (2020) also detected an inverted U-shaped association between income inequality for overall financial development and banking sector development in Turkey. Biyase and Chisadza (2022) examine the short and long-run symmetric and asymmetric effects of financial deepening on income inequality in South Africa by means of an autoregressive distributed lag and annual data for the period 1980 to 2017. They find evidence that the finance–income inequality inverted U-shaped hypothesis holds for South Africa.

3. Empirical Analysis

3.1 Data

We use the Gini index as our dependent variable (Y) for income inequality. The index is obtained from the Standardized World Income Inequality Database (SWIID) and is measured as an estimate of the Gini index of inequality in equivalized (square root scale) household disposable (post-tax, post-transfer) income (Solt, 2020). The Gini index ranges from zero to one, lower values indicating more equal societies while higher values indicate unequal societies. The Gini index is the most widely cited measure of income inequality in the literature (Benczúr1 & Kvedaras, 2020; Beck et al., 2007; Dabla-Norris et al., 2015; Shahbaz et al., 2015).

The most commonly used indicator of financial development is the ratio of liquid financial liabilities to GDP (King & Levine, 1993), or domestic credit to private sector by banks as a percentage of GDP (Beck et al., 2000; Clark et al., 2006;). However, the changes and subsequent developments within the financial sector have necessitated the need to look at multiple indicators to measure financial development. For example, while credit to the private sector still reflects the

contributory role of banks in financial sector, this measure falls short of capturing improvements in access to financial institutions, the efficiency of the financial system, nor does it capture the role of stock markets. It is with this in mind that we make our contribution to the existing literature by considering a recently constructed comprehensive index for financial development (Sahay et al., 2015).[4] This index captures elements across both financial institutions and financial markets, using indicators of financial depth, access, and efficiency. The overall index ($findvpt$) is disaggregated into financial institutions ($fininst$) which include banks, insurance companies, mutual funds, pension funds, and other types of nonbank financial institutions, and into financial markets ($finmarket$) which include stock and bond markets. Within financial institutions and financial markets, different dimensions of the financial system are measured: depth, access, and efficiency. Table 1 provides an overview of the financial development index with its sub-indices. The overall index and its sub-indices are normalised between zero and one, with higher values indicating greater financial development. As indicated earlier, we expect higher values of financial development to be associated with lower income inequality (Clark et al, 2006; Beck et al., 2007; Jeong & Townsend, 2008).

Table 1: Financial Development Index

Financial Development Index					
Financial Institutions			Financial Markets		
Depth	Access	Efficiency	Depth	Access	Efficiency
- Private-sector credit (% of GDP). - Pension fund assets (% of GDP). - Mutual fund assets (% of GDP). - Insurance premiums, life and non-life (% of GDP).	- Branches (commercial banks) per 100,000 adults. - ATMs per 100,000 adults.	- Net interest margin. - Lending-deposits spread. - Non-interest income to total income. - Overhead costs to total assets. - Return on assets. - Return on equity.	- Stock market capitalization to GDP. - Stocks traded to GDP. - International debt securities government (% of GDP). - Total debt securities of nonfinancial corporations (% of GDP). -Total debt securities of financial corporations (% of GDP).	- Percent of market capitalization outside of top 10 largest Companies. - Total number of issuers of debt (domestic and external, nonfinancial corporations, and financial corporations).	-Stock market turnover ratio (stocks traded /capitalization)

Source: Sahay et al. (2015)

[4] See Sahay et al. (2015) for construction of the financial development index and its sub-indices.

To avoid omitted variable bias, we include control variables that may also affect inequality: income per capita, inflation, government expenditure, openness and quality of institutions. Our choice of control variables is based on empirical evidence in the literature. Income per capita (*Gdpcap*) is measured as the real gross domestic product at constant 2015 US$. *Inflation* is the annual rate of inflation measured by consumer prices. Government Expenditure (*Gvtexp*) is the general government final consumption expenditure as a percentage of GDP, while *openness* is measured by trade as a percentage of GDP. These variables are taken from the World Development Indicators (WDIs). For quality of institutions, we use the electoral democracy index (*democracy*) from the Varieties of Democracy (Coppedge et al., 2020). The index is scaled from zero to one and captures the freedom of political and civil society organizations to operate in the country, clean elections that are not distorted by fraud or systematic irregularities, and elections that affect the composition of the chief executive of the country. Higher values indicate better quality of institutions.

Most of the variables are logged, except for Gini, financial development and democracy, which are indices. We expect inflation to be positively associated with income inequality. Rising consumer prices tend to adversely affect the poor relatively more than the rich because the latter usually have better access to financial instruments that can minimize their exposure to inflation (Easterly & Fischer, 2001). We expect income per capita, government expenditure, democracy and openness to be negatively associated with income inequality. Lower income inequality is associated with rising income per capita through reduced poverty (Zhang & Naceur, 2019). Government expenditure captures the redistributive benefits of taxes on income distribution, while openness captures the positive effects of globalization on reducing income inequality by allowing for efficient international allocation of capital and increase in financial wealth (Dabla-Norris et al., 2015). According to Sarkhosh-Sara et al. (2020), democratic institutions can reduce inequality by facilitating economic opportunities to the lower income groups.

3.2 Methodology

We estimate our model based on the inequality-narrowing hypothesis of financial development, which postulates that countries with larger capital market imperfections, that is narrower financial development, should have higher income inequality (Galor & Zeira, 1993; Banerjee & Newman, 1993). Using 148 countries between the years 1980 and 2019, we specify the following model:

$$Y_{it} = \alpha_i + \delta_t + \beta_1 findvpt_{it-1} + \beta_i X_{it-1} + \mu_{it}$$

where Y is income inequality in country i in year t, $findvpt$ is the financial development index, X is a vector of controls, and α_i and δ_t are country and year fixed effects. We run linear regressions with multiple levels of fixed effects (including heterogeneous slopes), by implementing the estimator of Correia (2017). The high dimensional fixed effects (HDFE) method has been suggested in the literature for estimating panels that are large in cross section and large in time series because it allows for unobserved country and time differences through individual specific effects thus giving more efficient estimates. The method pools the time series data for each group and allows the intercepts to differ across the groups. The standard errors are clustered at country and year level. We lag the explanatory variables to allow for delays in the responsiveness of income inequality to its determinants, as well as to minimize the potential bias of economic and statistical endogeneity issues, which can lead to biased estimates and inferences.[5]

Tables 2 and 3 report some descriptive statistics. The mean Gini coefficient averages 0.4 for the global sample, which is relatively low indicating reduced income inequality. The financial development index averages 0.3, which is at the lower end of the scale, suggesting narrow financial development. However, bear in mind that this is a global sample of countries and the true size of the financial development may be muted by the inclusion of economies with delayed growth in their financial sectors, such as in developing countries. Such biases motivate our analytical strategy to separate the countries into economic classifications, which account for the different levels of economic development: advanced, emerging and least developed countries.

Table 2: Summary of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini	5792	.382	.09	.176	.688
Findvpt	4741	.305	.224	0	1
Gdpcap	5312	12006.5	16144.03	215.747	105000
Inflation	5008	21.851	176.161	-18.109	7481.664
Gvtexp	4335	8.04e+10	2.55e+11	1.78e+07	2.80e+12
Openness	5008	78.348	54.349	1.378	442.62
Democracy	5272	.539	.274	.016	.919

Source: *SWIID, WDIs, Varieties of Democracy, Sahay et al. (2015)*

[5] We check for endogeneity in the main explanatory variable (financial development) using the Wu-Hausman F-test and the Durbin-Wu-Hausman chi-square test. We fail to reject the null hypothesis that the variable is exogenous.

When we split the sample of countries by these classifications in Figure 2, we find that advanced countries have relatively higher financial development than the emerging and least developed countries. At the same time, advanced countries also exhibit lower income inequality than emerging and least developed countries.

Figure 2: Income inequality and Financial Development by Economic Classifications

The correlations in Table 3 for all our explanatory variables are in line with expectations. Financial development, income per capita, governmemt expenditure, openness and democracy are negatively associated with income inequality, while inflation increases inequality.

Table 3: Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Gini	1.000						
(2) Findvpt	-0.376*	1.000					
(3) Gdpcap	-0.503*	0.794*	1.000				
(4) Inflation	0.022	-0.070*	-0.052*	1.000			
(5) Gvtexp	-0.147*	0.418*	0.347*	-0.011	1.000		
(6) Openness	-0.158*	0.238*	0.289*	-0.039*	-0.177*	1.000	
(7) Democracy	-0.352*	0.513*	0.551*	-0.013	0.264*	0.039*	1.000

* shows significance at the .05 level. ***Source:*** *SWIID, WDIs, Varieties of Democracy, Sahay et al. (2015)*

4. Results

We report the results by full sample and economic classifications of countries in our sample. We use the United Nations classification for the advanced and the least developed countries (United Nations, 2020). We use the Morgan Stanley Capital International (MSCI) Emerging Markets Index to classify the emerging countries (Amadeo, 2020). Some of the countries in the full sample are not included in these classifications by the organizations.[6]

Advanced countries are usually characterized by developed infrastructure, developed capital markets, exports of value-added goods and higher standards of living. Emerging countries are characterized by rapid economic growth and transitioning from agriculture to industrialization. However, they still have lower incomes per capita, less developed infrastructure and are prone to high market volatility in currency, commodity prices and domestic policies. The least developed countries, on the other hand, are characterized by poor economic growth, poor infrastructure, exports of raw materials, underdeveloped capital markets and low standards of living.

We report the results for the overall financial development index in Table 4. We find positive but statistically insignificant effects of financial development on inequality for the full sample of countries. As suggested earlier, the results for the full sample of countries may not reflect accurate information on the correlation between financial development and inequality due to the mix of different countries. We therefore concentrate our interpretation on the economic classifications. We find that on average, financial development decreases income inequality across all three classifications, but is statistically significant for emerging and least developed countries. These results are in line with the inequality-narrowing hypothesis that increasing financial development can provide poor households and entrepreneurs with better access to finance allowing them to meet their financial needs, such as investing in education, or starting up businesses (Johansson & Wang, 2014; von Ehrlich & Seidel, 2015). The coefficient is also larger for the least developed countries, suggesting a larger inequality-reducing effect from investing in the growth of the financial sector.

[6] The list of countries under each economic classification can be found in the Appendix in Table A1.

Table 4: Financial Development

Income Inequality	(1) World	(2) Advanced	(3) Emerging	(4) Least Developed
Findvpt $_{(t-1)}$	0.006	-0.013	-0.077***	-0.204***
	(0.006)	(0.008)	(0.013)	(0.045)
ln(Gdpcap $_{(t-1)}$)	0.019***	0.001	0.050***	0.043***
	(0.003)	(0.006)	(0.005)	(0.007)
ln(Inflation $_{(t-1)}$)	0.002***	0.001	0.005***	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)
ln(Gvtexp $_{(t-1)}$)	0.002	-0.011*	-0.001	0.008**
	(0.002)	(0.006)	(0.005)	(0.004)
ln(Openness $_{(t-1)}$)	0.004*	0.002	-0.000	-0.007*
	(0.002)	(0.004)	(0.005)	(0.004)
Democracy $_{(t-1)}$	-0.026***	-0.050***	-0.012*	-0.026**
	(0.004)	(0.017)	(0.006)	(0.012)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
F-stat	16.80***	3.34***	31.12***	16.63***
R2	0.954	0.882	0.935	0.942
Obs	3526	1088	759	531
No. of countries	148	35	25	36

Coefficients reported. Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Technological innovations have changed the make-up of financial sectors over time. Within financial institutions, while banks remain important, insurance companies, mutual funds, venture capital firms, and other types of non-bank financial institutions now play just as substantive roles (Sahay et al., 2015). In addition, the financial markets today include various financial instruments that allow people and firms to diversify savings, or raise income through bonds, stock markets and foreign exchange markets. The novelty of the financial development index is that we can capture these changes in the financial sector. Moreover, we can disaggregate the index to allow us to identify the key players in the development of the financial sector that may contribute to reducing income inequality. We report the results for financial institutions and markets in Table 5.

Table 5: Financial Development Disaggregation into Financial Institutions and Markets

	(1) World	(2) Advanced	(3) Emerging	(4) Least Developed
Fininst $_{(t-1)}$	-0.042***	-0.006	-0.106***	-0.125***
	(0.007)	(0.007)	(0.020)	(0.026)
Finmarket $_{(t-1)}$	0.028***	-0.007	-0.018**	-0.025
	(0.004)	(0.005)	(0.009)	(0.051)
ln(Gdpcap $_{(t-1)}$)	0.023***	0.001	0.051***	0.042***
	(0.003)	(0.006)	(0.005)	(0.007)
ln(Inflation $_{(t-1)}$)	0.001***	0.001	0.003***	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)
ln(Gvtexp $_{(t-1)}$)	0.003	-0.011*	-0.001	0.008**
	(0.002)	(0.006)	(0.006)	(0.004)
ln(Openness $_{(t-1)}$)	0.003	0.002	-0.000	-0.007*
	(0.002)	(0.004)	(0.005)	(0.004)
Democracy $_{(t-1)}$	-0.023***	-0.050***	-0.007	-0.024*
	(0.004)	(0.017)	(0.006)	(0.012)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
F-stat	23.87***	2.95***	28.87***	15.27***
R2	0.955	0.882	0.937	0.942
Obs	3526	1088	759	531
No. of countries	148	35	25	36

Coefficients reported. Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

There appears to be a trade-off between the effects of financial institutions and financial markets on income inequality in the full sample of countries, which may explain the statistically insignificant results in Table 4. Financial institutions reduce income inequality by increasing financial inclusion for all income groups, while the financial markets widen income inequality for the full sample of countries. The financial markets' inequality-widening effects may be driven by those countries that are prone to higher output volatility from exogenous shocks, such as terms of trade shocks and financial crises (Easterly et al., 2001; Alimi & Aflouk, 2016). Although, when we look at the effects by economic classifications of the countries, we find that both financial institutions and markets have mitigating effects on income inequality. However, the effects are prominent and statistically significant for emerging countries, while the negative effects from financial institutions are statistically significant for least developed countries. The returns from growing financial sectors should be relatively higher in countries that are still developing as compared to advanced economies that typically already have developed financial sectors and thus

any returns from financial development would be marginal. The downside of course is that countries that are growing may also be more vulnerable to economic shocks.

The findings here suggest that increased development in the financial institutions for emerging and least developed countries, such as the banking sector, has a relatively larger income inequality-reducing effect than development in the financial markets. These findings are in line with Suhaimee et al. (2021), Zhang and Naceur (2019) and Paramati and Nguyen (2019) who find that banking sector development had a stronger influence on reducing income inequality than stock market development. Access to banking credit through easing constraints for borrowing, lowering insurance premiums or increasing the availability of ATMs or bank branches in remote areas allows poor people easier access to finance, whereas trading in stocks or international securities may not be as affordable or easy to access for the lower income groups. Therefore, developments in financial institutions may have a stronger effect on income distribution because the turnaround is quicker and the positive returns on income are realized in the short to medium term. This may not hold for financial markets where prices are sensitive to macroeconomic instability, which affects the returns from investing in stocks.

To further unpack these results and get a better understanding of financial development-inequality nexus, we separate the index into a higher level of granularity. We investigate the types of characteristics within the financial institutions and markets that contribute to reducing income inequality, namely depth, accessibility or efficiency. We report the results in Table 6. We find some interesting nuances worth mentioning.

For the advanced countries, accessibility in both financial institutions and markets, as well as efficiency in the financial markets, contributes to lower income inequality, while efficiency in the financial institutions increases income inequality. Advanced countries have sophisticated banking and stock markets, which provides people with the ability to diversify their financial needs (i.e. increased accessibility to a variety of financial instruments) and hedge against financial shocks (i.e. efficiency of financial markets). Figure 3 corroborates our findings that advanced countries perform relatively better in financial depth, access and efficiency compared to the other economic classifications. However, empirical evidence in the literature has also shown that higher levels of

financial development can benefit the rich more so than the poor as the wealthy usually have disproportionately larger share of access to assets and finance (Claessens & Perotti, 2007).

For the emerging countries, financial depth and accessibility in both financial institutions and markets reduces income inequality, but efficiency in the financial markets has an opposite effect on inequality. Financial deepening, accompanied by more accessible financial systems, in emerging countries creates an inclusive financial sector that can reduce income inequality. However, emerging economies are rapidly growing, which means that high levels of financial development, though not impeding capital accumulation, may lead to a loss of efficiency in allocation of capital. Moreover, resources may get diverted to the financial markets at the expense of other complementary productive sectors, such as education or health (Sahay et al., 2015).

For the least developed countries, financial depth and efficiency in the financial institutions decrease income inequality, while access in the financial markets widens inequality. Financial deepening, complemented by efficient allocation of capital, can provide poor people with equal opportunity to enter the financial sector. However, least developed countries tend to have underdeveloped financial markets, therefore any development in the financial market may increase income inequality as only the wealthy will have the means and access to trading in stocks. Additionally, low-income households often face challenges in accessing financial services due to lack of financial knowledge, or limited and costly financial products (Dabla-Norris et al., 2015). Figure 3 clearly shows the underdevelopment of the financial sector with low access to finance being a serious constraint in least developed countries.

The results from some of the control variables are mainly in line with expectations across the economic classifications of the countries. For example, inflation rate adversely affects the poor because they tend to hold more cash relative to other financial assets compared to the rich (Erosa & Ventura, 2002). Strong quality of institutions reduce income inequality. According to Clark et al. (2006) and Chiu and Lee (2019), protection of property rights may protect the poor against expropriation from the rich who have the power to prevent the poor from accessing external finance. We however find that income per capita increases income inequality. Economic growth is associated with technological changes, which can raise the skill premium by eliminating low-

skilled jobs, thus resulting in increased income inequality in the labour market (Acemoglu, 1998). Government expenditure and openness have different effects depending on economic classifications of countries. Government expenditure decreases income inequality for advanced countries, but increases inequality for least developed countries. If redistribution of taxes targets low-income groups, then government consumption can reduce income inequality (Clark et al., 2006; Zhang & Naceur, 2019). Alternatively, misappropriation of public funds or redirecting resources to unproductive activities in the economy can adversely affect income distributions. Openness decreases income inequality for least developed countries. Trade openness can improve living standards through access to cheaper goods, and improved financial transactions, which in turn can reduce income inequality (Dabla-Norris et al., 2015).

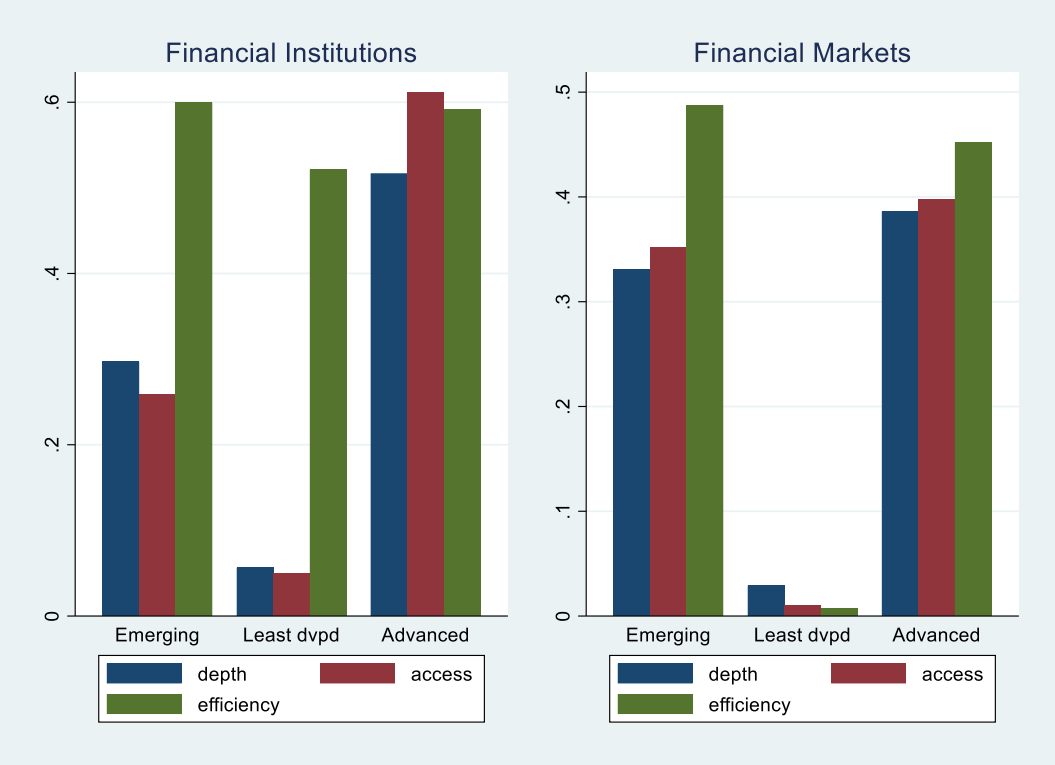
Table 6: Further Disaggregations of Financial Institutions and Markets

	(1) World	(2) Advanced	(3) Emerging	(4) Least Developed
Fininst_depth $_{(t-1)}$	-0.017**	0.003	-0.075***	-0.113**
	(0.007)	(0.007)	(0.020)	(0.055)
Fininst_access $_{(t-1)}$	-0.027***	-0.020***	-0.045***	-0.037
	(0.006)	(0.006)	(0.012)	(0.056)
Fininst_efficiency $_{(t-1)}$	-0.001	0.028***	0.007	-0.035***
	(0.004)	(0.006)	(0.010)	(0.008)
Finmarket_depth $_{(t-1)}$	0.027***	0.007	-0.028***	-0.014
	(0.004)	(0.005)	(0.009)	(0.029)
Finmarket_access $_{(t-1)}$	-0.007*	-0.010*	-0.043***	0.208***
	(0.004)	(0.005)	(0.009)	(0.044)
Finmarket_efficiency $_{(t-1)}$	0.004	-0.006**	0.017***	-0.018
	(0.002)	(0.003)	(0.004)	(0.016)
ln(Gdpcap $_{(t-1)}$)	0.023***	0.001	0.058***	0.041***
	(0.003)	(0.006)	(0.004)	(0.007)
ln(Inflation $_{(t-1)}$)	0.001***	0.001	0.004***	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)
ln(Gvtexp $_{(t-1)}$)	0.003	-0.013**	0.009*	0.010***
	(0.002)	(0.006)	(0.005)	(0.004)
ln(Openness $_{(t-1)}$)	0.002	0.003	0.004	-0.008**
	(0.002)	(0.004)	(0.004)	(0.004)
Democracy $_{(t-1)}$	-0.023***	-0.043**	-0.009*	-0.016
	(0.004)	(0.019)	(0.005)	(0.013)

Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
F-stat	19.79***	5.34***	27.53***	14.64***
R2	0.956	0.886	0.943	0.945
Obs	3526	1088	759	531
No. of countries	148	35	25	36

Coefficients reported. Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Figure 3: Dimensions of Financial Development by Economic Classifications



As a final analysis, we check for non-linearity between financial development and income inequality. We find statistically significant, but different, non-linear effects between the emerging and least developed countries. The 'u-shaped' results for least developed countries are consistent with findings from Tan and Law (2012) that in the early stages of financial development, the benefits are high enough to reduce income inequality (i.e. increased accessibility to all income groups). However, at higher levels of financial development, inequality starts to widen maybe due to diversion of skills away from productive sectors to the financial sector (Sahay et al., 2015). Moreover, too much financial development can increase the frequency of booms and busts in the financial sector increasing the risk of macroeconomic volatility. On the other hand, the inverted 'u-shaped' effects in emerging countries are in line with Greenwood and Jovanovic (1990). In the

initial phases of financial development, the rich benefit more than the poor, thus widening income inequality, but as the financial sector continues to develop, poor people get easier access to capital, thus reducing income inequality.

Table 7: Financial Development Non-linearity Effects

	(1) World	(2) Advanced	(3) Emerging	(4) Developing
$Findvpt_{(t-1)}$	-0.096***	-0.020	0.080**	-0.679***
	(0.015)	(0.018)	(0.034)	(0.148)
$Findvpt^2_{(t-1)}$	0.097***	0.006	-0.171***	2.005***
	(0.013)	(0.014)	(0.036)	(0.607)
$\ln(Gdpcap_{(t-1)})$	0.023***	0.002	0.056***	0.039***
	(0.003)	(0.006)	(0.005)	(0.007)
$\ln(Inflation_{(t-1)})$	0.001***	0.001	0.005***	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)
$\ln(Gvtexp_{(t-1)}$	0.003*	-0.011*	0.004	0.009***
	(0.002)	(0.006)	(0.005)	(0.004)
$\ln(Openness_{(t-1)}$	0.004*	0.002	-0.004	-0.007*
	(0.002)	(0.004)	(0.005)	(0.004)
$Democracy_{(t-1)}$	-0.023***	-0.049***	-0.015**	-0.025**
	(0.004)	(0.017)	(0.006)	(0.012)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
F-stat	23.85***	2.88***	31.20***	16.86***
R2	0.955	0.882	0.938	0.944
Obs	3526	1088	759	531
No. of countries	148	35	25	36

Coefficients reported. Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

5 Conclusion

Rising inequality is a widespread concern globally. Unequal distribution of income indicates unequal economic opportunities, which can give rise to social instability (Solt, 2015). Therefore understanding the factors that drive income inequality remains an important focus in the theoretical and empirical literature. Theory indicates that financial development can increase economic growth while simultaneously reducing poverty. The mechanisms identified include improving the efficiency of resource allocation, technological innovation and expanding economic opportunities to the lower-income groups. Given this context, we investigate the effects of financial development on income inequality. Our contribution to the literature comes in the form of a relatively novel

measure of financial development that captures various dimensions from the financial institutions and the financial markets, as well as comparing the effects across different levels of development for the sample of countries. This type of analysis allowed us to identify the role players in financial development that contribute to income inequality, as well as distinguish the different effects across the economic classifications of the countries.

We find that overall financial development reduces inequality in emerging and least developed countries. These results were consistent with the disaggregation of financial development into financial institutions and financial markets. The results are also statistically significant for emerging and least developed countries, but not for advanced countries. A plausible explanation could be that in advanced countries with already developed financial sectors, the marginal returns to growth from further financial development diminish at high levels of financial development (Sahay et al., 2015). When we further investigate the three dimensions under financial institutions and financial markets, mainly depth, access and efficiency, we find that banking sector development in the financial institutions has income inequality-reducing effects in emerging and least developed countries, while stock market activity in the financial markets widens inequality in least developed countries. We also find evidence of 'u-shaped' non-linear effects for financial development on inequality in least developed countries, whereas emerging countries exhibit an inverted 'u-shaped' non-linear effect.

The findings in our paper highlight the nuances in financial development depending on the development characteristics of countries. While advanced countries have highly sophisticated economies, they are also more prone to higher wage inequalities due to technological advancements demanding more skilled labour over low-skilled jobs. Alternatively, least developed countries have underdeveloped economies and are therefore prone to financial imperfections arising from informational asymmetries and credit constraints that limit poor people from participating in the financial sector, hence increasing income inequality (Kim & Lin, 2011). The emerging countries have rapidly growing economies, which means they are more prone to growth volatility and macroeconomic instability. However, having observed the income inequality-reducing effects from financial development, particularly the financial institutions, we recommend that policies in the financial sector should be targeted at expanding financial access in the least

developed countries (e.g. relaxing borrowing constraints, improving financial infrastructure), improving financial stability in emerging countries and sustaining efficiency in advanced countries.

References

Acemoglu, D. (1998). Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality. *Quarterly Journal of Economics*, 113(4), 1055–89.

Acemoglu, D. & Robinson, J., A. (2001). A Theory of Political Transitions. *American Political Science Review*, 91(4), 938–963.

Adams, S. & Klobodu, E. K. M. (2016), Financial development, control of corruption and income inequality, *International Review of Applied Economics*, 30(6), 1-19.

Alimi, N. & Aflouk, N. (2017). Terms-of-trade shocks and macroeconomic volatility in developing countries: panel smooth transition regression models. *The Journal of International Trade & Economic Development*, 26(5), 534-551.

Aghion, P. & Bolton, P. (1997). A theory of trickledown growth and development. *Review of Economic Studies*, 64 (2), 151–172.

Alvaredo, F., L. Chancel, Piketty T., Saez, E. & Zucman, G. (2017): "Global Inequality Dynamics: New Findings From WID.World," *American Economic Review*, 107(5), 404–409.

Alvaredo, F., Atkinson, A.B. & Morelli, S. (2018a). Top wealth shares in the UK over more than a century, *Journal of Public Economics*, 162, 26–47.

Alvaredo, F., Chancel, L., Piketty, T., Saez, E. & Zucman, G. (2018b). The World Inequality Report 2018, Harvard University Press, http://wir2018. wid.world.

Amadeo, K. (2020). Emerging Market Countries and Their Five Defining Characteristics. The Balance.

Ang, J.B. (2010). Finance and inequality: the case of India. *Southern Economic Journal*, 76(3), 738-761.

Baligh, N. & Piraee, K. (2013), Financial development and income inequality relationship in Iran, *Middle-East Journal of Scientific Research*, 13, 56-64.

Banerjee, A. & Newman, A. (1993). Occupational choice and the process of development. *Journal of Political Economy*, 101(2), 274-98.

Batuo, E. M., Guidi, F. & Kupukile, M. (2010). Financial Development and Income Inequality: Evidence from African Countries, African Development Bank.

Beck, T., Demirguc-Kunt, A. & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, 12, 27–49.

Beck, T., Levine, R. & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58, 261-300.

Benczúr, P. & Kvedaras, V. (2020). Nonlinear Impact of Financial Deepening on Income Inequality. *Empirical Economics*, 60, 1-29.

Berg A. & Ostry, J. (2011). *Inequality and unsustainable growth: Two sides of the same coin?* IMF Staff Discussion Note 11/08, International Monetary Fund.

Bittencourt, M. (2010), Financial Development and Inequality: Brazil 1985-1994, *Economic Change and Restructuring*, Springer, 43, 113-130.

Biyase, M. & Chisadza, C. (2022). Symmetric and Asymmetric Effects of Financial Deepening on Income Inequality in South Africa? Working Paper: 2022-14. University of Pretoria Department of Economics.

Bolarinwa, S. T., Adegboye, A. A. & Vo, X. V. (2021). Is there a nonlinear relationship between financial development and poverty in Africa? *Journal of Economic Studies*, 48(7), 1245– 1266. https://doi.org/ 10.1108/JES-10-2019-0486.

Chancel, L., Piketty, T., Saez, E. & Zucman, G. (2022). World Inequality Report 2022. Cambridge: Harvard University Press.

Claessens, S. & Perotti, E. (2007). Finance and Inequality: Channels and Evidence. *Journal of Comparative Economics*, 35(4), 748–73.

Clarke, G.R.G., Xu, L.C. & Zou, H. (2006), Finance and Income Inequality: What Do the Data Tell Us? *Southern Economic Journal*, 72(3), 578-596.

Coppedge, M., Gerring, J., Knutsen, C.H. et al. (2020). V-Dem Codebook v10. Varieties of Democracy (V-Dem) Project.

Correia, S. (2017). Linear Models with High-Dimensional Fixed Effects: An Efficient and Feasible Estimator. Working Paper. http://scorreia.com/research/hdfe.pdf.

Dabla-Norris, E., Kochhar, K., Ricka, F., Suphaphiphat, N. & Tsounta, E. (2015). Causes and Consequences of Income Inequality: A Global Perspective. IMF Staff Discussion Note SDN/15/13.

De Gregorio, J. (1996), Borrowing Constraints, Human Capital Accumulation, and Growth, *Journal of Monetary Economics,* 37(1), 49–72.

de Haan, J., Pleninger, R. & Sturm, J.E. (2021). Does Financial Development Reduce the Poverty Gap? *Social Indicators Research*, 161, 1–27.

Destek, M.A., Avik, S. & Sarkodie, S.A. (2020). The Relationship between Financial Development and Income Inequality in Turkey. *Journal of Economic Structures*, 9(11), 1-14.

Dollar, D. & Kraay, A. (2003), Growth is Good for the Poor, *Journal of Economic Growth*, 7(3), 195-225.

Easterly, W., Islam, R. & Stiglitz, J. (2001). Shaken and stirred: Explaining growth volatility. " in Annual World Bank Conference on Development Economics, ed. by Boris Pleskovic and Nicholas Stern (Washington: World Bank).

Galor, O., & Moav, O. (2004). From physical to human capital accumulation: Inequality and the process of development. *Review of Economic Studies*, 71(4), 1001–1026.

Galor, O. & Zeira, J. (1993). Income distribution and macroeconomics. *Review of Economic Studies,* 60(1), 35-52.

Gimet, C. & Lagoarde-Segot, T. (2011). A closer look at financial development and income distribution. *Journal of Banking & Finance,* 35(7), 1698–1713.

Greenwood, J. & Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy,* 98(5), 1076-107.

Jauch, S. & Watzka, S. (2016). Financial Development and Income Inequality: A Panel Data Approach. *Empirical Economics*, 51(1), 291–314.

Jeong, H. & Townsend, R.M. (2008). Growth and inequality: model evaluation based on estimation–calibration strategy. *Macroeconomic Dynamic,* 12, 1–54.

Johansson, A.C. & Wang, X. (2014). Financial sector policies and income inequality. *China Economic Review,* 31, 367–378.

Kim, D.H., & Lin, S.C., (2011). Nonlinearity in the financial development-income inequality nexus. *Journal of Comparative Economics*, 39(3), 310–325.

King, Robert G., & Ross Levine. (1993). Finance and Growth: Schumpeter Might be Right. *Quarterly Journal of Economics*, 108(3), 717-737.

Klobodu E.K.M, & Adams S (2016) Capital Flows and Economic Growth in Ghana. *Journal of African Business,* 17(3), 291–307.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review*, 45(1), 1–28.

Law, S. & Tan, H.B. (2009). The role of financial development on income inequality In Malaysia. *Journal of Economic Development*, 34(2), 153–168.

Li, H., Squire, L. & Zou, H.F. (1998). Explaining international and intertemporal variations in income inequality. *Economic Journal*, 108(446), 26–43.

Liang, Z. (2006). Financial development and income distribution: a system GMM panel analysis with application to urban China. *Journal of Economic Development*, 31(2), 1–21.

Lin, E.S. & Ali, H.E. (2009). Military spending and inequality: panel granger causality test. *Journal of Peace Research*, 46(5), 671–685.

Lucas, R.E. (1988) On the Mechanics of Economic Development, *Journal of Monetary Economics*, 22(1), 3-42.

Omar, M. A. & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Journal of Economic Structures*, 9(37), 1–25.

OECD (Organisation for Economic Co-operation and Development). (2008). Growing Unequal? Income Distribution and Poverty in OECD Countries. Organisation for Economic Co-operation and Development, Paris.

OECD (Organisation for Economic Co-operation and Development). (2015). In it Together: Why Less Inequality Benefits All. Organisation for Economic Cooperation and Development, Paris.

Paramati. S. & Nguyen, T. (2019). Does financial market growth improve income distribution? A comparison of developed and emerging market economies of the global sample. *International Journal of Finance & Economics*, 24(1), 629–646.

Pickett K.P. & Wilkinson, R.G. (2015). Income inequality and health: a causal review. *Social Science & Medicine*, 128(128), 316-326.

Piketty, T. (2014). Capital in the 21st century, Harvard University Press.

Sahay, R., Čihák, M., N'Diaye, P. et al. (2015). Rethinking Financial Deepening: Stability and Growth in Emerging Markets. IMF Staff Discussion Note, SDN/15/08.

Sehrawat, M., Giri, A.K. (2015). Financial development and income inequality in India: an application of ARDL approach. *International Journal of Social Economics*, 42(1), 64–81.

Shahbaz, M., Bhattacharya, M. & Mahalik, M.K. (2017). Finance and income inequality in Kazakhstan: Evidence since transition with policy suggestions. *Applied Economics*, 49(52), 5337-5351.

Shahbaz, M. & Islam, F. (2011). Financial development and income inequality in Pakistan: an application of ARDL approach. *Journal of Economic Development*, 36, 35-58.

Shahbaz, M., Loganathan, N., Tiwari, A.K. & Sherafatian-Jahromi, R. (2015). Financial development and income inequality: Is there any financial Kuznets Curve in Iran? *Social Indicators Research*, 124(2), 357–382.

Solt, F. (2015). Economic inequality and nonviolent protest. *Social Science Quarterly*, 96(5), 1314–1327.

Solt, F. (2020). Measuring income inequality across countries and over time: the standardized world income inequality database. *Social Science Quarterly*, 101(3), 1183–1199.

Tchamyou, V. S. (2020). Education, lifelong learning, inequality and financial access: evidence from African countries. *Contemporary Social Science: Journal of the Academy of Social Sciences*, 15(2), 7–25.

Tchamyou, V. S. & Asongu, S. A. (2017). Information sharing and financial sector development in Africa. *Journal of African Business*, 18(7), 24–49.

United Nations. World Economic Situation and Prospects. Technical report, United Nations, New York, 2020.

von Ehrlich, M. & Seidel, T. (2015). Regional implications of financial market development: Industry location and income inequality. *European Economic Review*, 73(C), 85–102.

Weychert, E. (2020). Financial Development and Income Inequality. *Central European Economic Journal*, 7(54): 84–100.

\Appendix

Table A1: Economic classifications

Advanced	**Emerging**	**Least Developed**
Australia	Brazil	Angola
Austria	Chile	Bangladesh
Belgium	China	Benin
Bulgaria	Colombia	Bhutan
Canada	Egypt	Burkina Faso
Croatia	Hong Kong	Burundi
Cyprus	India	Cambodia
Czech Republic	Indonesia	Central African Republic
Denmark	Jordan	Chad
Estonia	Korea	Comoros
Finland	Kuwait	Djibouti
France	Malaysia	Ethiopia
Germany	Mexico	Gambia
Greece	Pakistan	Guinea
Hungary	Peru	Guinea-Bissau
Iceland	Philippines	Haiti
Ireland	Qatar	Laos
Italy	Russia	Lesotho
Japan	Saudi Arabia	Madagascar
Latvia	Singapore	Mali
Lithuania	South Africa	Mauritania
Luxembourg	Thailand	Mozambique
Malta	Turkey	Myanmar
Netherlands	United Arab Emirates	Nepal
New Zealand	Vietnam	Niger
Norway		Rwanda
Poland		Senegal
Portugal		Sierra Leone
Slovakia		South Sudan
Slovenia		Sudan
Spain		Tanzania
Sweden		Timor-Leste
Switzerland		Togo
United Kingdom		Uganda
United States		Vanuata

		Zambia