THE LINK BETWEEN FINANCIAL SECTOR DEVELOPMENT AND INCOME DISTRIBUTION: EVIDENCE FROM SINGAPORE

Abdul Rahim Ridzuan♣
Universiti Teknologi MARA, Alor Gajah Campus, Melaka

Rosfadzimi Mat Saad
Universiti Teknologi MARA, Alor Gajah Campus, Melaka

Geetha Subramaniam
Universiti Teknologi MARA, Puncak Alam Campus, Selangor

Suhaidah Mohd Amin
Universiti Teknologi MARA, Jasin Campus, Melaka

Halimahton Borhan
Universiti Teknologi MARA, Bandaraya Melaka Campus, Melaka

ABSTRACT

Singapore has shown a remarkable progress in its economic growth in the last ten years. However, the country's economic growth also has lead towards higher income inequality in the society. The main objective of this research is to analyse the impact of financial development proxied by domestic credit to private sector (DC) and broad money (MS) on income distribution (GINI) in Singapore. Analysis was done using Autoregressive Distributed Lag Model (ARDL) estimation and the period of study was from 1970 until 2016. The empirical results show that deepening of financial development improves the income distribution in Singapore. One policy recommendation to ensure continuous improvement on its income distribution will be widening the accessibility of the financial products. This might enhance the role of financial institutions to be part of the driver in reducing the existing income gap. A financial sector which is socially inclusive between various segments of the society, may reduce the income inequality issue in the country.

Keywords: Financial development; Economic growth; Income distribution; Singapore

1. INTRODUCTION

Singapore has recorded remarkable success as a regional financial centre in Southeast Asia as a result of progressive financial sector reforms and the practise of fiscal incentives that managed to lure the interest of foreign bankers to open their financial institutions to this county. The country's economy has progressed significantly in the last four decades since the formation of Association of Southeast Asian Nation (ASEAN). As the only developed status country in the ASEAN region, Singapore has


♣Corresponding author: Faculty of Business and Management, Universiti Teknologi MARA, Alor Gajah Campus, 78000 Alor Gajah, Melaka, Malaysia. Tel: +60162325105 Email: rahim670@staf.uitm.edu.my

experienced sustainable economic growth rates through the transition of its economy from a manufacturing-based economy to a service-based economy. Singapore is currently a major financial centre, serving not only its local economy but also its region and beyond. The country also has become one of the preferred destinations for investment and international trade activities due to its deepening development in the financial market. Thus, the growth of financial market provided by Singapore has contributed significantly to its economic development.

Generally, the deepening financial sector development can be monitored through two main proxies namely domestic credit to private sector and the level of broad money or money supply, M2 as suggested by Sehrawat and Giri (2017). Between the two suggested proxies, domestic credit to the private sector is regarded as a more comprehensive measure of financial development in the literature (Beck et al. 2007; Polat et al. 2015). According to Beck et al. (2000), the use of domestic credit to the private sector to present financial development is suitable for developed countries like Singapore which experiences wider and deeper financial sectors. These two trends are observed and shown in Figure 1. Boutabba (2014), defines domestic credit to the private sector as financial resources disbursed to the private sector via loans, purchases of non-equity securities, trade credit and other accounts receivable that establish a claim for repayment. Martin et al. (2013) added that the actual level of domestic savings disbursed to investors for productive investment ventures, reflects financial development. Based on Figure 1, domestic credit to private sector in Singapore increased from 45.3 % in 1970 to 132.9 % in 2016 growing at an average annual rate of 2.94 %.

Broad money, the second proxy for financial sector development represents the sum of currency outside banks; demand deposits; savings; and foreign currency deposits; bank and traveller's checks; and other securities such as certificates of deposit. This proxy is relatively a weaker proxy for financial development as compared to domestic credit to private sector. The reason is that broad money or M2 as a share of GDP contains a large portion of currency and reflects monetization (Jalil and Feridun 2011). The highest value for broad money in Singapore during the past 47 years was 137% in 2016, while its lowest value was 53.36% in 1974. Both proxies show an overall upward trending thus providing some positive insight towards Singapore's financial development.

Figure 1: The trend of domestic credit to private to provide sector (% of GDP) and broad money (% of GDP) in Singapore
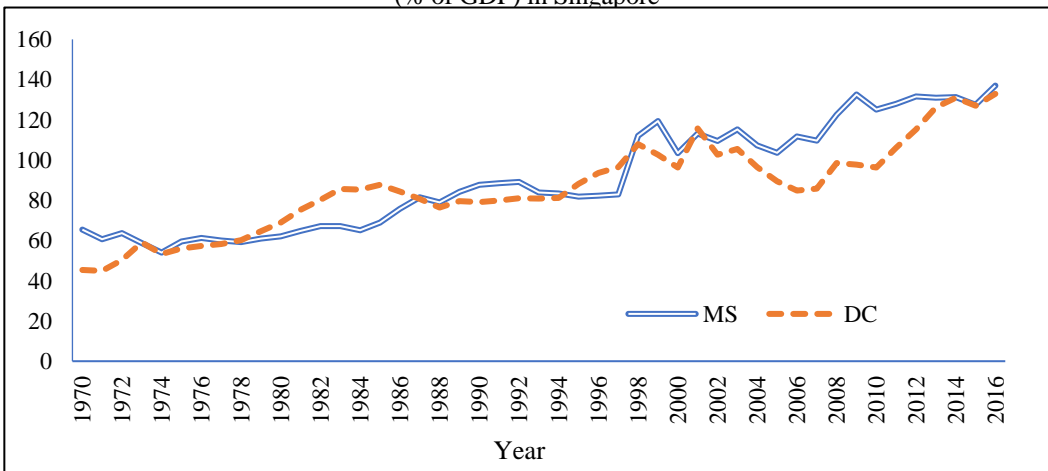
Despite achieving rapid economic development in the past forty years, Singapore has also recorded an imbalance on the average increment of the income distribution between the topmost and the bottom decile. The average income for families in the bottom decile of the income distribution increased just 3-4% while that of the topmost decile grew by 6-11%, between year 1990 until 2000. As a result, income inequality has grown markedly in Singapore during that period (see Figure 2) with a Gini coefficient value between 0.50 to 0.54. These values are far higher than most developing and developed countries which experienced long periods of high growth. During the Asian financial crisis, 1998-1999, income inequality continued to worsen due to the overall economic slowdown that resulted in higher unemployment rates and then re-employment at lower wage rates.

Globalization and the largely open-economy nature of Singapore has played a crucial part in creating this inequality, but strong commitment to meritocracy in education, recent adaptations to the tax structure and government's manpower policies towards attracting foreign talent have further intensified the problem in recent years. Huge income inequality could create negative implication, as it creates price distortion which may push low income families into poverty. However, the income inequality situation in Singapore has shown an improvement between 2003 until 2016 as the value began to fall between 0.42 and to its lowest point of 0.40 in 2016 as stated under Key Household Income Trend 2017 produced by Department of Statistics, Singapore. The country has undergone tremendous economic transformation since early 1990s, due to the government's liberalization and globalization policies and financial sector reforms. As the country's economic development is backed up by strong growth of financial institutions, there is a tendency that deepening financial sector development could be one of the potential mechanisms for the government to reduce the problem of income inequality. As highlighted by Shahbaz et al. (2014), the financial sector development could act as a tool to reduce income distribution via three main channels. First, an easy access to financial resources which may stimulate investment activities that directly improve the income of poor segments of population by creating job opportunities. Second, an easy access to financial resources which provides various opportunities and enables the poor segments of population among others to increase human capital formation by investing in education, health and various aspects of socioeconomic development of the household. Third, development and proper management of financial sector might also be helpful in protecting the indexed income of elite class via easy access to financial resources during the instances of high inflations since inflation is very harmful for those who earn fixed income as inflation reduces purchasing power.

Figure 2: The trend of GINI index in Singapore
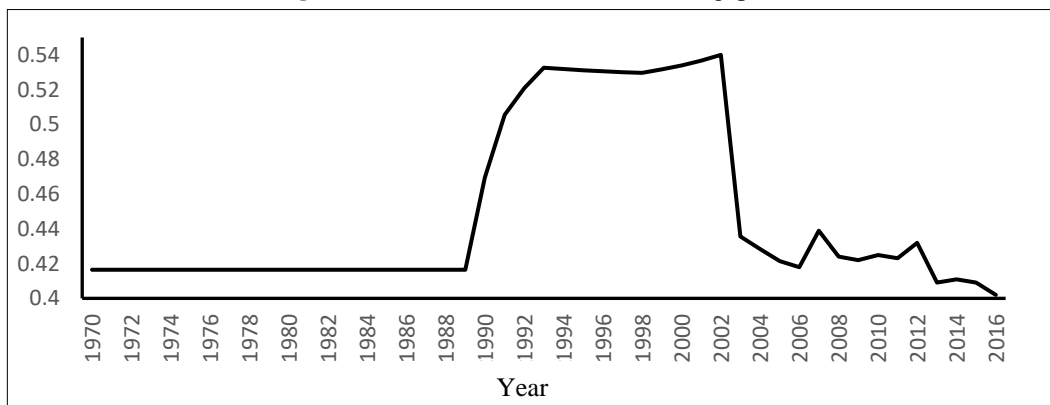
Given a strong growth of both proxies of financial development as shown in Figure 1, it will be interesting to test whether these proxies that represent financial sector development influence income distribution in this country. Recent empirical findings on this topic is very scarce and this paper could contribute to new findings in this area of studies. Hence, the purpose of this paper is to investigate the impact of financial sector development and other macroeconomic variables such as inflation (INF), foreign direct investment (FDI), trade openness (TO) and economic development (GDP), on income distribution for Singapore using (ARDL) and time-series data.

The rest of the paper is structured as follows: Section 2 presents literature review, section 3 describes the methodology, while section 4 will focus on empirical analysis. Section 5 concludes the paper with policy recommendation.

2.   LITERATURE REVIEW

The positive effect of financial development on economic growth has been well documented in the literature using different econometric approaches and samples. In this section, the theoretical aspect of financial development and income distribution is discussed. Besides, the past empirical findings on the theme of this research topic is reviewed based on the estimation using time series analysis and panel estimation.

There are two main hypotheses that describe the relationship between financial sector development and income distribution. The first hypothesis namely, the finance–income inequality widening hypothesis which was introduced by Lamoreaux (1995) and Haber (2004), postulates that financial sector development may benefit only the wealthy individuals when the institutional quality is weak. This hypothesis further proposes that financial sector development benefits the rich due to their perceived credit-worthiness to the banks. The socially and economically backward poor individuals, on other hand, lack both the financial credibility and sufficient collateral to be seen as good investments. They may find it difficult to access the financial services within financial institutions. Therefore, the poor are equipped only with primary education, and join the unskilled labour market at lower wages. Combining these factors, it can be concluded that financial sector development increases income inequality and a positive association between financial sector development and income inequality is expected. The second hypothesis namely the finance income inequality narrowing hypothesis is based on the theoretical contributions of Becker and Tomes (1979), Galor and Zeira (1993) and Banerjee and Newman (1993). The hypothesis states that the poor have access to credit from the financial institutions due to the new widespread financial development. The poor, who can now access better education, implement innovative ideas and develop managerial skills due to their improved financial situations, will benefit from better employment opportunities. This will eventually lead to an increase in their labour productivity. Financial sector development may thus improve the income distribution of the countries in transition (Jalilian and Kirkpatrick 2005). Next, the selected past empirical studies that focus on investigating the relationship between financial sector development and income distribution is explained in the next two paragraphs.

Using the ARDL estimation from time series analysis, Baligh and Piraee (2013) examined the relationship between financial development and income inequality in Iran, over the period 1973-2010. The findings show that there exists a negative and linear relationship between financial development and income inequality. Financial development significantly reduces income inequality

in Iran. However, studies by Ridzuan et al. (2018), found that financial development does not significantly influence the level of income distribution in Malaysia. The authors used ARDL estimation and in the study period 1970 to 2013. Meanwhile, Azleen and Mansur (2017) used the same technique to investigate the link between financial development and income distribution in Malaysia. The outcomes shows that financial development failed to influence the income distribution in this country. This result concurs with the outcomes of Law and Tan (2009) who examined the role of bank and stock market developments on income inequality in Malaysia for the period 1980–2000. The authors found that the development in banks and stock markets are not significantly associated with income inequality. Using ARDL estimation, Shahbaz et al. (2017), on the other hand, found that the deepening of financial development helped to reduce the income inequality gap, while economic growth worsens income inequality, and both inflation and trade openness increase income distribution in the case of Kazakhstan. Ridzuan et al. (2017), posit similar outcomes like Shahbaz et al (2017) where they investigate the impact of income inequality on financial development in Singapore using ARDL estimation for the period of 1970-2013. They found that deepening of financial institution in Singapore significantly reduces the level of income inequality in the country, both in the short run and long run. The authors, however, only used money supply, M2 as % of GDP to proxy financial development in their studies.

In the European Union region, Gimet and Lagoarde-Segot (2011) investigated the impact of financial development, in a set of 49 countries during the period 1994-2002. They found an inequality-increasing impact of financial development. Next, Law et al. (2014) used a panel threshold regression approach for testing the effect of financial development on income inequality at different institutional quality levels for 81 countries during the period 1985-2010. They observed that financial development serves to alleviate income inequality only after a certain threshold scale of institutional quality has been achieved and suggest that until then the threshold effect of financial development on income inequality is non-existent. Furthermore, Jauch and Watzka (2015) analyse the link between financial development and income inequality for a broad unbalanced dataset of up to 138 developed and developing countries between 1960 and 2008. They found that financial development increases income inequality, after controlling for country fixed effects and possible endogeneity problems. Interestingly, Adams and Klobodu (2016), examine the effect of financial development and control of corruption on income inequality in 21 Sub-Saharan African (SSA) countries over the period of 1985–2011 using the pooled mean group (PMG) estimator. The empirical results show that financial development in this group of economies have positive impact on income inequality, which suggests that financial development increases income inequality. On the other hand, the coefficients of control of corruption are negative and significantly related to income inequality which implies that corruption control reduces income inequality.

The mixed findings for the relationship between financial sector development and income distribution has sparked the interest for this research to be conducted using a similar testing on the only developed member country in ASEAN, namely Singapore.

3. METHODOLOGY

The formulation of the model is explained briefly in this section. The determinants of income distribution for Singapore are carefully selected as not all determinants can be included due to the limited number of observations.

Model of Income Distribution

The general functional form of model is listed as follow:

$$ID_t = f(FD_t, INF_t, FD_t, TO_t, GDP_t)...(1)$$

Where
IDt represents income distribution,
FDt represents financial development,
INFt represents price stability,
TOt represents trade openness,
GDPt represents economic growth.

All variables were transformed into log-linear form named as LN to translate the result into long run elasticities and reduce the sharpness of the time series data resulting in consistent and reliable estimates (Shahbaz, 2010). For empirical purpose, this paper adopted the following version of the model:

$$LNID_t = \delta_0 + \alpha_1 LNFD_t + \beta_2 LNINF_t + \sigma_3 LNFDI_t + \phi_4 LNTO_t + \lambda_5 LNGDP_t + \mu_t...(2)$$

where
LNID is income distribution proxy by GINI coefficient,
LNFD is financial development proxy by broad money to GDP (MS) and domestic credit to private sector (DC),
LNINF is inflation captured by consumer price index,
LNFDI is net foreign direct investment inflow to GDP,
LNTO is the sum of export and import to GDP,
LNGDP is a real gross domestic product (constant 2010).

Financial development provides an opportunity for different socio-economic background of people to borrow and invest. Undoubtedly, if people with a high-income level are the only group who can access to financial markets borrowing, income inequality could worsen. However, if a person from the middle income or lower income group could easily access to credit markets, most people can borrow and invest in their skills and human capital, and thus the income inequality is likely to improve. Hence, an estimate of α1 and α2 is expected to be either positive or negative. Note that given the standard definition of Gini, a positive estimate of α1 suggests a worsening effect of financial development and a negative estimate of α1 indicates improvement in income inequality due to financial development.

Next, the model includes several control variables to produce more reliable estimation and to avoid omitted variable bias. According to literature, high rate of inflation (LNINF) will harm the poor because of their constrained accessibility to financial services (Easterly and Fischer, 2001). Hence, consumer price index is used to capture the price stability (INF). The expected sign for FDI could be negative assuming FDI which creates the demand for unskilled workers or offers economic chances for those who are deemed to be unemployable, thus the host FDI nation would feel an enhancement in income inequality (Sylwester, 2005). To account for the impact of international trade on income distribution, the model includes a variable denoted by LNTO. Barro (2000) shows that trade openness

itself appears to be associated with increased inequality, while developed countries appear to experience decreased inequality with openness, thus the expected sign for φ4 is negative. The last determinant of Gini is the level of economic growth rate which is denoted by LNGDP. According to Bahmani-Oskee et al. (2008), if the economic growth rates improve income inequality, an estimate of λ5 should be negative.

The ARDL model based on Unrestricted Error Correction Model (UECM) is stated below:

$$\Delta LNID_t = \beta_0 + \theta_0 LNGINI_{t-1} + \theta_1 LNFD_{t-1} + \theta_2 LNINF_{t-1} + \theta_3 LNFDI_{t-1} + \theta_4 LNTO_{t-1} + \theta_5 LNGDP_{t-1} +$$

$$\sum_{i=1}^{p} \beta_i \Delta LNID_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta LNFD_{t-i} + \sum_{i=0}^{r} \delta_i \Delta LNINF_{t-i} + \sum_{i=0}^{s} \lambda_i \Delta LNFDI_{t-i} + \sum_{i=0}^{t} \vartheta_i \Delta LNTO_{t-i} + \sum_{i=0}^{u} \zeta_i \Delta LNGDP_{t-1} + \upsilon_t ...(3)$$

where Δ is the first difference operator and ut is the white-noise disturbance term. Residuals for the UECM should be serially uncorrelated and the models should be stable. The final model represented in equation (3.0) above can also be viewed as an ARDL of order, ($p\ q\ r\ s\ t\ u$). The model indicates that level of income distribution (ID) to be influenced and explained by its past values, so it involves other disturbance or shocks. From the estimation of UECM, the long run elasticities are the coefficient of the one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of the one lagged dependent variable. The short-run effects are captured by the coefficient of the first differenced variables. The null of no cointegration in the long run relationship is defined by: $H0$: $\theta0=\theta1=\theta2=\theta3=\theta4=\theta5=0$ (there is no long-run relationship), is tested against the alternative of $H1$: $\theta0\neq \theta1\neq \theta2\neq \theta3\neq \theta4\neq\theta5\neq 0$ (there is a long-run relationship exists), by means of familiar F-test. If the computed F-statistic is less than lower bound critical value, then we do not reject the null hypothesis of no integration. However, if the computed F-statistics is greater than the upper bound critical value, then we reject the null hypothesis of no co-integration. However, if the computed value falls within lower and upper bound critical values, then the result is inconclusive.

This study used annual data starting from 1970 up to 2016 comprising 47 years, as a sample period. Summary of the data and its sources are shown in Table 1 below:

Table 1: Sources of data

Variables	Description	Sources
ID	Gini coefficient	GCIP
MS	Broad money, M2 (% of GDP)	WDI
DC	Domestic credit to private sector (% of GDP)	WDI
INF	Consumer price index	WDI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
TO	Trade (% of GDP)	WDI
GDP	GDP per capita, (constant, 2010)	WDI

Note: WDI stands for World Development Indicator (2017), and GCIP stands for Global Consumption Income Project (2017).

Empirical studies show that different variables have been used to measure financial development (i.e., such as quasi money or broad money or domestic credit as a ratio of GDP). Furthermore, these variables are highly correlated and there is no specific variable to measure the financial development, which justifies the need to construct an index as a single proxy variable to measure financial development. In this study, we use the financial development (FD) index and it comprises two

variables that are widely used in the empirical literature: (1) domestic credit to the private sector as a share of GDP, and (2) the ratio of broad money stock as a share of GDP, which is often called the monetization variable of financial development. Besides, there are better proxies used to represent financial sector development for developed countries, such as stock market capitalization to GDP ratio or deposit money banks assets to GDP ratios. However, as these variables are only available in quarterly or monthly periods, it becomes difficult for us to proceed given that the GINI index data is more accurate using annual basis.

The Principal Component Analysis (PCA) is based on the variance of specific variables and can extract a minimum of factors that explain the largest number of specific variances. By using these two variables, we have developed a summary measure for financial development by employing principal component analysis as revealed in Table 2 that deals with the problems of multi-collinearity and over-parameterization (Stock and Watson, 2002a, b).

Table 2: Principal Component Analysis for Financial Development Index (FD)

Principal Component	Explained Variance	Cumulated Explained Variance
1	93.13%	93.13%
2	6.87%	100%

Note: The value of principle component analysis is counted using Eviews 9 software.

Eigenvalues suggest that the first principal component explains about 93.13% of the standardized variance and the second principal component explains another 6.87% variation. It can be concluded that the first principal component is better than the second component. Thus, the first eigenvector values are used as a weight to construct a Financial Development Index and denoted as FD.

4. THE EMPIRICAL RESULTS

The analysis begins by testing the unit root for each variable introduced in the model. The two standard unit root tests that are used in this research are Augmented Dickey Fuller (ADF) test and Philipps-Perron (PP) test. Each test is performed based on two stages: intercept and trend and intercept. These tests are considered important preliminary tests to identify the variable order of integration. If the variable contains unit root or being only significant at first difference for both ADF and PP unit root test, the next step will be Vector Error Correction model in order to derive short and long-term elasticities. However, if there is a mix evidence of stationarity at I(0) and I(1), then, the best analysis to be used is ARDL estimation.

Based on the outcome in Table 3, it is found that that there is a mix evidence of stationarity where LNM2, LNFDI and LNGDP are found to be stationary at 5% and 1% significance level, respectively for both ADF and PP unit root test. However, each variable is found to be stationary at 1% significant level as it is run by using first difference for both ADF and PP unit root tests. Thus, it can be concluded that the best estimation to determine the short and long run relationship for the proposed model is ARDL estimation as the outcomes fit with the condition as stated above.

Table 3: Results of Unit Root Tests

Model	Variable	ADF test statistic		PP test statistic	
		Intercept	**Trend and intercept**	**Intercept**	**Trend and intercept**
Level	LNID	-1.208 (0)	-0.984 (0)	-1.474 (3)	-1.252 (3)
	LNFD	-0.209 (0)	-3.203 (0)*	0.080 (2)	-3.333 (3)*
	LNINF	-3.120 (1)**	-4.193 (1)***	-3.946 (10)***	-5.720 (28)***
	LNFDI	-3.227 (0)**	-5.924 (4)***	-3.137 (1)**	-6.362 (1)***
	LNTO	-2.305 (0)	-2.141 (0)	-2.305 (0)	-2.141 (0)
	LNGDP	-3.341 (0)**	-1.739 (0)	-5.093 (7)***	-1.648 (4)
First difference	LNID	-5.650 (0)***	-5.726 (0)***	-5.667 (2)***	-5.738 (2)***
	LNFD	-8.337 (0)***	-8.279 (0)***	-8.354 (1)***	-8.297 (1)***
	LNINF	-3.786 (0)***	-4.279 (0)***	-3.595 (7)***	-4.069 (7)**
	LNFDI	-6.475 (4)***	-6.382 (4)***	-25.340 (25)***	-24.943 (25)***
	LNTO	-6.567 (0)***	-6.680 (0)***	-6.560 (0)***	-6.682 (1)***
	LNGDP	-5.463 (1)***	-6.723 (1)***	-5.421 (0)***	-6.992 (8)***

Notes: 1. (*), (**), (***) indicate significant at 10%, 5% and 1% significance level respectively. 2. The optimal lag is selected using the Schwarz info criterion for ADF test and the bandwidth had been selected by using the Newey–West method for the PP test.

Before pursuing long and short run elasticities, the model must pass the detection of long run relationship using ARDL cointegration. The outcome of this analysis is displayed in Table 4. The maximum lag of 4 was imposed in the model and the estimation is based on Akaike Information criterion (SIC). The findings reported in Table 4 imply that the computed F-statistics are greater than upper critical bound at the 1%, 5% and 10% levels of significance, respectively. This implies the rejection of the null hypothesis of no cointegration considering GINI, INF, FDI and TO as dependent variables. The hypothesis of no cointegration is accepted when FD and GDP are used as dependent variables. This shows the presence of four co-integrating vectors implying that long-run dynamics exist among most of the considered variables in our model.

Table 4: Result of ARDL cointegration

Model	Critical Values for F-statistics	Max. lag	Lag order	
ID = *f*(FD,INF,FDI,TO,GDP)	3.40*	4	(2,4,0,1,0,0)	
FD = *f*(ID, INF, FDI, TO, GDP)	2.13	4	(1,1,0,0,0,1)	
INF = *f*(ID, FD, FDI, TO, GDP)	10.25***	4	(2,4,3,4,3,3)	
FDI = *f*(ID, FD, INF, TO, GDP)	6.40***	4	(1,0,0,0,0,1)	
TO = *f*(ID, FD, INF, FDI, GDP)	10.53***	4	(1,1,1,4,3,0)	
GDP = *f*(ID, FD, INF, FDI, TO)	1.54	4	(1,0,1,3,2,0)	
k =5	**Significant level**		**Lower I (0)**	**Upper I (1)**
	1%		3.41	4.68
	5%		2.62	3.79
	10%		2.26	3.35

Notes: 1. The critical values for F-statistics are based on Pesaran (2001), case III: unrestricted intercept and trend. 2. k is a number of variables. 3. *, **, and *** represent 10%, 5% and 1% level of significance, respectively. k =6 for a model of income distribution.

Next, several diagnostic tests were performed to ensure that the output of the model produces robust results. The results from Table 5 confirms that the proposed model has no evidence of serial correlation, no heteroscedasticity effect in disturbances, and the model's specifications are well specified.

Table 5: Result of Diagnostic Checking

Model	Serial correlation	Functional form	Heteroscedasticity
	1.502	1.458	0.321
	[0.240]	[0.236]	[0.979]

Note: The numbers in brackets [ ] are p-values.

In addition, from the above test, CUSUM and CUSUM of Square (CUSUMsq) are performed to confirm the parameter constancy of the model as proposed by Brown et al. (1975). The following graphs confirm that the model is structurally stable at 5% significance level given that the blue line lies between the two dotted red lines.

Figure 2: CUSUM and CUSUMSQ
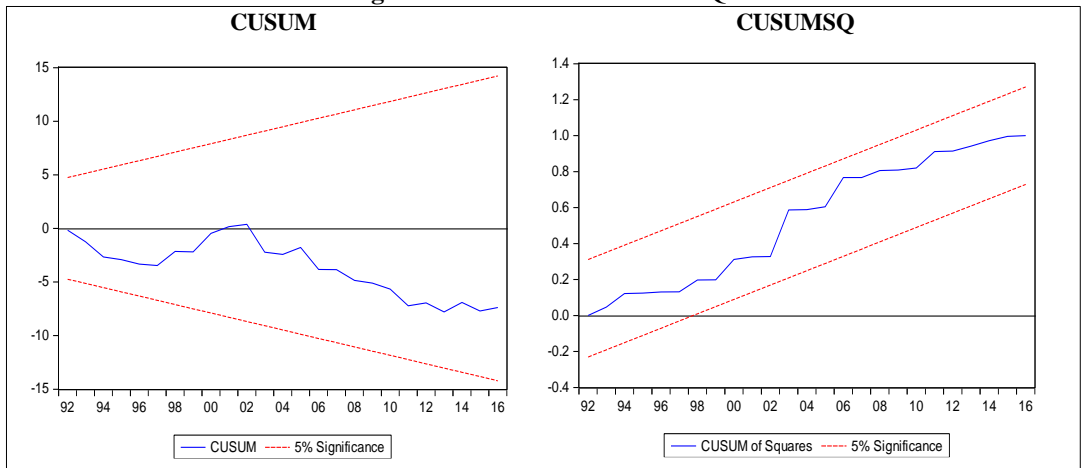
The analysis outcome as presented in Table 6 begins with long run elasticities, followed by short run elasticities and error correction term. All determinants of income distribution (GINI) are found to be significant at 5 and 10% significance level except for LNINF. The financial development (FD) index showcased a negative sign. This means that, deepening of financial development has successfully improved income distribution for Singapore, thus validating the finance–income inequality narrowing hypothesis, introduced by Greenwood and Jovanovich (1990). Based on technical interpretation, 1% increase in LNFD will reduce the income inequality by 0.44%. This finding is consistent with the findings of an earlier study by Ridzuan et al (2017) which shows that deepening of financial development proxy by broad money, M2 helps to improve the condition of income equality in Singapore. Among other studies that supported deepening of financial development as an important factor in reducing the income inequality are Ang (2010) and Clarke et al. (2006). Besides LNFD, it is also found that improving openness to trade (LNTO) also helps to improve income

distribution in Singapore. This implies, a 1% increase in LNTO improves the income inequality by 1.19%. Through active engagement in international trade activities, the country could boost their exports, thus there will be a higher demand for local workers. The country's middle and lower segments of the population will enjoy increased opportunities in the labour market, and eventually the income level of lower segments of the population would tend to increase, indicating an improvement in income distribution in Singapore. Economic development (LNGDP), on the other hand, showed a positive relationship with income distribution. In other words, the continuous progress of economic growth in Singapore economy could worsen the income inequality problem in this country. This implies, a 1% increase in LNGDP will increase the GINI index by 1.37%. Despite the Singapore economy experiencing a steady economic growth, the country also faces the problem of larger income disparity among its society. The share of wealth only benefits a particular group of people, probably the high-income earners, while not much difference is seen among the case of low-income earners. Lastly, LNFDI is found to be significant at only 10 % significance level, with elasticity of 0.37%. Probably higher foreign direct inflows have failed to bring an equal income distribution to the country's society.

The second half of Table 6 displays the outcome for short-run elasticities. Based on lag 0, it is found that both LNFD and LNTO have a negative relationship with LNGINI. In other words, in the short run, the deepening of financial development and openness to trade reduces the income inequality gap in the country. Perhaps, by comparing the outcomes or degree of elasticities between short run and long run, the progress of financial development (LNFD) and trade liberalization (LNTO) achieved in Singapore may create better conditions for its income inequality problem in the long run. Meanwhile, the impact of economic development which lead to the rising of income inequality seem to be greater in the short run compared to the long run.

Lastly, the long run relationship of the model was supported by the negative and significant value of error correction term (ECT). ECT reflects the speed of adjustment for the model and the negative value means that the variables in the model will converge in the long run. The recorded speed of adjustment for the proposed model is 0.142. Approximately, 14.2 percent disequilibria from the previous year's shock converges back to the long run equilibrium in the current year.

Table 6: Estimation of Long-Run and Short-Run Elasticities

Variables	Standard Error	t-Statistic	Coefficient
Long run elasticities			
LNFD	0.165	-2.656	-0.438**
LNINF	0.980	-1.295	-1.269
LNFDI	0.192	1.888	0.363*
LNTO	0.509	-2.335	-1.190**
LNGDP	0.524	2.610	1.369**
C	2.874	-1.082	-3.110
Short run elasticities			
$LNID_{-1}$	0.142	2.861	0.407***
ΔFD	0.016	-2.233	-0.036**
ΔFD_{-1}	0.017	4.518	0.080***
ΔFD_{-2}	0.020	-3.485	-0.070***
ΔFD_{-3}	0.018	3.702	0.066***

Variables	Standard Error	t-Statistic	Coefficient
ΔLNINF	0.146	-1.243	-0.181
ΔLNFDI	0.013	1.362	0.018
ΔLNTRADE	0.059	-2.851	-0.170***
ΔLNGDP	0.074	2.615	0.195**
CointEq$_{(-1)}$ @ ECT	0.049	-2.868	-0.142***

Notes: (*), (**), (***) indicate significant at 10%,5% and 1% significance level respectively. Δ refer to difference

5.   CONCLUSION

The findings from the study suggest that financial development and trade openness improves income distribution in Singapore, while economic development worsens the income distribution. No significant relationship was detected between FDI and income distribution. This study adds to the existing literature on the relationship between income inequality, financial development and other controlling factors such as economic growth, foreign direct investment and trade openness and its significant role in the development of the Singapore economy. The analysis was done using ARDL estimation on recent data available from 1970 until 2016, consisting of 47 years of observation.

The findings from this study have important policy implication for the Singapore government. Financial sector development could act as a driver for better income distribution in this country. To enhance this impact, the government could widen the accessibility of finance especially for microenterprises, and small and medium enterprises, which are dominated by young entrepreneurs. The development of capital markets and greater access to financial products and services should be necessary in this respect. A more active participation by the Singapore government in international trade could further assist the government to identify possible bilateral trade agreements that can enhance the country's export focusing on capital intensive products, thus creating high-skill job opportunities for the country's citizens. The second instruments that can improve income distribution is trough trade liberalization policies. Being more open towards international trade activities, seeking more opportunities with trading partners and participating more on bilateral trade agreement can benefits the country's labor force through better wage earnings to their labor force and thus reducing the income gap in the society.

ACKNOWLEDGEMENT

REFERENCES

Adams, S., & Klobodu, E. K. M. (2016). Financial development, control of corruption and income inequality. *International Review of Applied Economics*, *30*(6), 790-808.

Ang J. B. (2010). Determinants of private investment in Malaysia: What causes the post-crisis slumps? *Contemporary Economic Policy*, *28*(3), 378–391.

Azleen R. A., & Mansur, M. (2017). What is the link between financial development and income inequality? Evidence from Malaysia, *MYRA Paper No. 79416*, 1-26.

Bahmani-Oskooee, M., Hegerty, S. W., & Wilmeth, H. (2008). Short-run and long-run determinants of income inequality: Evidence from 16 countries. *Journal of Post Keynesian Economics*, *30*(3), 463–84.

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), 274–298.

Barro, R. J. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth*, *5*(1), 5–32.

Beck, T., Levine, R., & Loayza N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, *58*(1-2), 261–300.

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

Becker, G. S., & Tomes, N., (1979). An equilibrium theory of the distribution of income and intergenerational mobility. *Journal of Political Economy*, *87*(6), 1153–1189.

Boutabba, M. A. (2014). The impact of financial development, income, energy consumption and trade on carbon emissions: Evidence from the Indian economy. *Economic Modelling*, *40*(c), 33–41.

Brown, R., Durbin, L. J., & Evans. J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society*, *37*(2), 149–192.

Clarke, G. R. G., Xu. L. C., & Zou. H. F. (2006). Finance and income inequality: What do the data tell us? *Southern Economics Journal*, *72*(3), 578–596.

Easterly, W., & Fischer, S. (2001). Inflation and the poor. *Journal Money Credit Bank, 33*(2), 160–78.

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

Gimet, C., & Lagoarde-Segot, T. (2011). A close look at financial development and income distribution. *Journal of Banking and Finance, 35*(5),1698-1713.

Greenwood, J., & Jovanovich. B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy, 98*(5), 1076–1107.

Global Consumption and Income Project (GCIP). (2017). Income Inequality Dataset. Available online: http://gcip.info/graphs/download (Accessed on 5 March 2018).

Haber, S. H. (2004). Political Competition and Economic Growth: Lessons from the Political Economy of Bank Regulation in the United States and Mexico. Stanford University, mimeo.

Jauch, S., & Watzka, S. (2016). Financial development and income inequality: A panel data approach. *Empirical Economics*, *50*(1), 1–24.

Jalil, A., & Feridun, M. (2011). The impact of growth, energy and financial development on the environment in China: A cointegration analysis. *Energy Economics*, *33*(2), 284–291.

Jalilian, H., & Kirkpatrick, C. (2005). Does financial development contribute to poverty reduction? *Journal of Development Studies*, *41*(4), 636–656.

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.

Lamoreaux, N. (1995). Insider lending: Banks, personal connections, and economic development in industrial New England. Cambridge University Press, New York.

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*(1), 21-33.

Martin, C., Demirguc-Kunt, A., Erik, F., & Levine, R. (2013). Financial development in 205 economies, 1960 to 2010. *Journal of Financial Perspectives*, *1*(2) 17–36.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometric*, *16*(3), 289–326.

Polat, A., Shahbaz, M., Rehman, I., & Satti, S. L. (2015). Revisiting linkages between financial development, trade openness and economic growth in South Africa: Fresh evidence from combined cointegration test. *Quality and Quantity*, *49*(2), 785–803.

Ridzuan, A. R., Ismail, N. A., & Che Hamat, A. F. (2018). Foreign direct investment and trade openness: Do they lead to sustainable development in Malaysia? *Journal of Sustainability Science and Management,* 4, 79-91.

Ridzuan, A. R., Ismail, N. A., & Che Hamat, A. F. (2017). Does foreign direct investment successfully lead to sustainable development in Singapore? *Economies, 5*(3), 1-20.

Shahbaz, M. (2010). Income inequality-economic growth and non-linearity: A case of Pakistan. *International Journal of Social Economics*, *37*(8), 613–636.

Shahbaz, M., Tiwari, A., & Reza, S. (2014). Financial development and income inequality: Is there any financial kuznets curve in Iran? *Social Indicator Research*, *127*(2), 357-382.

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

Sehrawat, M., & Giri, A. K. (2017). The impact of financial development, economic growth, income inequality on poverty: Evidence from India. *Empirical Economics*, *55*(191), 1-18.

Stock, J. H., & Watson, M. W. (2002a). Forecasting using principal components from a large number of predictors. *Journal America Statistic Association*, *97*(460), 1167–1179.

Stock, J. H., & Watson, M. W. (2002b). Macroeconomic forecasting using diffusion indexes. *Journal Business Economics Statistics*, *20*(2),147–162.

Sylwester, K. (2005). Foreign direct investment, growth, and income inequality in less developing countries. *International Review of Applied Economics*, *19*(3), 289– 300.

World Development Indicators (2017). World development indicators: The World Bank, Washington, D.C. http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators (Accessed on 7 January 2018)