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What is the link between financial development and income inequality? evidence from Malaysia

Azleen Rosemy Ahmed[1] and Mansur Masih[2]

Abstract

This paper studies the long run relationship between financial development and income inequality in Malaysia over the period of 1970-2007. For the last 45 years, Malaysian income inequality has been decreasing from a height of 0.56 (Gini coefficient) in 1976 to 0.4 in 2014 while its economy and financial sector especially the banking industry has been expanding. The issue of importance is to investigate whether in a developing economy, the financial sector plays a role in reducing income inequality by mobilising and allocating savings into productive investments. We have employed the auto regressive distributed lag (ARDL) bound testing approach and the error correction mechanism to examine the existence of long run relationship, while variance decomposition (VDC) technique is used to provide Granger causal relationship between the variables. The cointegration tests show that there is a long run relationship between financial development, economic growth, trade openness and income inequality in Malaysia. However, financial development itself is found to be not statistically significant in influencing income inequality during the sample period. This finding is similar to Law & Tan's (2009) findings over a shorter period 1980-2000. However, the VDC finds that financial development can be a tool for the government to employ to reduce income inequality. This paper also provides evidence that trade openness helps reduce income inequality. In terms of policy, enhancing financial access that would steer the development of financial system towards a pro-growth and pro-poor direction is needed to ensure that financial development fully supports the reduction of income inequality in Malaysia.

Keywords: Financial development, income inequality, Malaysia, ARDL

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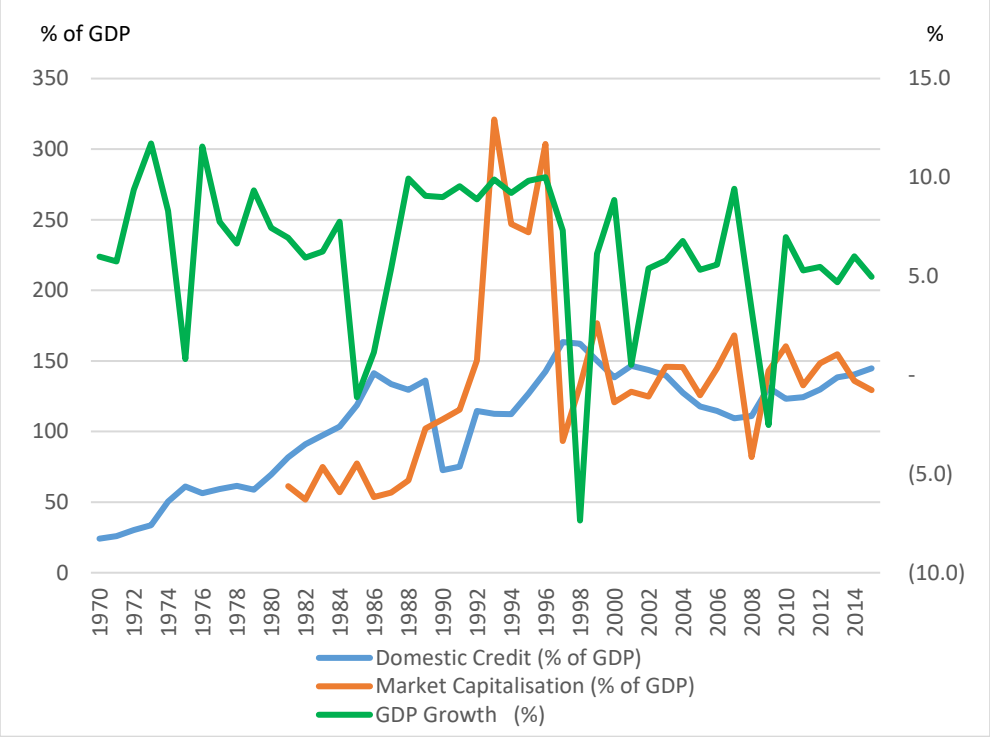
1. INTRODUCTION

The contribution of financial development in the process of economic development has long been recognized in the literature as well-developed financial systems can channel financial resources to the most productive uses. However, reforms and development in the financial sectors could lead to uneven growth which contribute towards income inequality. This could be the case when access to finance is limited to certain group of people based on their income level, locality and ability to provide collateral.

In the case of Malaysia, industrialization that took place in the 1970s and 1980s has contributed to its rapid economic growth, which was accompanied by significant improvement in its financial system. The ratio of domestic credit to GDP more than doubled from 24% in 1970 to 69% in 1980, and continued to grow until it peaked at 163% of GDP in 1997 (refer to Figure 1 below). Both the financial sector and the Malaysian economy were severely affected by the Asian financial crisis which led to a negative GDP growth of 7.4% in 1998. The economy recovered rather quickly and in 1999, real GDP grew by 6.1% from the previous year. However, the ratio of domestic credit to GDP has been on a downward trend since the Asian financial crisis reaching 109% of GDP in 2007[3]. Market capitalisation as a % of GDP too has increased from 61% in 1981 to a peak of 321% in 1993 but went down to 82% of GDP right in the middle of the Asian financial crisis in 1998.

Figure 1: GDP Growth, Domestic Credit and Market Capitalisation of Malaysia, 1970 – 2015



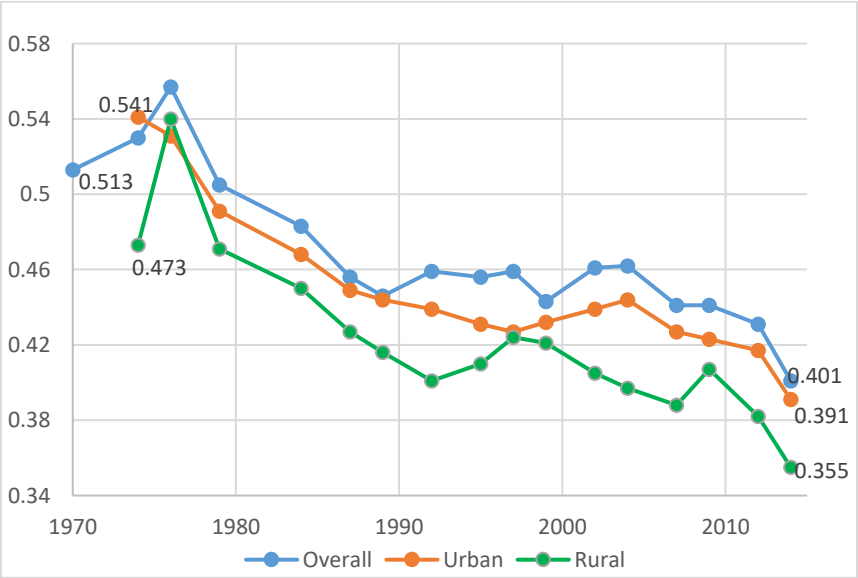
[3] Discussion in this paper is only until year 2007 due to limited availability of income inequality data (up to 2007) for our analysis. The domestic credit has since 2007 increased to 145% of GDP in 2015.

Source: The World Bank

The Malaysian government has been instrumental in providing infrastructure and policies to develop its financial system including its Islamic finance industry. In fact, measured by private credit/GDP, Malaysia had one of the highest levels of financial development in the world in 2000, following only by the United States, Japan, Cyprus, Switzerland and Hong Kong (Ang, 2007).

Being a multi-racial society, Malaysia has always been sensitive to distribution issue. There are several reasons behind this. Income inequality can be a source of social instability leading to ethnic and class tensions, and Malaysia has in its history the ethic riots in May 1969. The ethnic tension highlights the danger of income disparities amongst the ethnic groups. Income inequality can affect political stability and also result in increased crime, and all these instabilities in turn are detrimental to economic growth. According to Shari (2000), the development policies implemented under the 1971-1990 New Economic Policy have had a major impact on reducing income inequality from the late 1970s. Figure 2 depicts the Gini coefficient (a measurement of income inequality) for Malaysia from 1970 to 2014. The income inequality for Malaysia (as measured by Gini coefficient) peaked in 1976 (0.56) and fell thereafter up to 1989 (0.45). During the high economic growth in the 1990s when GDP growth was above 9% from 1988 to 1996, the Gini coefficient recorded a slight increase to 0.46 and remain at this level until 2004 but started showing reduced income inequality after that with the lowest level recorded at 0.4 in 2014.

Figure 2: Gini[4] Coefficient of Malaysia, 1970 - 2014



Source: Malaysian Economic Planning Unit

[4] Gini coefficient is one of the indicators to measure income inequality – zero (0) value suggests perfect income equality, and one (1) implies absolute unequal distribution, i.e. one person possesses all the income.

Theories provide conflicting predictions about the effect of financial development on income inequality. There are two influential hypotheses: the inequality-widening hypothesis and the inequality-narrowing hypothesis of financial development. The inequality-widening hypothesis posits that financial development might benefit the rich and well connected more than the poor, especially when institutional quality is weak. This is because the rich have collateral to offer which the poor has limited, and hence the latter find it difficult to access financing even when the financial markets are well developed. Hence, income inequality would be worsen and there is a positive relation between financial development and income inequality. On the contrary, the inequality-narrowing hypothesis states that when the financial market grows, the poor who were previously excluded from getting loans will have access to financing. The financial system development improves efficiency of capital allocation and lessen funding constraints from the financial market, thereby resulting in a negative relationship. There is also a third hypothesis by Greenwood and Jovanovic (1990) that predicts a non-linear relationship where the distributional effect of financial development depends on the level of economic development. This study however tests the linear hypothesis of finance-inequality nexus.

While theories have different predictions, empirical studies conducted too have produced differing results and the various empirical findings are discussed in Section 2 of this paper. In Malaysia, various financial restructuring programmes that aim to achieve a better financial system have been launched since the 1970s. However, there is little empirical evidence providing policy makers with the necessary information as to whether these reforms have had any impact on the financial system, and hence on economic development (Ang, 2007) and its income distribution.

Like the finance-growth nexus, it is possible that poverty and income inequality reduction exerts a positive effect on financial development through an increase in savings and demand for funds. An examination of this relationship not only helps to understand the role of financial deepening in sustainable development but also sets a framework for discussion of financial and distribution policies for the lower income group. Consequently, it is important to reveal the direction of causal relationship between finance and income inequality. This study therefore aims to study the relationship between financial development and income inequality in Malaysia based on data from 1970 to 2007 (38 years). We have utilised both the bank-based and market-based indicators for financial development.

Law and Tan (2009) analyses data sets from 1980 to 2000 but find no indication to suggest that financial market development reduces income inequality in Malaysia. The authors only tested the linear relationship hypothesis. This paper makes a few contributions to the literature by: (1) extending the work of Law and Tan (2009) by using the most recent data available and for a longer time series; (2) filling in the gap in the existing literature which is dominated by cross-country analysis; (3) using a

wider credit definition of domestic credit provided by financial institutions rather than private credit provided by banks; (4) studying both long-run and short-run impacts; (5) establishing the causal relationship between financial development and income inequality; (6) contributing to the debate on the effectiveness of financial expansion and liberalization on income distribution in Malaysia; and (7) helping the policymakers in pursuing the inclusive growth objectives and address the issue of distributive justice in Malaysia.

This paper examines the dynamic relationship between financial development and income inequality using an error-correction model, in which both long-run and short-run effects are estimated jointly using an autoregressive distributed lag (ARDL) model. Our empirical research shows that a long-run theoretical relationship exists between financial development, income inequality, economic growth and trade openness. However, during the period under study, financial development does not have significant effect on income inequality while trade openness has income-narrowing effect. The forecast variance decomposition finds that Granger causality lies between both financial development dimensions to income inequality. The policy implication in this paper is that a more inclusive financial development could bridge the gap for income equality.

The remainder of this paper is structured as follows: Section 2 explains the literature review which covers the theoretical foundation and previous empirical studies on this subject. Section 3 presents the data and methodology of the study. Section 4 discusses the empirical results, while Section 5 concludes the paper.

2. LITERATURE REVIEW

2.1 Theoretical Perspectives on Finance and Inequality

The beneficial role of financial development in economic growth has been well documented. The literature on finance-income inequality nexus has also been growing in recent years but research on Malaysia specific is limited. When financial markets and institutions work well, they provide financing opportunities to all market participants. These funds provided can be mobilized for productive uses (to start business, for education and to achieve one's aspiration) as well as to promote economic growth. There are two types of hypothesis advancing the finance-inequality nexus: - an inequality-widening hypothesis and inequality- narrowing hypothesis.

The finance-inequality widening hypothesis reveals that financial development may benefit only the wealthy individuals when institutional quality is weak (Clarke et. al., 2006). This hypothesis suggests financial development benefits the rich due to their credit-worthiness to the banks. The socially

and economically backward poor individuals, on the other hand, relatively lack credit-worthiness and sufficient collateral at their disposal. They may find it difficult to access the financial services within the financial institutions. Due to this position, the poor are equipped only with primary education, and join in the unskilled labour market with lower wages. Combining these, a positive association is expected where financial development worsens income inequality.

The finance-inequality narrowing hypothesis is put forward by Galor and Zeira (1993), and Banerjee and Newman (1993). These authors propose that the presence of financial market imperfections deters the poor from borrowing adequately to invest in human and physical capital, implying that financial development helps alleviate income inequality. It is assumed that individual inherits different amount of wealth and those with large wealth invest in education and take up skilled work. Those with lesser initial wealth have to resort to borrowing for investment in human capital. In an underdeveloped financial market, borrowing costs are costly and those who are unable to borrow will remain unskilled and this goes on generation after generation. As the economy expands, financial market develops to support the growing economy and with broader credit services, the poor have opportunity to borrow for human capital investments and upgrade their earning potentials. Accordingly, income equality starts to reduce and the linear hypothesis concludes that income inequality negatively relates to the development of the financial sector.

The theoretical predictions on effects of financial development and income inequality are still unresolved. Offering a related, but different perspective on these basic ideas, Greenwood and Jovanovic (1990) present a theoretical model that has elements of both ideas from the linear relationships that are put together in a non-linear relationship. At the early stage of economic development, only the rich has the ability to access and benefit from the financial system and hence, the income difference between the rich and the poor widens with the expansion of the financial system and the rapid economic growth. As the economic growth mature, the financial sector is more developed to provide wider financial access to the economy including to the poor. As the economy reaches a stable and steady state, income inequality begins to shrink and hence this non-linear hypothesis suggests an inverted U-shaped theory.

As regards to impact of income equality to financial development, there could be a trade-off between reducing inequality with growing financial sector. As income distribution improves, demand for financial services increases which lead to growth in the financial industry.

2.2 Empirical Review

Given that theories provide ambiguous predictions regarding the effects of finance on the distribution of income, it is useful to approach the issue at the empirical level. This could facilitate our

understanding of the relationship between finance and inequality, and help us to assess the validity of each theoretical model.

Similar to the theoretical literature providing conflicting conclusions on the finance-inequality nexus, the empirical evidences are also mixed and conflicting. Nevertheless, most empirical research, although subject to ample qualifications, suggests that improvements in financial contracts, markets, and intermediaries expand economic opportunities and reduce inequality. A summary of the findings of some of the literatures on the effect of financial development on income inequality is tabulated in Appendix A.

Clarke[5] et al. (2006) tested both the linear and non-linear hypotheses to determine the relationship between finance and income inequality by constructing a panel data set with 83 countries from the period between 1960 and 1995. Their results demonstrate that inequality is lower in countries with better-developed financial markets, and that inequality decreases as economies develop their financial intermediaries. They reject the finance-inequality widening hypothesis that financial development benefits only the rich and did not find support for the inverted U-shaped hypothesis by Greenwood and Jovanovic (1990). Many other studies that tested both the linear and non-linear finance-inequality hypothesis found similar results as Clarke et. al. (2006). Based on a GMM[6] approach, Batuo et al. (2012) studied the same questions in the context of 22 African countries and conclude with similar results. Researchers also revisited the conflicting theories by considering the experience of an individual country using time-series data and mostly show there is a linear and negative relationship, but do not provide support to the Greenwood-Jovanovic hypothesis of an inverted U-shaped relationship between finance and inequality. Amongst them are Liang (2006)'s study on China, Ang (2010)'s on India, Shahbaz and Islam (2011)'s on Pakistan, and Baligh and Piraee (2013)'s on Iran. Accordingly, this study only looks at the two contrasting perspectives of the linear hypothesis, but not at the non-linear hypothesis of Greenwood and Jovanovic (1990).

Most studies that investigate linear finance-inequality relationship find support for the hypothesis they tested. Using cross-sectional analysis, Mookerjee and Kalipioni (2010), and Law et al (2014)'s findings support Galor and Ziera (1993), and Newman and Banerjee (1993) hypothesis that financial development is narrowing inequality. Arora (2012), and Hoi & Hoi (2013), also show support to the negative relationship between financial development and income distribution when time-series analysis is run for specific countries.

[5] Clarke, Xu and Zou are researchers at World Bank, Washington DC.
[6] Generalized Method of Moments

In contrast, other studies suggest that financial development may fail to reduce income inequality and poverty. Law and Tan (2009) examine the case of Malaysia over the period 1980–2000 by adopting the autoregressive distributed lag (ARDL) approach. By using both private credit as a % of GDP (to proxy bank development) and stock market capitalisation (to proxy capital market development), they find no significant evidence supporting the effect of financial development on income inequality. They argued that in addition to various public development programmes, the government should focus on improvement of institutional quality, and maintenance of low inflation to combat income inequality. It is, however, possible that the small sample (21 years) they use which ends in 2000 may have failed to capture the true impact of financial development on Malaysia's inequality. Furthermore, using a broad dataset from 138 developed and developing countries between 1960 and 2008, Jauch and Watzka (2012) find that financial development in fact increases income inequality. Similar inequality-widening results was discovered by Sehrawat and Giri (2015) when they investigate the finance-inequality nexus in India for the period 1982 to 2012.

Bahmani-Oskooee and Zhang (2015) employs error-correction modelling technique on time series data of 17 countries. They find in 10 counties, the short-run effects of financial market development on income distribution were found to be equalizing (negative relationship). In 5 countries, the short-run effects were however unequalizing (positive relationship). However, the equalizing (negative relationship) effects lasted into the long run only in three countries while nine countries financial development shows a long run income-widening affect. Tan and Law (2009) investigate the impact of financial development on income inequality in 35 developing economies using GMM approach for the period 1980 to 2000. Their findings show that financial development improves income distribution supporting the inequality-narrowing hypothesis. However, this impact is only significant from the banking sector factor while the stock market development does not have an important role to play.

A recent study by Seven and Coskun (2016) find no support for both the linear and the non-linear relationship between financial development and income inequality. Using dynamic panel data methods with dataset from 45 emerging countries for the period 1987 to 2011, Seven and Coskun (2016) assess the finance–inequality–poverty nexus by taking the separate and simultaneous impacts of banks and stock markets into account. Their mixed findings suggest that although financial development promotes economic growth, it does not necessarily benefit those on low-incomes in emerging countries. They instead find that improvements in banking sector may increase income inequality in emerging economies. Their results show that bank development – compared to stock market development – has a greater and significant impact on income inequality and poverty. However, the authors find mixed but statistically insignificant results for the relationship between stock market development and inequality/poverty measures. When the combined impact of banks and stock markets (the overall

development in the financial sector) is tested, Seven and Coskun (2016)'s results show no evidence of a statistically significant relation between financial development and inequality/poverty measures.

More recent papers attempted to include other dimensions of financial development. Naceur and Zhang (2016) consider five dimensions of financial development: financial access, depth, efficiency, stability and liberalisation. Each aspect is represented by two indicators: one related to financial institutions, and the other to financial markets. Using a large sample of 143 countries from 1961 to 2011, the authors find that four of the five dimensions of financial development can significantly reduce income inequality and poverty, except for financial liberalization, which tends to exacerbate them. Similar to Seven and Coskun (2016), Naceur and Zhang (2016)'s evidence suggests that banking sector development has a stronger income narrowing effect on income distribution than stock market development. Together, these findings are consistent with the view that macroeconomic stability and reforms that strengthen creditor rights, contract enforcement, and financial institution regulation are needed to ensure that financial development and liberalization fully support the reduction of poverty and income inequality. Their findings also support the positive roles played by per capita income, government expenditure, and trade openness in reducing inequality and poverty. Inflation, however, is found to harm the income of the poor.

3. DATA AND METHODOLOGY

3.1 Data and Measures of Income Inequality and Financial Development

Our study examines the time-series data from Malaysia over the period between 1970 and 2007. All data are sourced from the World Bank except for the Estimated Household Income Inequality Index. Income inequality can be measured in various ways. In our study, we used the Estimated Household Income Inequality (HII) by the University of Texas Inequality Project (UTIP) directed by Galbraith and Kum (2005), which is available annually for a group of developed and developing countries for the period 1963 to 2007. The HII is expressed in percentage, and ranges from 0 (perfect equality) to 100 (perfect inequality). The UTIP has developed the household income inequality measure, based on data collected by the United Nations Industrial Development Organization (UNIDO). Manufacturing wage data from UNIDO are used to compute the between groups component of Theil's T-statistic for manufacturing wage inequality.[7] According to Galbraith and Kum (2005), this measure of inequality is based on household and expenditure survey, due to its greater availability and because at least in industrialized countries, there seems to be a strong link between increased earning and wage inequality and income inequality. To the extent this holds, the UTIP-UNIDO data set provides a denser data set on inequality to facilitate time-series analysis proposed by this paper, as compared to other sources (World Bank, Datastream and Malaysian Economic Planning Unit[8]).

[7] The UTIP-UNIDO data are available at http://utip.lbj.utexas.edu/data.html

[8] The Gini coefficients from Malaysian EPU as used in Figure 2 of this paper are not available yearly but are provided every few years (non-consistent gap), and hence are not able to be used for this time-series analysis.

Measurement for financial development is also another major problem in the empirical literature due to the varied selection of key variables. There are bank-based and market-based financial indicators to measure financial development. We have used banking sector development as our base model (Model 1). We have applied the commonly used domestic credit as a % of GDP (Clarke et al, 2006; Ang, 2010; Shahbaz and Islam, 2011; Baligh and Piraee, 2013; Naceur and Zhang, 2016; and many other researchers) as our proxy for financial development. The domestic credit used in our study however is not only from the banks but is extended to cover all financial institutions as this indicator measures the role of all financial institutions (rather than just banks) in channelling funds to fund users. We have extended the domestic credit definition so that the banking data would also capture the Islamic banking and development financial institutions which is of our interest.

To test the robustness of our results, we also run the same tests using market-based financial proxy namely market capitalisation as a % of GDP (Model 2). The number of available observations for stock market indicators in Malaysia is however shorter than the domestic credit to GDP data whereby stock market data is only available from 1981 onwards. We also regressed two additional models using the ARDL tests to establish the long-run relationship of the independent variables including income inequality with financial development as our dependent variable where Model 3 and Model 4 have domestic credit and market capitalisation as the dependent variable respectively.

3.2 Control Variables

In addition to the focus variables of financial development and income inequality, we also include two control variables in our models. The first control variable is GDP per capita in real terms (in RM) because per capita GDP is highly correlated with financial sector development (Clarke et. al, 2006). We also include the ratio of trade to GDP in our models to capture the degree of openness of the economy. Trade openness is derived by taking the values of imports and exports divided by GDP. The Stolper-Samuelson theorem suggests that trade liberalisation generates more jobs for the labour-intensive sector. This implies that more unskilled labour will benefit from trade openness. Daumal (2013) finds that inequality between states in Brazil is negatively correlated with trade openness while regional inequality in India may be partially caused by general trade liberalisation.

3.3 Empirical Methodology

Unit Root / Stationarity Test

The study aims to explore the long run relationship between income inequality, financial development and other economic variables in Malaysia during the period 1970 to 2007. We first tested

the unit root of all the variables using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests. After checking for the unit root, we can then employ either the Johansen and Juselius (1990), or the Engle Granger cointegration test if the series of each variable is integrated of the same order. We however found that the variables used in our study are not all integrated of the same order and hence, we have employed the ARDL approach to test for cointegration as Johansen method for testing for cointegration requires the variables to be integrated of the same order. Otherwise the predictive power of the models tested would be affected.

The ARDL approach as developed by Pesaran & Shin (1999) and Pesaran et al. (2001) overcome these problems as ARDL can be applied irrespective of whether the variables are I(0) and/or I(1). More importantly, Johansen approach is not suitable for studying cointegration for small sample time series as in our study. ARDL on the other hand provides robust results even in small samples (Pesaran and Shin, 1999) and this is advantageous as income inequality data is only available for annual data and the period available are also limited for many emerging economies like Malaysia. Another benefit of ARDL is that it allows the optimal lag lengths for the variables to differ, while the Johansen approach requires that all variables in the model to have the same number of lags. For this study, AIC (Akaike Information Criterion) has been used to determine the optimal lag lengths for the ARDL model. Even though using SBC (Schwarz Bayesian Criterion) provides smaller standard errors for some of our models tested under the ARDL, we find that in some models, SBC runs the models with ARDL (0,0,0,0) such that no ECM statistical output was produced. This is due to the SBC's method of choosing the minimum lag possible and accordingly, we find that AIC is more suitable for our study.

ARDL Model to Test Cointegration

The first step in ARDL is to empirically investigate the existence of long run relationship between the variables. The calculated F-statistic is then compared against the upper and lower critical bound provided by Pesaran et al. (2001) which correspond to the assumptions that the variables are I(0) and I(1) respectively. If the calculated F-statistics exceeds the upper critical bound (UCB), then the series are cointegrated; if it is below the lower critical bound (LCB), there is no cointegration. If the calculated F-statistics is between the UCB and the LCB, then decision about cointegration is inconclusive and knowledge of the cointegration rank of the forcing variables is required to continue further.

In the second step, once cointegration between the variables has been established, the long run coefficients and the error correction term (ECT) can be estimated. The ARDL cointegration procedure allows cointegrating relationship to be estimated by OLS once the lag order is selected. The ARDL model can be specified as follows:

$$\Delta IE_t = a_0 + \sum_{i=1}^{k} b_i \Delta IE_{t-i} + \sum_{i=1}^{k} c_i \Delta FD_{t-i} + \sum_{i=1}^{k} d_i \Delta GDP_{t-i} + \sum_{i=1}^{k} e_i \Delta TR_{t-i}$$
$$+ \delta_1 LIE_{t-1} + \delta_2 LFD_{t-1} + \delta_3 LGDP_{t-1} + \delta_4 LTR_{t-1} + u_t$$

where IE is for income inequality, FD is financial development, GDP is real income per capita in RM and TR is trade openness. FD is further proxied by CR (Domestic credit/GDP) and MC (market capitalisation/GDP). Note that all variables have been transformed into logarithms. Δ denotes the first difference of the logged variables and u_t is the residual term. This equation is a standard VAR model in which a linear combination of lagged-level variables are added as proxy for lagged error terms. The coefficients b_i, c_i, d_i and e_i represent the short run effects while all δ_j (for j=1 … 4) represents the long run effects.

The ARDL cointegration test is testing the following hypotheses:

H_0 : $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ i.e there is no long run relationship between the variables

H_A : $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$ i.e there is cointegration or long run relationship between the variables

The dynamic error correction model (ECM) is derived from the ARDL model through a simple linear transformation where the ECM integrates the short run dynamics with long run equilibrium, without losing the long run information. The causality in the earlier step will be tested and confirmed through the t-statistic of the ECM while the coefficient of the ECT from the ECM indicates the speed of adjustment of the dependent variable towards its long run equilibrium. The endogeneity or exogeneity of the variable is tested though the ECM, and the same equation is used with each proxy of the financial development as well as income inequality in turn being the dependent variable.

The ECM tests the following hypothesis:

H_0 : The variable is Exogeneous

H_A : The variable is Endogenous

Finally, for the purposes of determining the relative degree of endogeneity or exogeneity of the variables, we applied the generalised variance decomposition (VDC) technique. The VDC provides a decomposition of the variance of the forecast errors of the variables in the VAR (vector auto regression) at different horizons. The relative exogeneity or endogeneity of a variable can be determined by the

proportion of the variance explained by its own past. The variable that is explained mostly by its own past is deemed to be the most exogenous of all.

4. RESULTS AND DISCUSSION

Cointegration between the Variables

The variables were first tested for cointegration by applying ARDL bound testing approach and the results for testing the Null that there is no long-run (LR) relationship among the variables are presented in Table 4.1.

Table 4.1 : ARDL Cointegration Test Results

Model	Model for Estimation	F-Statistics	Decision	
1	F (LIE | LCR LGDP LTR)	4.153*	Reject the Null	
2	F (LIE | LMC LGDP LTR)	18.683***	Reject the Null	
3	F (LCR | LIE LGDP LTR)	2.028	Accept the Null	
4	F (LMC | LIE LGDP LTR)	3.173	Accept the Null	
1A	F (LGDP | LIE LCR LTR)	0.136	Accept the Null	
1B	F (LTR | LIE LCR LGDP)	4.474*	Reject the Null	
	Bound Critical Values	**Significance**	**LCB**	**UCB**
		1%	4.617	5.786
		5%	3.539	4.667
		10%	3.063	4.084

** Significant at 10%* ***Significant at 5%* ****Significant at 1%*

The results reveal that the calculated F-statistics exceeded the upper critical value in three out of six equations tested at standard acceptable significance levels. We conclude that the variables are cointegrated and there is long-run theoretical relationship among the variables.

Results of Estimated Long-run Coefficients

After the evidence of cointegration between variables has been established, the long run coefficients of the models were estimated. As shown in Table 4.2, none of the financial development indicators (bank or capital market) shows any significant long-run relationship with income inequality. Hence we find no evidence to support the hypothesis that financial development increases or reduces income inequality in Malaysia. This finding is consistent with Law & Tan (2009) findings for Malaysia using a shorter time series from 1980 to 2000. It seems that there are other factors that have been contributing towards the decreasing income inequality level for the last 40 years.

However, there is a negative significant relationship between trade as a % of GDP and income inequality in Model 1. This result provides support to Naceur and Zhang's (2016) recent study's findings using OLS regression on 143 countries for the period 1961 to 2011. Our findings seem to indicate that the industrialisation of the Malaysian economy over the 1970s and 1980s period have created jobs and business opportunities to contribute towards reduction in income inequality.

We also regressed the two financial indicators as dependent variables and the results are shown in Table 4.3. There is no significant long run relationship from income inequality to domestic credit. Interestingly, in Model 4, income inequality has a negative and significant relationship with market capitalisation at 10% significant level. Reduced income inequality appears to be associated with increased in market capitalisation/GDP. This is in line with expectation as when income inequality is reduced, we would expect there would be more domestic players in the stock market resulting in an expanded stock market.

Table 4.2 : Long-Run ARDL Estimation Based on AIC
Dependent Variable = Income Inequality

	Model 1 (FD = Domestic Credit)		**Model 2 (FD=Market Capitalisation)**	
Regressor	**Coefficient**	**T-ratio [Prob]**	**Coefficient**	**T-ratio [Prob]**
LCR	0.080	1.510 [0.142]	-	-
LMC	-	-	-0.019	-0.706 [.489]
LGDP	0.095	0.744 [0.463]	0.038	0.338 [.739]
LTR	- 0.297 *	- 2.002 [0.055]	-0.180	-1.407 [.176]
Constant	3.921 ***	7.712 [0.000]	4.369 ***	7.999 [.000]

** Significant at 10%* ***Significant at 5%* ****Significant at 1%* *FD= Financial Development*

Table 4.3 : Long-Run ARDL Estimation Based on AIC
Dependent Variable = Financial Development

	Model 3 (Dependent = Domestic Credit)		**Model 4 (Dependent = Market Capitalisation)**	
Regressor	**Coefficient**	**T-Ratio[Prob]**	**Coefficient**	**T-Ratio[Prob]**
LIE	-1.968	-0.778 [0.443]	- 7.446 *	-2.040 [0.054]
LGDP	0.891	1.149 [0.262]	-0.082	-0.087 [0.931]
LTR	-0.668	-0.656 [0.517]	0.377	0.317 [0.755]
Constant	6.678	.0583 [0.564]	31.208 *	1.900 [0.071]

** Significant at 10%* ***Significant at 5%* ****Significant at 1%* *FD= Financial Development*

Results of Error Correction Model (ECM)

The ECM confirms the long-run relationship indicated in the first step of the ARDL modelling. The results of our ECM are shown in Tables 4.4 and 4.5 for income inequality and financial development as the dependent variable respectively.

From the p-value of error correction in these two tables, we can conclude that both income inequality and financial development are endogenous. The lagged ECM terms for all four models have the expected negative sign and are significant at 1% significant level. For Models 1 and 2, the error correction term implies that the deviation of the variables (as represented by the error correction term) has a significant feedback effect on income inequality that bears the burden of short run adjustment to bring about the long run equilibrium. In Model 1, the value of lagged error correction term is - 0.229. This suggests that 22.9% of the change in income inequality were corrected each year adjusting towards its long run equilibrium or it takes approximately 4.4 years for income inequality to return to its long run equilibrium if there is a shock to the system. The speed of adjustment is faster at 31.8% per year when market capitalisation is used as proxy for financial development.

Though the detailed results are not reported here, we also find that GDP per capita and trade openness are exogeneous. This tends to indicate that both income inequality and financial development variables respond to the GDP and trade variables during the sample period.

Although domestic credit/GDP does not have significant effect in the long run on income inequality, it is found to be positive and statistically significant in explaining the changes in income inequality in the short run. Similarly, GDP per capita which does not have significant long-run relation with income inequality was found to have statistically significant short-run effect in both Models 1 (Domestic Credit) and 2 (Market Capitalisation) while trade openness has both significant short-term and long-term effect on income inequality.

Interestingly, we find from Model 3 that income inequality in the short run has a positive and significant effect on banking sector development though they are not significantly related in the long-run. This is the opposite when market capitalisation is used as proxy for financial development where income inequality does not have significant short-term effect but have a negatively significant long-term effect on stock market development.

Table 4.3: Error Correction Model
Dependent Variable = Income Inequality

	Model 1 (Domestic Credit)		Model 2 (Market Capitalisation)	
Regressor	**Coefficient**	**T-ratio [Prob]**	**Coefficient**	**T-ratio [Prob]**
dLCR	0.018*	1.854 [0.073]		
dLMC			-0.006	-0.643 [.527]
dLGDP	-0.170 **	-2.503 [0.018]	-0.212 **	-2.547 [.019]
Dlgdp 1			-0.147 **	-2.754 [.012]
dLTR	-0.136 ***	-3.772 [0.001]	1.389 **	2.815 [.010]
Ecm(-1)	-0.229 ***	-2.859 [0.008]	-0.318 **	-2.709 [.013]
Diagnostic Tests	**P-value**		**P-value**	
Serial Correlation	0.287		0.316	
Functional Form	0.192		0.059	
Normality	0.582		0.696	
Heteroskedasticity	0.113		0.308	

** Significant at 10%* ***Significant at 5%* ****Significant at 1%* *FD= Financial Development*

Table 4.5: Error Correction Model
Dependent Variable = Financial Development

	Model 3 Dependent = Domestic Credit		Model 4 Dependent = Market Capitalisation	
Regressor	**Coefficient**	**T-ratio [Prob]**	**Coefficient**	**T-ratio [Prob]**
dLIE	3.320 *	1.992 [0.056]	-5.236	-1.659 [0.112]
dLIE1	3.580 **	2.229 [0.034]	-	-
dLGDP	.363	1.086 [0.287]	-0.058	-0.088 [0.931]
dLTR	.339	0.728 [0.472]	0.265	0.321 [0.752]
dLTR1	0.879 *	1.913 [0.066]	-	-
Ecm(-1)	-0.408 ***	-3.763 [0.001]	-0.703 ***	-3.075 [0.006]
Diagnostic Tests	**P-value**		**P-value**	
Serial Correlation	0.739		0.365	
Functional Form	0.608		0.843	
Normality	0.005		0.328	
Heteroskedasticity	0.995		0.096	

** Significant at 10%* ***Significant at 5%* ****Significant at 1%* *FD= Financial Development*

Variance Decomposition (VDC)

From ECM, we know the endogeneity and exogeneity of a variable during the sample period. For policymakers, however, what is more important is to recognise the relative degree of endogeneity and exogeneity of the variables for some forecasted horizon so that policies can be targeted to the appropriate variable(s). This useful information can be derived from the output of VDC. VDC decomposes the variance of the forecast error of each variable into proportions attributable to shocks from each variable in the system including its own. The relative endogeneity and exogeneity of a variable can then be determined by the proportion of variance that is explained by its own past. The

variable that is explained mostly by its own past variations and depends relatively less on other variables is deemed to be the most exogenous (most leading) amongst the variables.

Tables 4.6 and 4.7 show the results of VDC for Models 1 and 2. Those percentages highlighted in blue indicate the contribution of the variable's own shock towards explaining the forecast error variance of each variable. From the ECM results of Model 1 above, we find that domestic credit is endogenous during the sample period but the VDC results indicate that domestic credit is the leading variable (most exogenous) amongst the variables considered in this paper for the future time horizon. The relative rank in exogeneity-endogeneity of the variables is somewhat stable as time passes from 5-year horizon to 10-year horizon. The VDC results imply that banking sector development is an important driver that the policymakers can use to achieve their target income inequality level. As 2nd rank, economic development which results in higher income level is also another important aspect that can drive income inequality. It is known that one of the factors that can affect poverty and income inequality is economic growth which is due to development of financial markets and institutions (Beck et. al., 2007). Financial markets and institutions play a pivotal role in economic development by bridging information asymmetries between borrowers and savers, thereby mobilizing savings, capital fund allocation, monitoring the use of funds and managing risks which together support the economic growth process. This economic growth due to financial development can be effective on income inequality.

From Table 4.7, we also find that stock market development is relatively more exogenous than income inequality and hence development of the capital market can also be used as a tool to address income inequality issue. Surprisingly, both trade and GDP per capita which were found to be exogenous in the ECM is found to be the most endogenous when domestic credit and market capitalisation are used as proxy for financial development respectively. These findings are counter-intuitive as income inequality is found to be relatively more exogenous (at 3rd ranking) than the economic variables (at 4th ranking). More likely than not, there are some external forces that have made income inequality to be more exogenous than the economic variables. We believe that the government's policies in equalising income distribution for inter-racial stability in the country has contributed to this. Various economic policies have been formulated by the Malaysian government since the inter-racial riot in 1969. These social re-engineering and affirmative action programmes which began with the Second Malaysia Plan (1971-1975), and lasted until the Fifth Malaysia Plan (1986-1990), had the objectives of achieving national unity, harmony and integrity through socio-economic restructuring of the society; and to minimize the level of poverty in the country.

Table 4.6: Variance Decomposition (FD = Domestic Credit)

	Horizon	DIE	DCR	DGDP	DTR	Ranking
Dependent Variable						
DIE	5	56.0%	6.2%	12.7%	25.0%	3
DCR	5	11.9%	80.3%	5.0%	2.8%	1
DGDP	5	24.0%	4.1%	58.3%	13.6%	2
DTR	5	28.4%	13.6%	2.2%	55.8%	4
DIE	10	56.0%	6.3%	12.7%	25.0%	3
DCR	10	12.1%	79.9%	5.0%	3.0%	1
DGDP	10	24.0%	4.4%	58.1%	13.6%	2
DTR	10	28.3%	13.8%	2.3%	55.6%	4

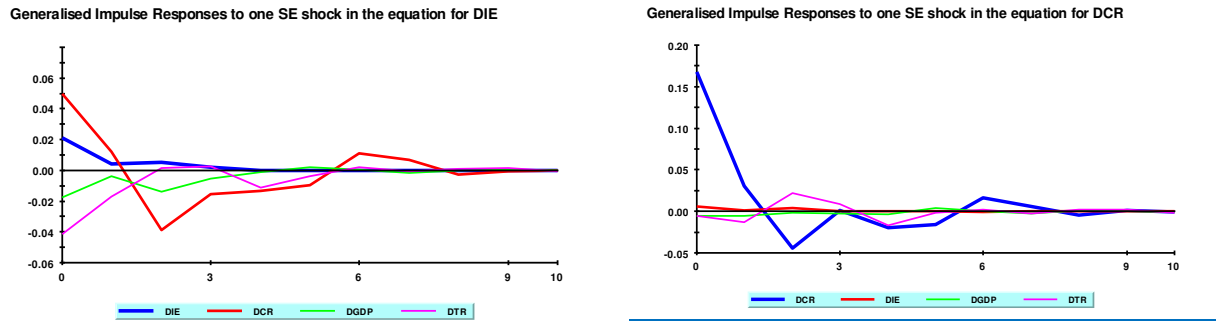
Table 4.7: Variance Decomposition (FD = Market Capitalisation)

Variable	Horizon	DIE	DMC	DGDP	DTR	Ranking
Dependent Variable						
DIE	5	61.7%	8.8%	7.4%	22.1%	3
DMC	5	22.9%	67.2%	5.3%	4.6%	2
DGDP	5	22.0%	24.5%	37.0%	16.5%	4
DTR	5	17.8%	3.0%	1.6%	77.7%	1
DIE	10	61.6%	8.9%	7.4%	22.1%	3
DMC	10	22.9%	67.2%	5.3%	4.6%	2
DGDP	10	22.0%	24.5%	36.9%	16.6%	4
DTR	10	17.8%	3.0%	1.6%	77.6%	1

Impulse Response Functions (IRFs)

We also applied the generalised impulse response functions to look at the impact of shock of one variable on the other variables and their degree of response. The IRFs essentially produce the same information as the VDCs, except that they are presented in graphical form. From Figure 3 below (left panel), when income inequality is shocked, domestic credit which is the most exogenous shows the least response. On the other hand, the right panel of Figure 3 shows that when domestic credit is shocked, income inequality being the third endogenous variable responses well to the shock.

Figure 3 : Generalised Impulse Response



Diagnostic Tests

To check the goodness of fit of the two models, diagnostic tests such as Lagrange Multiplier (LM) of residual serial correlation, RAMSEY's Reset test, Normality test and Heteroskedasticity test were conducted. Our main Model 1 passes all the diagnostic tests at 5% significance level. The diagnostic tests from Model 1 reveal that there is no serial collection among the variables, the functional form of the model is well specified, the residual terms are normally distributed; and the residual terms are homoscedastic. Model 2 however did not pass the functional form diagnostic test and hence its results should be read with caution.

5. CONCLUSION AND POLICY IMPLICATIONS

This paper examines the presence of long-run theoretical relationship between financial development, income inequality, economic growth and trade openness in Malaysia for the period 1970 to 2007. Using the ARDL bound testing approach, we consider two financial development indicators – domestic credit and stock market capitalisation. We used the ADF and PP unit root tests to check the stationarity of the series and found that the variables included in this study are not all of the same order.

This study finds that income inequality was cointegrated with financial development, per capita GDP and trade openness during the period under review. However, we find no significant long run effect between financial development and income inequality and this supports earlier findings by Law & Tan (2009) on a shorter time series data for Malaysia. The estimated long-run coefficient test however shows that only trade openness has statistical impact on income inequality. The significant long-term effect of trade openness on income inequality is found in both models when domestic credit and market capitalisation are used as indicator for financial development. We also find that income inequality is negatively related to stock market capitalisation/GDP which indicates that low income inequality is associated with higher stock market capitalisation/GDP. As the income distribution gap

becomes smaller, more people would have opportunities and resources to participate in the capital market investments and transactions.

The bank-based financial indicator used in our study is domestic credit by all financial institutions, which includes financing from Islamic banks as well as development banks. One of our motivations for this study is to capture financial development of financial institutions other than banks.to see whether the wider definition of domestic credit would produce different results than the findings in Law & Tan (2009) which use private sector credit as its bank-based financial indicator. Time series data on Islamic banks and development financial institutions are limited and hence we are not able directly use them in our analysis.

Our findings of no significant effect between the focus variables are alarming particular so that Islamic finance industry has been playing a bigger role in Malaysian financial system for the last 30 years since the establishment of Bank Islam Malaysia Berhad in 1983. This is because Islamic finance is supposed to aim for double perspective objectives, namely enhancement of the economic and social conditions. One of the motivations for the development of Islamic finance is to have social justice via reducing income inequality. This could have been achieved amongst others, by broadening and deepening the process of financial system. In fact, Islamic and development finance is expected to have been able to assist in reducing poverty and inequality by including a larger proportion of the population into the financial system, and by providing an easy and transparent access to a diversified portfolio of services. Unfortunately, our empirical analysis is not able to support this expectation.

In the context of our findings on finance-inequality relationship during the period studied where financial development is found to be endogenous and has no significant effect on inequality, effective redistribution and economic policies in Malaysia could have been the more effective and direct approach to reduce income inequality in the past as income inequality has been coming down since 1980s. With the robust economic development and urbanization that came with it, the Malaysian government realized that the rural community should not be marginalized in terms of facilities and economic opportunities. Various policies have been implemented including the New Economic Policy (1971-1990), National Development Policy (1991-2000) and the National Vision Policy (2001-2020) which all aim to develop the socio-economy, basic physical infrastructure and human capital especially in the rural areas[9].

[9] http://www.epu.gov.my/en/content/q1-what-are-steps-taken-government-ensure-more-balanced-development-between-urban-and-rural

In terms of policy implications, since there is no significant effect of financial development on income inequality in the past, policymakers need to look into minimizing financial market imperfections and constraints, as well as to steer the development of the financial system in a pro-growth and pro-poor direction. Our VDC results using bank-based financial development show that domestic credit/GDP is the most exogenous variable and therefore the policymakers can make financial sector development as its focus economic policy that can influence the income inequality in the country. Efforts to increase the poor's and small & medium entreprises' (SMEs) access to financial services to enhance their income and productive assets need to be heightened. This could come in the form of providing appropriate infrastructure to promote microfinance amongst the financial institutions including financial cooperatives. Another possible avenue is to use funds from philanthropic activities (like donation/sadaqah, waqf and Qard Hasan) as well as from Islamic banks' profits for social business. The Islamic banks' involvement in the social business can be as part of its corporate social responsibilities activities or as its own business investments.

Inequality is a complex process and the econometric models used in this study may have its limitations. More advance studies with broader dataset including the recent years data (after 2007) and different variant of financial development proxies and dimensions could be explored. Also, using dynamic econometric models is greatly encouraged to deepen our understanding on the finance-inequality linkage, and to understand the interaction effects between financial development and the other independent variables especially economic growth. Further primary researches based on detailed survey data at the micro-level are also highly encouraged to draw more conclusion on financing access to the have-nots.

REFERENCES

Ang, J.B. (2007). Financial deepening and economic development in Malaysia. *Economic Papers: A Journal of Applied Economics and Policy*, *26*(3), 249-260.

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

Arora, R. U. (2012). Finance and inequality: a study of Indian states. *Applied Economics*, *44*(34), 4527-4538.

Bahmani-Oskooee, M., & Zhang, R. (2015). On the impact of financial development on income distribution: time-series evidence. *Applied Economics*, *47*(12), 1248-1271.

Baligh, N., & Pirace, K. (2013). Financial Development and Income Inequality Relationship in Iran. *Middle-East Journal of Scientific Research*, *13*(Special Issue of Economics), 56-64.

Banerjee, A. V., & Newman, A. F. (1993). Occupational choice and the process of development. *Journal of Political Economy*, 274-298.

Batuo, M. E., Guidi, F., & Mlambo, K. (2012). Financial development and income inequality: Evidence from African Countries. *African Development Bank*.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, 12(1), 27-49.

Clarke, G. R., Xu, L. C., & Zou, H. F. (2006). Finance and income inequality: what do the data tell us?. *Southern Economic Journal*, 578-596.

Daumal, M. (2013). The impact of trade openness on regional inequality: the cases of India and Brazil. *The International Trade Journal*, *27*(3), 243-280.

Galbraith, J. K., & Kum, H. (2005). Estimating the inequality of household incomes: a statistical approach to the creation of a dense and consistent global data set. *Review of Income and Wealth*, *51*(1), 115-143.

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

Greenwood, J. & Jovanovic, B. (1990). *Financial Development, Growth, and the Distribution of Income.* Department of Economics Research Reports, 9002. Department of Economics, University of Western Ontario.

Hoi, L.Q. & Hoi, C. M. (2013). Financial sector development and income inequality in Vietnam: evidence at the provincial level. *Journal of Southeast Asian Economies (JSEAE)*, *30*(3), 263-277.

Jauch, S., & Watzka, S. (2012). Financial development and income inequality: a panel data approach. *Empirical Economics*, 1-24.

Johansen, S. and Juselius, K. (1990), "Maximum likelihood estimation and inference on cointegration, with applications to the demand for money", *Oxford Bulletin Economics Statistics*, 52(2), 169-210.

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

Law, S. H., Tan, H. B., & Azman-Saini, W. N. W. (2014). Financial development and income inequality at different levels of institutional quality. *Emerging Markets Finance and Trade*, *50*(sup1), 21-33.

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.

Mookerjee, R., & Kalipioni, P. (2010). Availability of financial services and income inequality: The evidence from many countries. *Emerging Markets Review*, *11*(4), 404-408.

Naceur, S.B., & Zhang, R. (2016). Financial development, inequality and poverty: some international evidence. *IMF Working Paper*, WP/16/32

Pesaran, M. and Shin, Y. (1999), "An autoregressive distributed lag modelling approach to cointegration analysis", in Strom, S. (Ed.), paper presented at *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium,* Cambridge University Press, Cambridge.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289-326.

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

Seven, U., & Coskun, Y. (2016). Does financial development reduce income inequality and poverty? Evidence from emerging countries. *Emerging Markets Review*, *26*, 34-63.

Shahbaz, M., & Islam, F. (2011). Financial development and income inequality in Pakistan: an application of ARDL approach. *Journal of Economic Development*, *36*(1), 35.

Shari, I. (2000), Economic Growth and Income Inequality in Malaysia, 1971-1995. *Journal of Asia Pacific Economy*, 5, 112-114.

Tan, H. B., & Law, S. H. (2009). Does Financial Deepening Improve Income Distribution? A Dynamic Panel Analysis on Developing Countries. *Nottingham Univ. Business School, Malaysia Campus, Research Paper*, (2009-01).

APPENDIX A: SUMMARY OF LITERATURE REVIEW

Author	Country	Data Period	Methodology	Measures for Financial Development (FD)	Significant effect of FD on IE	Support hypothesis		Other significant predictors of Income Inequality (IE)
						Linear	Inverted U-shaped	
Clarke et. al. (2006)	83 countries	1960 - 1995	OLS + Kuznet (FD^2)	Private credit / GDP Bank asset (deposit money / GDP)	Yes	Yes (-)	No	
Liang (2006)	China	1986-2000	GMM	Share of financial sector in GDP Ratio of total credits to gross fixed capital formation Private credit	Yes	Yes (-)	No	Urban unemployment (+) GDP (-/+) Education (+)
Tan & Law (2009)	35 countries	1980 - 2000	GMM		Yes	Yes (-)	Normal U-shaped	
Ang (2010)	India	1951-2004	ARDL VECM	Private credit to GDP (M3 – M1) / GDP Commercial bank assets/(commercial bank + central bank assets)	Yes	Yes (-)	No	
Shahbaz & Islam (2011)	Pakistan	1971 - 2005	ARDL VECM	Private credit	Yes	Yes (-)	No	Economic growth (+) Trade (+) Inflation (-)
Batuo et al (2012)	22 African countries	1980 - 2004	GMM	M2/GDP Private credit / GDP	Yes	Yes (-)	No	Education (-)
Baligh & Piraee (2013)	Iran	1973-2010	Bound testing approach	Private credit / GDP Ratio of liquidity (M2 to GDP)	Yes	Yes (-)	No	Institutional quality (-) Economic growth (+)
Seven & Coskun (2016)	45 countries	1987-2011	OLS/ GMM	Private credit by bank / GDP Deposit money bank asset / GDP M3 /GDP Private credit by deposit bank moneys and other financial institutions /GDP Bank deposits /GDP Stock market capitalisation /GDP Stock market total value traded / GDP Stock market turnover ratio	No (combined banks & stock markets) /Yes	No [10] / Positive [11]	No	

[10] For test using combined banks and stock markets indicators.
[11] For test using bank development indicators only.

Author	Country	Data Period	Methodology	Measures for Financial Development (FD)	Significant effect of FD on IE	Support hypothesis		Other significant predictors of Income Inequality (IE)
						Linear	Inverted U-shaped	
Law & Tan (2009)	Malaysia	1980 – 2000 (quarterly)	ARDL	Private credit /GDP Stock market capitalisation /GDP Domestic credit /GDP Total share value traded/GDP (Private Credit + Share Value Traded) /GDP (Private Credit + Market Capitalisation) /GDP	No	No		Real income (-) Institutional quality (-) Inflation (+)
Mookerjee & Kalipioni (2010)	70 countries	2000 - 2005	OLS	Banks per 100,000 population Min amount to open checking & savings Location to submit loan applications	Yes	Yes (-)		Trade (-) Inflation (+)
Arora (2012)	India	1999-2000 2006-2007	Pooled estimation	Credit Bank branches	Yes (urban area only)	Yes (-)		
Hoi & Hoi (2013)	Vietnam	2002-2008	OLS	Number of financial firms /1.0 million people Average operating capital of financial firms per head Average fixed assets of financial firms per head	Yes	Yes (-)		Education (-) Trade openness (-)
Law et al (2014)	81 countries	1985–2010		Private sector credit Bank credit deposit money to private Bank sector branches	Yes (for institutional quality above certain threshold)	Yes (-)		
Bahmani-Oskooee & Zhang (2015)	17 countries	Time series (different period)	OLS (LR) ARDL/VECM (SR)	**Credit** : Private credit / GDP & Bank assets / GDP **Liquidity channel** : liquid liabilities / GDP & deposits / GDP **Efficiency** : Bank credit / bank deposit	Yes	Yes (mixed) [12]		

[12] Short run effect found in 10 countries (negative effect) and 5 countries (positive effect). Long run effect found in 3 countries (negative) and 9 countries (positive).

Author	Country	Data Period	Methodology	Measures for Financial Development (FD)	Significant effect of FD on IE	Support hypothesis		Other significant predictors of Income Inequality (IE)
						Linear	Inverted U-shaped	
Naceur & Zhang (2016)	143 countries	1961 - 2011	OLS	**Access** : Bank accounts per 1000 adults & value of top 10 trading companies/total traded value **Depth** : Private credit/GDP & stock market value/GDP **Efficiency** : net interest margin & stock market turnover ratio **Stability** : ratio of regulatory capital/risk-weighted assets & volatility of stock price index **Liberalisation** : measures for domestic liberalisation and external liberalisation	Yes (-1)	Yes		GDP per capital (-) Government expenditure (-) Trade openness (-) Inflation (+)
Jauch & Watzka (2012)	138 countries	1960 - 2008	OLS	Private credit/GDP Bank deposit/GDP	Yes	Positive (+)		
Sehrawat & Giri (2015)	India	1982 - 2012	ARDL/VECM	Private credit/GDP Market capitalisation/GDP	Yes	Positive (+)	No	Economic growth (+) Inflation (+) Trade openness (-)

Legends:
ARDL = Auto Regressive Distributed Lag bounds testing approach
ECM =Vector Error correction model
GDP = Gross Domestic Products
GMM = Generalized Method of Moments
LR = Long run
OLS = Ordinary Least Squares
SR = Short run
SVAR = Structural Vector Auto-Regression