

THE DETERMINANTS OF FINANCIAL DEVELOPMENT IN FOUR SELECTED ASEAN COUNTRIES: A PANEL DATA ANALYSIS

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ABSTRACT

This study used panel datasets from four selected ASEAN countries comprising Malaysia, Singapore, Thailand and Philippines and two estimation techniques; Pooled Ordinary Least Square (POLS) estimation and Seemingly Unrelated Regression (SUR) System estimation to investigate the factors contributed to the financial development of those countries. Using POLS estimation technique, it is found that the explanatory variables of real income and trade openness are the most important significant determinants of financial development for all of the selected ASEAN countries under study. The Durbin-Watson Test conducted for POLS model however discovered that there is evidence of positive autocorrelation among the residuals. Considering this result and a major problem of POLS model which facade the heterogeneity that may exist among the countries, the second estimation technique, SUR system was then used to reflect more efficient results and estimations. The results of SUR system estimation showed that real income is the most important significant determinant of financial development only for Singapore and Thailand, while trade openness is the most important significant determinant of financial development only for Malaysia and Philippines. Thus, estimation using SUR indicates more specific finding of the most important significant determinant of financial development for those ASEAN countries. Therefore, policymakers, government and relevant agencies might promote necessary policies such as encouraging more trade liberalization among countries as this could enhance financial development and economic growth.

Keywords: financial development, ASEAN, Pooled Ordinary Least Square (POLS) estimation technique, Seemingly Unrelated Regression (SUR) System estimation

1.0 INTRODUCTION

The question of why a different country has a different level of prosperity than the others is still gaining attention among researchers. In the attempt of finding the significant contributors to the prosperity of a country, discussion on its economic growth is among the important areas of study. Economic growth refers to the annual rate of increase in real Gross Domestic Product (GDP) of a country (Solow, 1956; Barro, 1989; Mankiw et al., 1990). Economic growth is related to the progress and advancement of a country's economy and often recorded a positive impact on the county's level of employment in particular and the national income as a whole. These then resulted in higher standards of living in the country.

According to the empirical literatures and economic theories, there are a lot of important factors which contribute to the economic growth for a country. Among the factors that have been highlighted in the literature were financial development (Ang, 2008; Lerohim et al., 2014; Sanusi et al., 2012), financial markets (King & Levine, 1993; Beck et al., 2000; Hermes & Lensink, 2003; Alfaro et al., 2004; Durham, 2004; and Azman Saini et al., 2010), trade regime (Balasubramanyam et al., 1996), human capital (Noorbakhsh et al., 2001; Borensztein et al., 1998), economic freedom (Azman Saini et al., 2010) and institutional quality (Masron & Abdullah, 2010; Cristina & Leveigue, 2013; and Esey & Yaroson, 2014).

One of the most interesting and major issues discussed by past researchers is financial development since the development of financial market system is important for economic growth. Choong and Chan (2011) and Lerohim et al. (2014) defined financial development generally as the process to improve financial intermediary services in terms of their quantity, quality and efficiency. Recently, the finance-growth literature has begun to shift its attention towards the determinants of financial development (Bilquess et al., 2011; Huang & Temple, 2005). The main reason why some researchers are eager to study the determinants of financial development is due to their beliefs that financial development promotes economic growth (Herwartz & Walle, 2014). Most findings of past studies on the relationship between financial development and economic growth revealed that there were positive associations between them. While some researchers found that the development in the financial sector is essential to the economic growth of a country, other researchers found the opposite. Obviously, both growth-led finance and finance-led growth hypotheses are still being debated among many researchers (Choong & Chan, 2011).

Some economists do not believe that the finance-led growth relationship is important. For instance, Robert Lucas asserted in 1988 that economists badly over-stress the role of financial factors in economic growth. According to this view, economic growth creates demands for a particular type of financial arrangement, and the financial system responds automatically to these demands. However, other economists strongly believed that financial systems are important for economic growth. Overall, the notion seems to develop that the optimal financial system, in combination with a well-developed legal system, should incorporate an element of both direct that is market-based, and indirect, bank-based finance. A well-developed financial market system should improve the efficiency of financial decisions, favoring better allocation of resources and thereby economic

growth. Empirical findings show that the better developed financial system promotes long term economic growth (Hassan et al., 2011).

Nevertheless, the issues on the selection and measurement of financial development indicators still remain controversial among most researchers (Choong & Chun, 2011), thus creating an ambiguous effect of the role of financial development on economic growth. In general, the indicator has been measured largely on a ratio of some broad measure of different types of monetary aggregates such as M1, M2 and M3 to the level of nominal GDP or GNP (Choong & Chun, 2011; Demetriades & Hussein, 1996). Concerning the determinants of financial development, past literatures showed real income, real interest rate, inflation rate, trade openness, capital flows, international trade and institutions are amongst the determinants of financial development (Bilquess et al., 2011; Bittencourt, 2011; Matadeen & Seetanah, 2013; Huang & Temple, 2005; Chin & Ito, 2005). However, it was found that not all of those variables were significant determinants of financial development.

Concerning the level of financial development of the ASEAN countries, due to the instability of economic conditions and financial crisis, the ASEAN countries recorded lower level of financial development as compared to the other advanced countries. For instance, financial development index in 2011 for Hong Kong and Japan are 0.72 and 0.64, respectively, which are obviously higher than the financial development index for Malaysia of 0.42, Singapore of 0.48, Thailand of 0.4 and Philippines of 0.2. Past empirical studies showed that different indicators of financial development used will create the different results. Thus, the determinants of financial development in ASEAN countries should be explored and empirically examined by the researchers. This motivates the present study to discover amongst the above mentioned variables, which variables are significant determinants of financial development in four selected ASEAN countries including Malaysia (Mal/M), Singapore (Singa/S), Thailand (Thai/T) and Philippines (Phil/P). Hence, the objective of this study is to examine the determinants of financial development in those four countries based on the theoretical postulates from real income, real interest rate, inflation rate, and trade openness perspectives.

As the financial development appears to be among the key explanations for economic growth, examination on the influencers of the financial development in ASEAN countries is expected to provide new empirical findings on the most important determinant of the financial development in ASEAN countries. This is also expected to give hints for the formulation of the new strategies and policies which may be implemented by the authorities and governments, particularly on the encouragement to boost financial development in a country.

The remainder of this paper is organized as follows. The brief related literature is provided in Section 2. Section 3 discusses methods and data. The main results and discussion of this study are contained in Section 4. Finally, Section 5 presents the concluding comments on overall findings.

2.0 A SELECTIVE REVIEW OF LITERATURE

In general, the financial sector plays an important role in the economic growth of a country. The development of the domestic financial sector will influence the economic growth of that country since the allocation of resources can be made in a more effective way. Hence, a study of finance-growth relationship is essential to all countries in the world (Choong & Chun, 2011).

The empirical findings of a study by Mahawiya (2015) showed that countries that promote more openness of the financial sectors and trade lead to more financial development. This study used dynamic panel approach for a data of Economic Community of West African States and Southern African Development Community (SADC) from 1980 to 2011. By using another estimation technique which is the generalized method of moments analysis, Mbulawa (2015) who also studied on 11 SADC countries from 1996 to 2010, found evidence of the importance of the institutional quality (including low corruption, increasing government accountability, improving regulation quality, maintaining rule of law and low levels of political violence) to the financial development. Another study by Ayadi et al. (2013) on the determinants of financial development on Mediterranean countries for the years 1985 to 2009 found that countries with strong legal institutions, good democratic governance and adequate implementation of financial reforms can have a substantial positive impact on financial development.

Causality tests between financial development and real GDP using time series techniques had been conducted by Demetriades & Hussein (1996). The data set for their study containing time series data from 16 countries which fulfilled the criteria of the World Bank definition as not highly developed countries in the year 1960, must have a minimum of 27 continuous annual observations on the variables of interest and its population must be more than 1 million in the year 1990. They used two proxies for financial development, which are the ratio of bank deposit liabilities to nominal GDP and the ratio of bank claims on the private sector to nominal GDP. Their study found that finance is a leading factor to enhance economic development of a country. They also found the evidence of reverse causation which showed the association between financial development and growth appeared to be bi-directional. Their findings provided evidence of a stable association between at least one indicator of financial development and real GDP per capita in most of the countries. Their findings also revealed that causality patterns differ across countries and, therefore, they highlighted the dangers of statistical inference based on cross-section country studies which implicitly treat different economies as homogeneous entities.

Bilquess et al. (2011) conducted a study on seven members of D-8 countries including Bangladesh, Egypt, Indonesia, Malaysia, Nigeria, Pakistan, and Turkey for the period of 1985 to 2008. They examined the impact of real income, real interest rate, capital flows, trade openness and institutions on the financial development of those countries. In the study, they used liquid liabilities and private sector credit as indicators for financial development. For the explanatory variables, they used the real GDP per capita based on the constant US dollar prices for the year 2000 as indicator for real income, the annual percentage of interest as the

indicator for real interest rate, the gross private capital flows (the sum of capital inflows and outflows) over GDP as a proxy for capital flows, the total trade (the sum of exports and imports) over GDP as a proxy for trade openness and lastly, the summation of five indicators namely, (i) Corruption; (ii) Rule of Law; (iii) Bureaucratic Quality; (iv) Government Repudiation of Contracts; and (v) Risk of Expropriation as indicators for institutions. In their study, they used two different dynamic panel data estimation techniques, which are panel generalized method of moments (GMM) and pooled group mean (PGM) estimator. Their study found that real income, capital flows, trade openness and institutions are positively and significantly associated with the financial development of those countries. However, the real interest rate turns out to be an insignificant determinant of financial development. In their study, they recommended that stimulating foreign capital flows and trade openness, improving institutions and economic growth will encourage financial development.

Meanwhile, Bittencourt (2011) investigated the role of inflation for financial development in ten economically diverse regions in Brazil using data covering the period between 1985 and 2004. In his study, the data set used to construct the measures of financial development covering the annualised monetary aggregate, M2 (i.e., the liquid liabilities), M3 (i.e., M2 plus other financial assets that are more illiquid but with higher rates of nominal and real returns than the ones in M2), credit to the private sector (i.e., credit provided by public and private financial institutions to firms) and personal credit (i.e., credit provided by public and private financial institutions to individuals only). His study found that the impact of inflation on financial development is negative and mostly statistically significant.

Using semi-annual data spanning over a period of 23 years covering the years 1989-2011, Matadeen and Seetanah (2013) examined whether both financial openness and trade openness are preconditions for financial development in Mauritius. To capture stock market development, they used market capitalization ratio and stock market liquidity. In measuring financial openness, two measures were employed in their study, firstly is the ratio of the total foreign direct investment inflows to GDP, and secondly is the ratio of gross fixed capital formation to GDP. Meanwhile, the trade openness level was measured by the ratio of the sum of imports and exports to GDP. This is the most widely used, simplest, and most intuitively appealing measure of trade openness. All of their data sets were collected from World Bank's World Development Indicator (WDI). Overall, their results showed that financial openness through proxy by the two variables does have a positive and significant influence on financial development. As for trade openness, its impact was significant but surprisingly negative influence on financial development was discovered.

Huang and Temple (2005) examined whether finance is influenced by external trade in a sample of 88 countries. Their data sets were five-year averages over a period of 1960-1999, giving a maximum of eight cross-sections per country. They used a standard measure of openness, namely imports plus exports, relative to GDP as an indicator of trade openness. Their study found strong evidence that openness and finance are strongly associated for higher-income countries, but not for lower-income countries.

A study on several dimensions of the financial sector has been done by Chin and Ito (2005). Their samples covered 108 countries for a period of 20 years ranging from 1980 to 2000. They used a panel data analysis to test whether financial openness can lead to equity market development if the levels of legal and institutional development are controlled. They examined whether the opening of the goods sector is a precondition for financial opening. They also investigated whether a well-developed banking sector is a precondition for financial liberalization to lead to equity market development and also whether bank and equity market development complement or substitute. Their empirical results suggested that a higher level of financial openness contributes to the development of equity markets only if a threshold level of general legal systems and institutions is attained, which is more prevalent among emerging market countries.

In sum, the above studies showed that there exist significant associations between the measures of financial development and its potential determinants in most of the countries under study.

3.0 METHODOLOGY

3.1 The Model

According to Bilquess et al. (2011), the theoretical literature predicts financial development to be a positive function of real income and the real interest rate and this is based on McKinnon-Shaw type models and the endogenous growth literature.

Based on those theoretical postulates, a financial development association can be specified as:

$$FD = f(RGDPC, R)$$

where FD is financial development, RGDP is the real GDP per capita (indicator for real income) and R is the real interest rate.

Recently, the roles of inflation and trade openness in influencing financial development have also received attention in the literature (for examples Mahawiya, 2015; Bilquess et al., 2011; Bittencourt, 2011; and Matadeen & Seetanah, 2013). Therefore, in this study, the above equation is extended to include inflation and trade openness in order to examine the possible separate influence of these variables on financial development. Thus, the financial development equation that will be estimated in this study is specified as follows:

$$FD = f(RGDPC, R, INF, TO)$$

where INF and TO are inflation rate and trade openness, respectively.

The following is the log-linear equation for financial development used in this study:

$$IFD_{it} = \beta_0 + \beta_1 IRGDPC_{it} + \beta_2 R_{it} + \beta_3 INF_{it} + \beta_4 ITO_{it} + \varepsilon_{it}$$

For estimating the above equation, two panel data techniques, namely the Pooled Ordinary Least Squares (POLS) estimation and the Seemingly Unrelated Regression (SUR) system estimation are employed.

3.2 Empirical Estimation

3.2.1 Pooled Ordinary Least Square (POLS) Estimation

Firstly, the Pooled Ordinary Least Squares (POLS) estimation technique has been used. This technique is the easiest, but also the least realistic estimation procedure to use for panel data. POLS hold the assumptions of the classical linear regression model where there is no correlation between the explanatory variables and the error term.

With POLS, the panel nature of the data for this model is ignored, and the error is assumed to have constant variance and to be uncorrelated over time and countries. Since there are four explanatory variables, the model can be written as:

$$y_{it} = \beta_0 + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \varepsilon_{it}$$

or more specifically as:

$$IFD_{it} = \beta_0 + \beta_1 IRGDPC_{it} + \beta_2 R_{it} + \beta_3 INF_{it} + \beta_4 ITO_{it} + \varepsilon_{it}$$

The subscripts i and t refer to the country and the time period, respectively. The coefficients are assumed to be the same for all countries (and over time), and it is assumed that $\text{var}(\varepsilon_{it}) = \sigma^2$ and $E(\varepsilon_{it} \varepsilon_{js}) = 0$ for $i \neq j$ or $t \neq s$.

3.2.2 Seemingly Unrelated Regression (SUR) System Estimation

A single model may contain a number of linear equations. In such a model, it is often unrealistic to expect that the equation errors would be uncorrelated. Therefore, with the assumption of different coefficients and different error variances exist, the SUR system estimation technique is next being used in this study. A SUR system estimation technique refers to a set of equations that has contemporaneous cross-equation error correlation (i.e. the error terms in the regression equations are correlated). At first look, the equations seem to be unrelated, but the equations are related through the correlation in the errors.

In this model, we assume that the four countries' equations are related because the error terms are correlated. Since there are four countries, the model can be written as:

$$\begin{aligned} Y_{itM} &= \beta_{0M} + \beta_1 X_{1itM} + \beta_2 X_{2itM} + \beta_3 X_{3itM} + \beta_4 X_{4itM} + \varepsilon_{itM} \\ Y_{itS} &= \beta_{0S} + \beta_1 X_{1itS} + \beta_2 X_{2itS} + \beta_3 X_{3itS} + \beta_4 X_{4itS} + \varepsilon_{itS} \\ Y_{iT} &= \beta_{0T} + \beta_1 X_{1iT} + \beta_2 X_{2iT} + \beta_3 X_{3iT} + \beta_4 X_{4iT} + \varepsilon_{iT} \\ Y_{itP} &= \beta_{0P} + \beta_1 X_{1itP} + \beta_2 X_{2itP} + \beta_3 X_{3itP} + \beta_4 X_{4itP} + \varepsilon_{itP} \end{aligned}$$

or more specifically as:

$$\begin{aligned} IFD_{itM} &= \beta_{0M} + \beta_1 IRGDPC_{itM} + \beta_2 R_{itM} + \beta_3 INF_{itM} + \beta_4 ITO_{itM} + \varepsilon_{itM} \\ IFD_{itS} &= \beta_{0S} + \beta_1 IRGDPC_{itS} + \beta_2 R_{itS} + \beta_3 INF_{itS} + \beta_4 ITO_{itS} + \varepsilon_{itS} \\ IFD_{iT} &= \beta_{0T} + \beta_1 IRGDPC_{iT} + \beta_2 R_{iT} + \beta_3 INF_{iT} + \beta_4 ITO_{iT} + \varepsilon_{iT} \\ IFD_{itP} &= \beta_{0P} + \beta_1 IRGDPC_{itP} + \beta_2 R_{itP} + \beta_3 INF_{itP} + \beta_4 ITO_{itP} + \varepsilon_{itP} \end{aligned}$$

3.3 Data Descriptions

In this study, all of the data are drawn primarily from the World Bank's World Development Indicators 2012. The required data set consists of a panel of observations for four selected ASEAN countries for the period of 1987 to 2013. The selection of countries is based on the original members of ASEAN that was formed in August 1967, but Indonesia is exempted due to the incomplete data set of the interest variables. Thus this study focuses on Malaysia, Thailand, Singapore and Philippines. An important advantage of using panel data is that it captures both time series and cross section variations in variables.

Several measures of financial development have been proposed in the empirical literature. However, based on the availability of the data, the domestic credit to private sector (% of GDP) has been used in this study as the indicator of financial sector development. Domestic credit to private sector refers to the financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, trade credits and other receivable accounts that establish a claim for repayment.

Meanwhile, the measures used for the explanatory variables chosen in this study were based on the literature and the availability of data. The annual data on real GDP per capita (RGDPC) as indicator for real income have been collected based on the constant US dollar prices for the year 2005. The data for real interest rate (in %) (R) indicator is based on the lending interest rates adjusted for inflation as measured by the GDP deflator. The data for inflation (INF) indicator is measured by the consumer price index (annual %), which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Lastly, the data for the trade openness (TO) indicator employed in this study is through proxy by the total trade (% of GDP). Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. In estimating the functions and testing for the models, all of the data were run through a very powerful and user-friendly econometrics software package, E-Views.

4.0 RESULTS AND DISCUSSION

This section presents the estimation results of POLS, SUR, Breush and Pagan Lagrange Multiplier test and Wald test. We began our empirical investigation by examining the associations between real income, real interest rate, inflation rate and trade openness with financial development using POLS estimation technique.

For the first estimation technique used, POLS, the empirical results of this study are reported in Table 1. Based on the coefficient values, the estimated financial development function for all the four countries is:

$$\hat{IFD}_{it} = - 4.4086 + 0.4907IRGDPC_{it} + 0.0117R_{it} - 0.0240INF_{it} + 0.4201TO_{it}$$

where it is estimated that real income, real interest rate and trade openness have positive associations with financial development. This implies that the increase in real income, real interest rate and openness of trade will lead to the increase in financial development or more specifically, domestic credit to the private sector. However, inflation rate has a negative association with financial development which implies the increase in inflation rate will lead to the decrease in domestic credit to the private sector. Referring to the p-value of the t-statistic, it can be concluded that all of the explanatory variables are significant determinants of financial development. However, real income, inflation rate and trade openness indicate higher confidence interval which are 99% as compared to the real interest rate which has lower confidence interval of 90%.

For the test on the overall significance of the sample regression coefficients, since the p-value of the F-statistic of 0.00 is lower than the significant level of 0.01, it can be concluded that at least one of the explanatory variables affects financial development at significant level of 1%. Meanwhile, the Goodness-of-Fit Test has produced value of R² equal 0.5380 which can be interpreted as 53.80% of the variation in financial development can be explained by real income, real interest rate, inflation rate and trade openness while the other 46.20% can be explained by the other variables which are not included in this model. Lastly, the Durbin-Watson Test was used to test the correlation between each residual. Since the Durbin-Watson statistic of 0.2344 is below d_L value of 1.08, it can be concluded that there is evidence of positive autocorrelation among the residuals. Under this circumstance, the POLS technique used in this study is inappropriate and an alternative method needs that be considered.

**Table 1: Results of Pooled Ordinary Least Squares (POLS) Estimation
(Dependent Variable: Financial Development)**

Variable	Coefficient	T-Statistic
C	- 4.4086 (1.0941)	- 4.0292
RGDPC	0.4907*** (0.0954)	5.1424
R	0.0117* (0.0060)	1.9312
INF	- 0.0240*** (0.0075)	- 3.1690
TO	0.4201*** (0.0822)	5.1070
R-squared		0.5380
Adjusted R-squared		0.5200
F-statistic		29.9875
Prob(F-statistic)		0.0000
Durbin-Watson statistic		0.2344

Notes: RGDPC = real GDP per capita; R= real interest rate; INF= inflation rate; TO= trade openness. Figure in parenthesis are standard error. *** and * indicate significance at the 1% and 10% levels, respectively. Variables RGDPC and TO are in logarithmic form.

The major problem with this model is that it does not distinguish between the various countries nor does it tell whether the response of the dependent variable to the explanatory variables over time is the same for all countries. In other words, by lumping together different countries at different times, the heterogeneity (individuality or uniqueness) that may exist among the countries was a facade. Another way of stating this is that the individuality of each subject is subsumed in the error term, ϵ_{it} . As a consequence, it is quite possible that the error term may be correlated with some of the explanatory variables in the model. If that is the case, the estimated coefficients may be biased as well as inconsistent.

Based on the results of autocorrelation test and the above mentioned major problem of POLS technique, the second estimation technique which is SUR system was used to reflect more efficient results and estimations. The empirical results of this study using SUR system are reported in Table 2 below:

**Table 2: Results of Seemingly Unrelated Regression (SUR) System Estimation
(Dependent Variable: Financial Development)**

Variable	Country	Coefficient	T-Statistic
C	Malaysia (M)	0.0099 (0.7021)	0.0141
	Singapore (S)	0.0344 (0.3436)	0.1001
	Thailand (T)	-8.4808 (1.2732)	-6.6607
	Philippines (P)	-5.1758 (1.6985)	-3.0472
RGDPC	Malaysia (M)	0.0907 (0.0711)	1.2752
	Singapore (S)	0.2084*** (0.0337)	6.1787
	Thailand (T)	1.0043*** (0.1451)	6.9188
	Philippines (P)	0.4508*** (0.1468)	3.0690
R	Malaysia (M)	0.0027 (0.0028)	0.9532
	Singapore (S)	0.0087*** (0.0021)	4.0414
	Thailand (T)	0.0150*** (0.0034)	4.3969
	Philippines (P)	0.0036 (0.0051)	0.7005
INF	Malaysia (M)	-0.0028 (0.0075)	-0.3713
	Singapore (S)	-0.0015 (0.0033)	-0.4509
	Thailand (T)	0.0162*** (0.0042)	3.8471
	Philippines (P)	0.0044 (0.0050)	0.8690
TO	Malaysia (M)	0.4613*** (0.1566)	2.9452
	Singapore (S)	-0.1511 (0.1632)	-0.9257
	Thailand (T)	-0.4029** (0.1942)	-2.0742
	Philippines (P)	0.8808*** (0.1595)	5.5196
R-squared		0.9575	
Prob(F-statistic)		0.0000	
Durbin-Watson stat		1.0841	

Notes: RGDPC = real GDP per capita; R= real interest rate; INF= inflation rate; TO= trade openness. Figures in parenthesis are standard error. *** and ** indicate significance at the 1% and 5% levels, respectively. Variables RGDPC and TO are in logarithmic form.

Based on the coefficient values, the estimated financial development function for each of those four countries are as follows:

$$\hat{IFD}_{itM} = 0.0099 + 0.0907IRGDPC_{itM} + 0.0027R_{itM} - 0.0028INF_{itM} + 0.4613ITO_{itM}$$

$$\hat{IFD}_{itS} = 0.0344 + 0.2084IRGDPC_{itS} + 0.0087R_{itS} - 0.0015INF_{itS} - 0.1511ITO_{itS}$$

$$\hat{IFD}_{itT} = - 8.4808 + 1.0043IRGDPC_{itT} + 0.0150R_{itT} + 0.0162INF_{itT} - 0.4029ITO_{itT}$$

$$\hat{IFD}_{itP} = - 5.1758 + 0.4508IRGDPC_{itP} + 0.0036R_{itP} + 0.0044INF_{itP} + 0.8808ITO_{itP}$$

Referring to the above functions, it is estimated that only real income and real interest rate have positive associations with financial development for all those four countries. However, there are mixed results for inflation rate and trade openness. The positive association between inflation rate and financial development was found only for Thailand and Philippines while for Malaysia and Singapore, the association between inflation rate and financial development was found as inverse association. As for the association between trade openness and financial development, the positive association was found only for Malaysia and Philippines while for Singapore and Thailand, there exist negative association between trade openness and financial development.

Referring to the p-value of the t-statistics, it can be concluded that, firstly; we are 99% confident that the real income is a significant determinant of financial development in all countries except Malaysia which showed that it is an insignificant determinant. Secondly; we are also 99% confident that the real interest rate is a significant determinant of financial development in Singapore and Thailand, while it was found as an insignificant determinant in Malaysia and Philippines. Thirdly; it was found that the inflation rate is an insignificant determinant of financial development in all countries except Thailand which showed that the inflation rate is significant at 99% confidence interval. Last but not least; the trade openness was found as a significant determinant of financial development in Malaysia and Philippines at 99% confidence interval and in Thailand at 95% confidence interval. However, it is an insignificant determinant of financial development in Singapore.

For the test on the overall significance of the sample regression coefficients, since the p-value of the F-statistic of 0.00 is lower than the significant level of 0.01, it can be concluded that at least one of the explanatory variables affects financial development at significant level of 1%. The R² value of 0.9575 implies 95.75% of the variation in financial development can be explained by real income, real interest rate, inflation rate and trade openness while the other 4.25% can be explained by other variables which are not included in this model. However, since the Durbin-Watson Statistic of 1.084104 is between the values of d_L of 1.08 and d_U of 1.76, the test for autocorrelation in this model is inconclusive.

In order to derive more meaningful results, the test for contemporaneous correlation and the test for equality of the coefficients in the SUR model were conducted. Breusch and Pagan Lagrange Multiplier Test which is the relevant statistic test for contemporaneous correlation was used in this study. The formula is $LM = T \times r^2_{1,2}$ where $r^2_{1,2}$ is the squared correlation between the least squares residuals from the two equations. The empirical results of the test are reported in Table 3 below:

Table 3: Results of Breusch and Pagan Lagrange Multiplier Test

Country	r	r ²	TM = T x r ²	p-value of Chi-square
M - S	0.328240	0.107742	2.90903	0.0880*
M - T	0.764915	0.585095	15.79757	0.0000***
M - P	0.813258	0.661388	17.85747	0.0000***
S - T	0.362596	0.131476	3.549853	0.0595*
S - P	0.346270	0.119903	3.237384	0.0719*
T - P	0.735579	0.541077	14.60907	0.000***

Notes: T = 27. *** and * indicate significance at the 1% and 10% level, respectively

Based on the results of p-value of the Chi-square, it is concluded that, firstly; we are 99% confident on the existence of contemporaneous correlation between the equations errors of Malaysia and Thailand, Malaysia and Philippines, and also Thailand and Philippines. Secondly; we are 90% confident on the existence of contemporaneous correlation between the equations errors of Malaysia and Singapore, Singapore and Thailand, and Singapore and Philippines.

Lastly, the equality of the coefficients in the SUR model using Wald Test was carried out. The test was on the following hypothesis:

$$H_1 : \beta_{1,M} \neq \beta_{1,S} \neq \beta_{1,T} \neq \beta_{1,P}, \beta_{2,M} \neq \beta_{2,S} \neq \beta_{2,T} \neq \beta_{2,P}, \beta_{3,M} \neq \beta_{3,S} \neq \beta_{3,T} \neq \beta_{3,P}, \beta_{4,M} \neq \beta_{4,S} \neq \beta_{4,T} \neq \beta_{4,P}$$

However, writing the hypothesis in terms of E-Views coefficient, we have:

$$H_1 : C(5) \neq C(6) \neq C(7) \neq C(8), C(9) \neq C(10) \neq C(11) \neq C(12), C(13) \neq C(14) \neq C(15) \neq C(16), C(17) \neq C(18) \neq C(19) \neq C(20)$$

The empirical results of the test are reported in Table 4 below:

Table 4: Results of Wald Test

Null Hypotheses (H ₀)	Coefficients	F-	Chi-square	Probability
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		statistic	Value	
C(5) = C(6) = C(7) = C(8)	β_1	16.57580	49.72741	0.0000***
C(9) = C(10) = C(11) = C(12)	β_2	3.144046	9.432138	0.0241**
C(13) = C(14) = C(15) = C(16)	β_3	5.242857	15.72857	0.0013***
C(17) = C(18) = C(19) = C(20)	β_4	12.52420	37.57261	0.0000***

Note: *** and ** indicate significance at the 1% and 5% level, respectively

Based on the p-value of the Chi-square for β_1 and β_4 of 0.0000, also β_3 of 0.0013, H_0 is rejected at 1% significance level, while for β_2 of 0.0241, H_0 is rejected at 5% significance level. Therefore, it can be concluded that we are 99% confident that the estimate coefficient of β_1 , β_3 , and β_4 between Malaysia, Singapore, Thailand and Philippines are not equal. Besides that, we are 95% confident that the estimate coefficient of β_2 between Malaysia, Singapore, Thailand and Philippines are also not equal.

Our key empirical results using POLS revealed that real income, real interest rate and trade openness have positive associations, while inflation rate has negative association with financial development. This model found that all of those explanatory variables are significant determinants of financial development at 99% and 90% confidence intervals. These findings were parallel to the study of Mahawiya (2015) and Bilquess et al. (2011) who found that real income and trade openness were positively and significantly associated with the financial development but not the real interest rate which was found to be as an insignificant determinant of financial development. For the findings on negative and significant association between inflation rate and financial development in this model, it is supported by the study of Bittencourt (2011) who found that impact of inflation on financial development is negative and mostly statistically significant. However, our findings on positive and significant association between trade openness and financial development are not fully supported by Matadeen and Seetanah (2013) as they found even though trade openness is a significant determinant of financial development but surprisingly it was a negative association. The Durbin-Watson Test conducted for the POLS model however discovered that there is evidence of positive autocorrelation among the residuals. Considering this result and a major problem of POLS model which facade the heterogeneity that may exist among the countries, the second estimation technique SUR system was then used to reflect more efficient results and estimations.

The results of SUR system estimation showed that only the real income and real interest rate have positive associations with financial development for all those four countries. However, there are mixed results for inflation rate and trade openness where some countries have positive while some others have negative associations. In the SUR model, it is found that real income is a significant determinant of financial development in all countries except Malaysia. Real interest rate is a significant determinant of financial development in Singapore and Thailand, while being insignificant in Malaysia and Philippines. It is also found that the inflation rate is an insignificant determinant of financial development in all countries except Thailand, and trade openness is found as a significant determinant of financial development in Malaysia, Philippines and Thailand, but insignificant in Singapore however. Interestingly, for both models, the test on the overall significance of the sample regression coefficients arrived at a conclusion that at least one explanatory variable affects financial development at a significant level of 1%. However, the result of Goodness-of-Fit Test derived value of R^2 of SUR model of higher than the value of R^2 of POLS model. This implies that for this study, the fitness of the SUR model is better as compared to the POLS model.

To enhance the evidence of the efficiency of estimation using SUR model compared to POLS model, test for contemporaneous correlation and test for equality of the coefficients of the SUR model were conducted. The results of the test for contemporaneous correlation showed that the contemporaneous correlation between all of the equations errors in the model exist at significance levels of 1% and 10%. Furthermore, the results of the test for the equality of the coefficients revealed that the estimated coefficient of β_1 , β_2 , β_3 , and β_4 between all those four countries are not equal at significance levels of 1% and 5%.

5.0 CONCLUSION

Based on the estimation results using different techniques, POLS estimated that the most important significant determinant of financial development for all of the selected ASEAN countries under study is the real income and supported by the trade openness. Interestingly, the SUR estimation techniques provide different results which indicate that the real income is the most important significant determinant of financial development only for Singapore and Thailand, while the trade openness is the most important significant determinant of financial development only for Malaysia and Philippines. Thus, estimation using SUR indicates more specific finding of the most important significant determinant of financial development for those ASEAN countries. Therefore, a set of complementary policies that focus on the real income, the trade openness and improvement of country GDP must be a priority to the policymakers, government and relevant agencies as they might formulate new strategies and policies to encourage more financial development and thus enhance the economic growth. For instance, the implementation of Strategic Plan of Custom Development by ASEAN countries might promote more bilateral trade and multilateral trade. Moreover, the elimination of tariff and non-tariff barriers would provide more inflows from the biggest economies like U.S, Japan and China.

Despite the concluding remarks mentioned earlier, it is worthwhile to highlight some limitations of this study. One limitation of this study is that it has relied on data from the World Bank's World Development Indicators. Thus, the validity of the findings and conclusions is limited to the extent to which these data are credible. In addition, this study focused only on four selected ASEAN countries and using POLS and SUR systems estimation techniques. It will, therefore, be advisable for future researchers to consider using other panel data techniques such as fixed effects and random effects. It is also suggested to study on other

ASEAN countries to discover the similarities and differences in the findings, if any. Notwithstanding these limitations, it is hoped that this study will make a significant contribution to the finance-growth discourse.

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