THE EFFECT OF FINANCIAL INTEGRATION ON FINANCIAL DEVELOPMENT: EVIDENCE FROM ASEAN COUNTRIES

By

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ABSTRACT

Under the International Monetary Fund and World Bank structural adjustment reform programs, integration was introduced to the developing countries as a means of growing these economies. The objective of the study is to determine the effect of financial integration on financial development for nine major economies in ASEAN countries. This study employs the unbalanced panel data for nine selected ASEAN countries, which are Malaysia, Indonesia, Thailand, Singapore, Cambodia, Myanmar, Philippines, Vietnam and Laos for the period 2004 and 2014. The study uses secondary data since the nature of the data is quantitative. It focused on six key variables namely financial depth as a dependent variable while financial integration, economic growth, inflation, real interest rate and income group as independent variables. The study discovers the positive relationship between financial integration and financial depth for nine ASEAN countries. In addition, the study also finds a positive link between economic growth and financial depth. The findings of this study will provide insights to regulators in improving rules and regulations of their country in order to reduce the restrictions of external account into the country.

Keywords: Financial Integration, Financial development, Panel data, Macroeconomic

ABSTRAK

Di bawah program pembaharuan pengubahsuaian struktur Antarabangsa Tabung Kewangan dan Bank Dunia, integrasi telah diperkenalkan kepada negara-negara membangun sebagai satu cara untuk berkembang ekonomi ini. Objektif kajian ini adalah untuk menentukan kesan integrasi kewangan kepada pembangunan kewangan selama sembilan ekonomi utama di negara-negara ASEAN. Kajian ini menggunakan data panel tidak seimbang selama sembilan negara ASEAN dipilih, yang terdiri daripada Malaysia, Indonesia, Thailand, Singapura, Kemboja, Myanmar, Filipina, Vietnam dan Laos untuk tempoh 2004 dan 2014. Kajian ini menggunakan data sekunder kerana sifat semula jadi data adalah kuantitatif. Kajian ini tertumpu kepada enam pembolehubah utama mendalam iaitu kewangan sebagai pemboleh ubah bersandar manakala integrasi kewangan, pertumbuhan ekonomi, inflasi, kadar faedah sebenar dan berpendapatan sebagai pembolehubah bebas. Kajian ini mendapati terdapat hubungan positif antara integrasi kewangan dan kedalaman kewangan bagi sembilan negara ASEAN. Di samping itu, kajian itu juga mendapati terdapat hubungan positif antara pertumbuhan ekonomi dan kedalaman kewangan. Penemuan daripada kajian ini dapat membantu pihak berkuasa dalam meningkatkan kaedah-kaedah dan peraturan-peraturan negara mereka untuk mengurangkan sekatan akaun luar ke negara ini.

Kata kunci: Integrasi Kewangan, Perkembangan Kewangan, Data Panel, Makroekonomi

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Sincerely,

Syarifah Intan Munirah bt Sayed Mahadzir

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LIST OF ABBREVIATIONS/NOTATIONS/GLOSSARY OF TERMS

Terms	Definition
AEC	ASEAN Economic Blueprint
ASEAN	Association of Southeast Asian National
CPI	Inflation
D4IG	Income group
FI	Financial Integration
GDP	Gross Domestic Product
GFDD	Global Financial Development Database
IMF	International Monetary Funds
OLS	Ordinary Least Square
P-P	Normal Probability Plot
RIR	Real interest rate

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Financial integration is defined as an integration within international financial markets which cause significant changes in countries' production structures and in the methods of doing business through the quantity and quality of international capital flows (Serdaroglu, 2015). Financial liberalization has taken three major categories which are (i) the deregulation of interest rates; (ii) the introduction of competition between the different channels of financing and (iii) the opening of the financial system to others (Allegret & Dulbecco, 1999).

Financial integration normally occurs in a situation which financial markets countries are closely linked together in financial market system. It is a process of removal of various constraints in the financial sector including the restriction on interest rate and banking regulations (Chauhan, 2012). In particular, financial integration brings advantages to emerging markets economies with the better mobilization of savings either in local or foreign market. Besides, financial integration can also strengthen the domestic financial system by leading to a more efficient allocation of capital, thereby promoting international risk-sharing (Yang, 2012).

Financial development is a part of the strategy of private sector development in order to encourage economic growth and reduce the level of poverty in a country. Financial development thus involves the establishing and enlargement of institutions, instruments and markets that support this investment and growth process. A better measurement of financial development is crucial to assess the development of the financial sector thus will

understand the impact of financial development on growth and reducing the poverty level. One of the dimensions in financial development is depth. Depth is defined as the size of the banks, other financial institutions and financial markets in a country taken together and compared to measure the economic output. For financial markets, earlier work by Levine and Zervos (1998), indicates that there is a relatively relationship between the trading of ownership claims on firms in an economy and the rate of economic development.

1.1 Overview of the Asean Financial Integration and Financial Development

Association of Southeast Asian National (ASEAN) is the association established in Bangkok Thailand since August 1967. Initially, members of the association comprise of five countries which are Malaysia, Thailand, and Philippines, Singapore and Indonesia which are widely known as ASEAN-5 members. In addition to the five original members, Brunei later joined the in 1984, Vietnam in 1995, Laos, and Myanmar (Burma) in 1997 and Cambodia in 1999.

Since 2007, ASEAN has adopted an economic blueprint to improve the financial integration through smooth function of regional financial system and liberalized capital account regimes and inter-linked capital markets. Subsequently in 2011, ASEAN countries have adopted the ASEAN Financial Integration Framework (AFIF), the initiatives under the ASEAN Economic Community (AEC) that provides general improvement of financial integration in ASEAN with the objectives to have semi-integrated financial market by 2020. In pursuing the objectives, ASEAN countries have made great strategies in order to strengthen their macroeconomic framework during the Asian financial crisis due the increasing number of trade and capital flows into Asia economies. ASEAN financial integration has also progressed with increasing direct investment, and cross-border banking

linkages that leads to increased participation of foreign investors and deepened capital markets.

1.2 Problem Statement

Financial integration is one of the effective ways to promote financial development of a country. In Masten, Coricelli and Masten (2007), they argue that financial integration becomes beneficial for growth only after the development of national financial markets passes a certain threshold in the European market. The recent experience in the European Union underscores that it is equally important to take a regional approach to financial development. This indicates that financial integration is imperative to every country including less developed and emerging countries such as ASEAN. Among initiatives done is the establishment of AEC blueprint which calls for regulatory harmonization and the strengthening of policy coordination among member countries.

Financial integration can contribute to the development of the financial sector. In theory, financial integration can convey important benefits to a country and a region. ASEAN countries' financial systems remain for the most part bank-centered, particularly in the countries at earlier stages of economic development. Financial integration can also develop a larger, deeper, and more liquid markets. For ASEAN, an important aspect of financial integration will be that the less financially developed economies will catch up with the more developed ones.

However, despite its notable advantages, there are some arguments against financial integration. Financial integration has been argued to expose a country to capital flight and financial crisis and financial malpractices (Boyle,2009). In the presence of weak institutions and information asymmetries, countries integrated with and open to the

international capital market may lack the ability to absorb external capital into new investment. Financial integration may also increase risk, thus jeopardizing financial development, particularly in developing countries without well-established financial systems and good policies to regulate them (Yang, 2012). Financial market integration also can increase a country's exposure to macroeconomic instability and financial crisis if a country's financial market is imperfect (Rogoff et al.,2006). The imperfections in financial market can generate speculative attacks bubbles, and herding behavior among others. Imperfections in international financial markets may also lead to financial crises even in countries with sound fundamentals. It was also pointed out that inadequate financial infrastructure during the process of integration can weaken the health of the local financial market and increase its vulnerability (Obstfeld, 1998; Demirguc-kunt and Detragiache 1999 and Lane and Mislesi- ferretti 2006).

Given the benefits and drawbacks of financial integration to a country as discussed extensively in literature, there are still debates and inconclusive results of whether a complete financial integration could be established in any economic cooperation. Thus, this study attempts to fill the gap by conducting an exploratory relationship in a research setting conducted and tested in one of the fast growing emerging markets in the world. Besides, other factors such as economic growth, inflation, real interest rate and income group also have an impact on financial development of a country. The differences between the interest on loan and interest on savings will increase in savings and also the investment (McKinnon & Shaw, 1973). Furthermore, causative direction between financial development and growth dominates the linear dependence for the industrial and developing countries (Calderón & Liu, 2002). Financial deepening could stimulate economic growth

and, simultaneously, economic growth propels financial development in developing countries

1.3 Research question

The study aims to answer the following questions:

i. Does financial integration influence financial development in ASEAN countries?

ii. Do macroeconomic variables influence financial development in ASEAN countries?

1.4 Objectives of study

Based on the research questions, research objectives are developed to answer the questions:

i. To determine the impact of financial integration on financial development in ASEAN countries.

ii. To investigate the effect of macroeconomic variables on financial development in ASEAN countries.

1.5 Significance of the study

This study can provide an insight whether financial integration initiatives could stimulate financial development. Thus, it is important for regulator to formulate policy in encouraging more economic cooperation among ASEAN countries. Theoretically, this research could add to existing literature of financial integration as it focusses on emerging market like South East Asean countries.

1.6 Scope and limitation of study

This study will focus on potential factors that determine financial development in ASEAN countries. Thus, the findings might not be generalized to other emerging market. Furthermore, this study will focus on financial depth as a proxy for financial development. Thus, the result might not reflect the actual financial development. In terms of sample period, this study examines an 11-year period from 2004 until 2014. The period is chosen to capture several economic cycles faced by ASEAN countries.

1.7 Organization of the thesis

The study is organized into five sections; Chapter one is the introduction which gives the overview of research setting and research issue. Chapter two reviews related literature on the financial integration and financial development. Chapter three describes the data, the research methodology, and the explanatory variables employed in the paper. Section four shows the results of analysis and discussion of finding. Finally, Chapter 5 describes the conclusion and recommendations of the dissertation.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews theoretical literature and empirical findings from the extant literature that examine the relationship between financial integration and financial development. As such, this chapter presents the previous empirical evidences in developing, developed countries and various economies. Section 2.1 highlight the theoretical perspective of financial integration and development. Section 2.2 highlight the empirical studies on relationship of financial integration and financial development.

2.1 Theoretical perspective of financial integration and financial development

Financial development occurs when there are increases in financial sector efficiency and sizes. A well-developed financial structure or system can be accessed through its market institution and issued instruments which will operate financial system of a country (Levine, 1997). One of the financial development indicator is represented by examining financial deepening (Ansari, 2002; King & Levine, 1993)

The McKinnon-Shaw (1973) was the first who develop financial liberalization models. Their methodology of economic development claimed that because of the government involvement in the financial system, financial depth and economic performance in many developing countries is said to be at early stage.

Theoretically, if there is no integration in financial markets, the portfolio choices and companies' financing decision will be affected by investment barriers. Thus, full integration requires that there is no bias among market participants based only on their origin. The area is said to be not financially integrated if there is a discrimination against

foreign investment opportunities such as national legal restrictions. It is also required to cautiously differentiate between the sources of integration and determine the degree of financial openness may not only in terms of economic performance but also the degree of real and financial convergence with other economies. The investors will prefer a country with high level of openness to make investment. However, higher integration will reduce the opportunities to diversify portfolios within the country, thus providing incentives to focus more on diversifying across sectors or across regions.

2.2 Empirical studies on relationship of financial integration and financial development

Nashahibi et al, (2001), claimed that the financial system in middle-east countries are liberalized. For these countries, they will enhance the function of market forces in determining interest rate, credit allocation and general size of financial institutions. The financial liberalization process requires them to efficiently organize the domestic deposits to be allocated in productive investment. However, the implication of financial liberalization to countries has produced wide-ranging outcomes, such as more efficient and market oriented financial system (Kabir & Hoque, 2007).

2.2.1 Financial integration and financial development in various markets and economies

The empirical literature review is categorized based on the category whether one country is considered as developing or developed country.

<u>Developed countries</u>

In long run relationship, financial integration shows a positive relationship with financial development. In addition, through capital account liberalization will encourages financial development of a financial system (Jose D.G,1999). There is a study of long-run relationship between financial integration and financial development for period 1969-1989

for North America, North Europe and East Asia. They found that financial development contributes to channel funds to profitable investment and diversified portfolio through efficiency financial market as impact on increasing degree of financial integration. Financial development is measured by two measurements which are size of financial system determines based monetary aggregate, M1 and M2 and M3 measures the liquid liabilities and proxy of degree financial intermediaries and the efficiency of investment is ratio of domestic credit to private sector to GDP. This ratio also acts as credit granted to the private sector provided by central bank and financial integration measures used four models which are International arbitrage pricing modal (IAPM) based on excess return of given asset at given time, International capital asset pricing model (ICAPM) determining weighted common stock, to value of shares traded in year over GDP, indicate the liquidity of stock market and VOL measure the volatility stock markets.

Developing countries

The financial integration would give benefits to the financial development in the existence of the adequate legal and institutional development (Beji S., & Xiii, P, 2007). By using KAOPEN[1] index to measure financial integration and financial development which includes four financial development indicator which are related banking sector 1) banking liquidity ratio of banking assets, 2) domestic credit granted by banking sector to GDP, 3) domestic credit to private sector ratio of GDP and capital market indicator 4) stock market capitalization of listed companies to GDP. Long term effect of capital account or financial openness have been studied on financial development for 10 south Mediterranean

[1] KAOPEN is a name for financial integration index introduced by Chin Ito (2007)

countries[2] over the period 1980 to 2005 after controlling level of institutional and legal development. It shows all financial development indicator will assist to improve in financial activity and also effect on financial integration. However, the study found the inverse relationship between capital account openness and trade liberalization.

Financial integration has a positive effect on capital market development and financial development and opening capital accounts has been necessary for financial development to take place. financial development can also be affected by the level of financial integration (Ito, H., 2006). Higher level of financial integration contributes to the development of equity markets, but is also depends on countries regulations on financial system. The study investigates the level of financial integration impact to financial development in Asia using panel including 87 less developed countries (including Malaysia, Singapore, Indonesia, Thailand and Philippine) over the period 1980-2000. For this paper has determined financial integration used "de jure" and "de facto" measurement. De jure measurement by the capital account openness index, KAOPEN, developed by Chinn and Ito (2002) and price-based measures as de facto measures of financial integration. Proxy for financial development used four variables consist one ratio represents overall development in private banking markets which is the ratio of private credit from deposit money banks to the private sector and the development stock market present by three variables which are SMKC (stock market capitalization), SMTV (total value of stocks traded), and SMTO (stock market turnover ratio).

[2] Israel, Jordan, Lebanon (high level of financial development); Algeria, Egypt, Morocco, Tunisia and Turkey (Middle level of financial development) Libya and Syria (Lower level of financial development)

There is two-way relationship between financial liberalization and financial development in Nepal (Bhetuwal, K.R.,2007). The causal relationship between financial sector liberalization of financial development is assessed in Nepal for period 1975 to 2006. Granger causality test has been used to find out the direction of causation between the financial liberalization and financial development. Financial development consists of the ratios of liquid liabilities of the financial system to GDP, credit to private sector to GDP, domestic assets of commercial banks to the sum of domestic assets of Nepal Rastra Bank and commercial banks, and private sector credit to total loans and advances of commercial banks. financial liberalization indicates by 6 six variables which are, entry barriers, Interest rate controls, credit controls, regulations and securities market, restriction in international financial transactions and privatization of the financial sector for Nepal.

Financial system liberalization acts as a factor to increase the level of financial depth and economic growth. It has been implemented by many developing countries since 1970s, Shaw & McKinnon (1973). financial liberalization is said to be one of the factor to promote financial development and economic growth of the developing countries, Habibullah & Eng (2006). They studied the causativeness between financial development and economic growth of 13 Asian developing countries over the period 1990 to 1998.

Higher degree of financial integration led faster growth of financial development compare with lower financial integration countries, (Do & Levchenko, 2004). That means the trade or financial openness is linked with faster financial development in high income countries compare with countries with slower financial development progress in lower income countries. The study on cross country data 77 countries including these three Asian

countries (Indonesia, Malaysia and Thailand) argue that the different advanced and developing countries will face not similar financial development.

A study argues that financial integration may allow the domestic firm easy to obtain funds from the foreign funds (B.H. Baltagi,2007). It continues study from Rajan and Zingales (1993), study correlation between financial development and financial integration with panel data regression from two separate datasets which are developing and industrialized countries using dynamic panel estimation techniques. For this paper, authors used two different measurements to measure financial integration which first using indicator constructed by Lane and Milesi-Feretti (2006), ratio the volume of a country's foreign assets and liabilities (% of GDP) for 42 developing countries during 1980-2003.

The study on the relationship between financial development with financial integration and trade openness done by Acikgoz et. al (2012), using time series data on Turkey for the 1989-2007 period and also examine the financial development maintain for long-run relationship. This paper constructs four variables to measure financial development in Turkey which are real size of financial development that defined as the ratio of liquid liabilities of the financial system to GDP ,to measure the relative importance on specific financial institutions: the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets, ratio of claim on the non-financial private sector to total domestic credit and ratio of private credit by deposit money to GDP . Financial integration determines as the ratio of gross capital inflows plus capital outflows to GDP. The findings, all variables indicate the relationship between financial development and financial integration shows the long- run relationship and financial integration have led to financial development in Turkey. The results are consistent with the

hypothesis of (Rajan and Zingales,1993). Other than that, interest rate liberalization also has significant positive effect on both savings and investment in Nepal (Shrestha and Chowdhury, 2005). Based on the ARDL model, they tested the impact of financial liberalization on savings and investment for Nepal over the period 1970 to 2003. Furthermore, financial liberalization influences the savings level in South Africa. The study proven that the national savings will be affected by interest rate liberalization (Odhiambo, 2006).

Financial depth has been strongly influenced by real GDP per capita and the real interest rate (Laurenceson & Chai, 1998). This is proven by examining the impact of financial liberalization on financial depth in China for the period of 1978 until 1996 by using the Autoregressive Distributed Lag (ARDL) model. The study proved that financial liberalization led to financial deepening in China. Financial depth is act as a function of real GDP per capita, the real interest rate, financial institution density and financial repression index. This indicates that an error correction model(ECM) derived from the ARDL model exposes that the real interest rate is a predominantly key factor in explaining short run fluctuations in financial depth. The findings support the McKinnon-Shaw hypothesis.

2.3 Summary of Chapter

As a conclusion, this chapter provides the theoretical perspective of underlying theories that can explain relationship of financial integration. It also covers an empirical review financial integration in developed and developing market.

CHAPTER THREE

DATA AND RESEARCH METHODOLOGY

3.0 Introduction

Chapter three presents descriptions of data, research methodology and analysis employed in the study. Several research hypotheses developed in this study are tested in order to fulfil the research objectives and research questions examined in Chapter 2. This chapter is divided into two sections; namely research design and research methodology. Section 3.2 discusses about research design which includes data description and model of research, while Section 3.3 discusses the research methodology of this study, which includes two regression techniques used namely ordinary least square regression (OLS) and Panel data regression.

3.1 Data and sample selection

Sample countries are identified from the website of Global Financial Development Database (GFDD).[3] There are initially ten (10) ASEAN countries, which are Malaysia, Indonesia, Philippines, Singapore, Thailand, Vietnam, Myanmar, Brunei, Cambodia and Laos. However, Brunei is excluded from the study because there is no financial integration exist in this country. The 11 years' panel data from 2004 to 2014 involving 9 countries leave with 87 observations. 3 observations for Laos are excluded from the sample due to unavailability of financial development data in certain years.

[3] The list of ASEAN countries can be obtained from www.worldbank.org (list updated until 2016)

3.2 Variables measurement and model specification

In this study, financial development is used as a dependent variable. One of the most commonly used measures of financial development is depth (Levine,1997). Depth gives the financial system size and it is calculated as total assets held by deposit money banks as a share of sum of deposit money bank and Central Bank claims on domestic nonfinancial real sector.

For independent variables, five variables are proposed including financial integration as a variable of interest. Financial integration is constructed using Chinn Ito index. This index attempts to degree of financial openness. Higher index indicates higher financial openness or level or restriction on external account.

Other independent variables are economic growth (measured by annual GDP), Inflation rate (measured by CPI), Real interest rate (measured by adjusted nominal interest rate). A dummy variable to examine differences in income level for our sample is used. Detail on these variables and the source of information is provided in Table 3.1.

Table 3.1
Description of variables used for this study

NO.	VARIABLES	DEFINITION	SOURCES
1	Financial development (Depth)	Percentage of total assets from deposit money banks to total of deposit money bank and central bank from domestic nonfinancial real sector. Assets = all claims on domestic real nonfinancial sector (local, state, central governments, nonfinancial public enterprises and private sector). Deposit money banks = commercial banks and other financial institutions that accept demand deposits	World Bank
2	Financial Integration (FI)	This index, known as KAOPEN is based on degree of financial openness. (The construction of the index is attached in Appendix A)	Chinn-Ito index
3	Gross Domestic Product (GDP)	GDP per capita is gross domestic product divided by midyear population. (U$ Dollar)	World Bank
4	Consumer Price Index (CPI)	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. The Laspeyres formula is generally used.	International Monetary Fund (IMF)
5	Real Interest rate (RIR)	RIR = (i - P) / (1 + P), i = the nominal lending interest rate P = the inflation rate (as measured by the GDP deflator).	World Bank
6	Income group (D4IG)	There are two income categories of the countries as stated in world bank ; 1) higher income 2) lower income	World Bank

3.3 Descriptive analysis

Before a multivariate analysis is performed, one needs to understand the nature of his data. In doing so, this study employs a descriptive analysis. It measures the mean, median, minimum, maximum value and also the kurtosis. The descriptive analysis provides and summarizes a given data set which gives the mean, minimum, maximum and standard deviation for the entire sample. The given results from the descriptive analysis would enable central tendency and inconsistency measurement. There are 3 assumptions of multiple regression in this diagnostic tests which deals with sample size, multicollinearity and outliers.

Firstly, it is important to check whether the sample size for the study is relevant in order to ensure that the samples could be generalized to other samples. There is a formula to check the sample size; taking into account the number of independent variables that are to be used: $N > 50 + 8m$ (where m = number of independent variables). This study has five (5) independent variables, so minimum cases must be; $[50 + 8(5)] = 90$ cases.

Secondly, we need to check for second assumption of multiple regression which is multicollinearity. This refers to the relationship among the independent variables. The importance of multicollinearity analysis is to determine whether two or more variables in a regression model are highly correlated. The existence of multicollinearity imposes critical issue on the regression model due to the obstacles that occurred when identifying the consequence between independent and dependent variables. The most common used method to detect multicollinearity is Variance Inflation Factor (VIF). The function of multicollinearity test is to discover whether the explanatory variables in multiple regressions are highly linearly correlated. An optimum value of VIF should be in range 1

until 10. If the value exceeds 5, it indicates that the independent variables have high correlations which lead to a multicollinearity problems. Multicollinearity exists when the independent variables are highly correlated (r= 9 and above).

Multiple regression is very sensitive to outliers (very high or very low scores). Checking for extreme scores is one part of the initial data screening in this study. It is done for all the variables including both dependent and independent variables which is used in this study.

3.4 Method of analysis

The data described earlier is examined and analysed using Panel Ordinary Least Square (POLS) procedure using SPSS software.

3.4.1 Pooled Ordinary Least Squares Regression Model

This method of analysis is a method to estimate the unknown parameters in a linear regression model. The main goal is to minimize the differences between the observed responses in some arbitrary dataset and the responses predicted by the linear approximation of the data. There are several advantages for using this method;

i. The best-fitting regression line is easily can be found
ii. Only one best-fitting line can be confirmed
iii. The OLS estimator is consistent when the regressors are exogenous and there is no perfect multicollinearity, and optimal in the class of linear unbiased estimators when the errors are homoscedastic
iv. OLS provides minimum-variance mean-unbiased estimation when the errors have finite variances.

v. Under the additional assumption that the errors be normally distributed, OLS is the maximum likelihood estimator.

3.4.2 Panel data regression

In statistics and econometrics, panel data can be referred as multi-dimensional data commonly involving measurements over time. Panel data comprise observations of numerous occurrences found over multiple time periods for the same subject. A common panel data regression can be modelled as Yit = α + βXit + μit where Y is the dependant variable, X is the independent variable, α and β are coefficients, i and t are indices for subject and time. μit is an error term.

The model specification in this study;

$$FD = \alpha + \beta_1 FI_{it} + \beta_2 GDP_{it} + \beta_3 CPI_{it} + \beta_4 RIR_{it} + \lambda_5 D4IG_{it} + \epsilon \quad \text{(Eq 1)}$$

FIit - Financial Integration Index assigned for country I in time t

GDPit - Growth Rate per Capita for country i in time t

CPIit - Inflation rate for country i in time t

RIRit - Real Interest rate for country i in time t

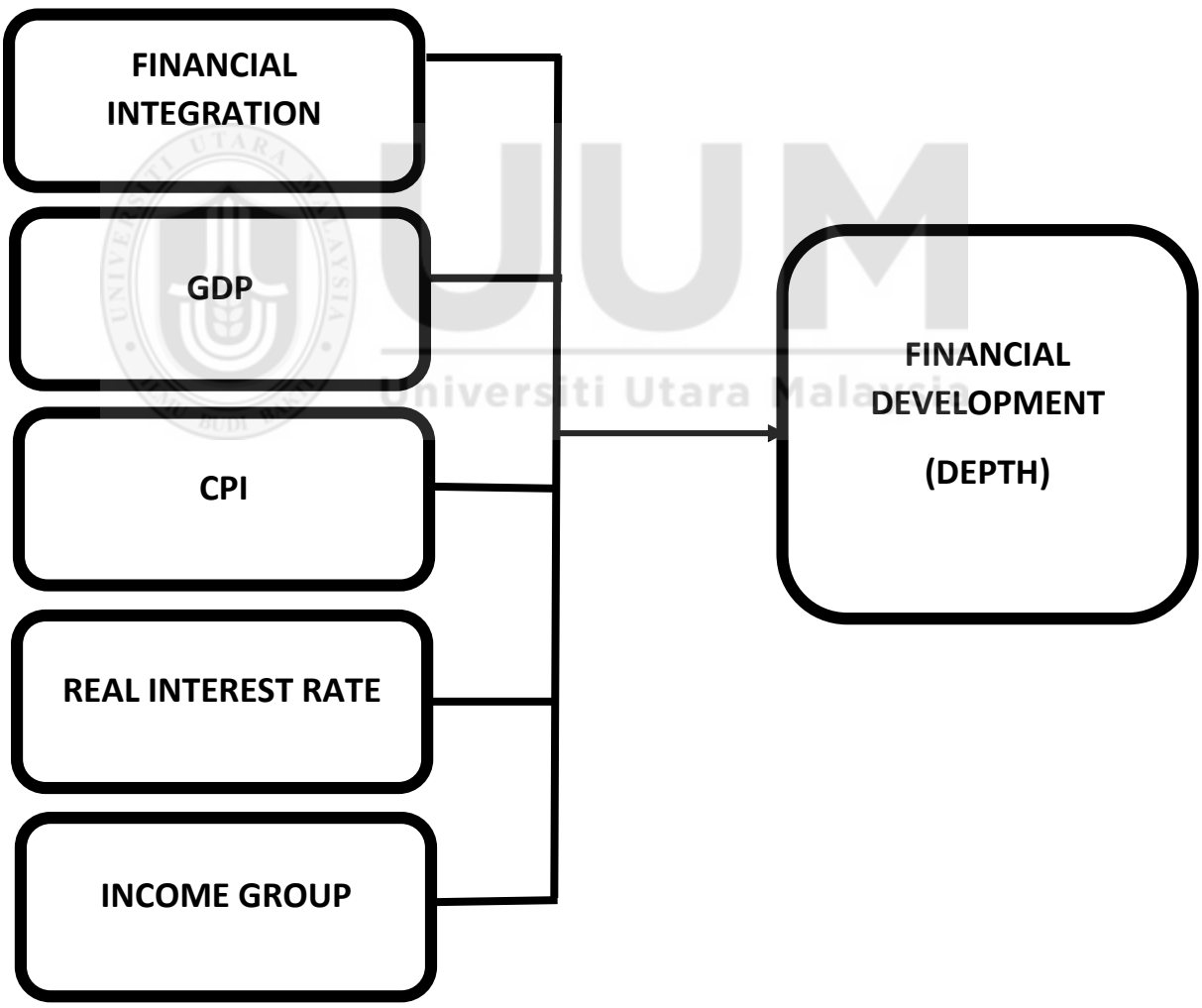
D4IGit - Dummy for Income Group for countries i in time t

ϵ - Error Term

3.5 Research framework

Figure 3.1 depicts the five independents variables that could determine financial development as measured by financial depth. It is proposed that financial integration serves as the main variable of interest while according to past literatures the other four independent variables could also determine the dependent variable.

Figure 3.1
Research framework



3.6 Hypotheses

As discussed earlier in Chapter 2, previous literature has revealed the relationship between financial development with selected independent variables such as financial integration, GDP and CPI.

3.6.1 Financial integration (FI)

Numerous studies have been done to prove the positive relationship between financial integration and financial development. The view is suggested by Ito,H. (2006) who claims that in emerging market countries, if a threshold level of general legal system and institutions is achieved, the higher level of financial integration could affect the development of equity. Among emerging market countries, a higher level of governmental quality will increase the effect of financial opening in fostering the development of equity markets. However, the extent of financial integration also depends on countries' regulations on financial system. Besides, Baltagi et.al (2007) suggests that financial integration not only gives positive effects on capital market development, but also to development of financial market. They also propose the development of capital accounts as a necessary medium for financial development In other market, Acikgoz et al (2012) suggests that there is a long- run causal relationship between financial integration [4]and financial development. Odhiambo (2005) who also found positive effect of financial liberalization on the financial development in Kenya, South Africa and Tanzania. Laurenceson and Chai (1998) found that financial liberalization led to financial deepening

[4] Financial integration and financial liberalization are used interchangeably in various literatures.

in China. Given the established evidence of financial development and financial integration, in many various markets, hypothesis 1 is developed for this study is written as:

H1: There is a positive relationship between financial integration and financial development

3.6.2 Gross Domestic Product (GDP)

Several theoretical literatures on the relationship between financial development and economic growth. However, there is a difference on how the financial development affects the growth and it is depending on the theories. The relationship between economic growth and financial development is also been cited as having simultaneous and causal relationship. For instance, financial deepening, had a positive influence on output growth for Hong Kong, South Korea and Taiwan (Kwan et. al., 1998). From this point of view, they argue that a sound financial system is essential in the course of economic development.

In a more recent study, Wadud (2005) finds a causality between the level of financial development and economic growth for India, Pakistan and Bangladesh. By employing cointegrated vector autoregressive model to assess the long-run relationship between the variables relating to bank-based, capital market based and economic growth. The findings indicate that there is a relationship between financial and economic growth running from financial development to economic growth. Nevertheless, despite the positive associations between financial development and economic growth, a few studies find otherwise. Given the mixed evidence on relationship of economic growth and financial development, Hypothesis 2 for this study is written as

H2: There is a relationship between GDP and financial development

3.6.3 Inflation (CPI)

Higher inflation rate will affect the financial sector to efficiently allocate the resources. It is proved that there is a negatively significant relationship between inflation and both banking sector development and equity market activity. Thus, the relationship is said to be nonlinear. However, marginal impact of inflation on banking lending activity and the development of stock market weakens rapidly as per inflation rises. Boyd et al. (2001) tried to assess empirically the impact of continuous inflation rate on financial sector performance. It is proved that inflation has a significant negative relationship with financial development. Moreover, they found that inflation and financial sector activity was highly nonlinear. Besides the nonlinear relationship, researchers in later years have used a rolling regression technique to examine the interactions between financial development and inflation that for 84 countries (Rousseau & Wachtel, 2002). They found that financial depth has a significant positive effect on growth only when inflation falls below a threshold of about 6 percent to 8 percent. However, the results also show that inflation had a negative effect on financial depth when the five-year average inflation rate was below about 15 percent to 20 percent. Given the inconsistent relationship between inflation rate and financial development, this study hypothesizes that:

H3: There is a relationship between inflation rate and financial development

3.6.4 Real Interest rate (RIR)

Real interest rate is the nominal return on assets after discounting for expected inflation. The increasing real interest rate will attract more investor to invest and increase the volume of saving. Subsequently, financial liberalization will be enhanced and thus promote financial development of a nation. A higher rate of saving will attract more foreign investors to invest in country and increasing value of financial integration (Hernando, Santabarbara &Valles, 2016). Another study that finds a positive significant relationship between financial development and real interest rate is from Bayar (2014). The study which uses error correction model(ECM) reveals that the real interest rate is one of the important factor in explaining short run fluctuations in financial depth. The results support McKinnon-Shaw hypothesis. Given the positive relationship reported in past studies, we therefore hypothesize that;

H4: There is a positive relationship between real interest rate and financial development

3.6.5 Income group (D4IG)

It is also proved that there is a significantly positive effect of bond markets and the capital stock on growth in four emerging economies of Southeastern Europe for the period 1995-2005 (Hagmayr et al.,2007). The accomplishment of financial development of one nation largely depends on the categories of income earned by populations in one country. There is also a study conducted by Abiad and Mody (2005) consists of 34 countries including developed and developing countries for the period 1980-1996 and found the income level will contribute to the development of particular countries. Therefore, hypothesis 5 for this study is written as:

H5: There is a relationship between income group and financial development

3.7 Conclusion

This chapter illustrates the data and methodology used in this research. Besides, the diagnostic test and analysis method of the data are explained in detail. Finally, hypotheses development that stems from research framework are constructed.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Introduction

This chapter covers data analyses and findings of the empirical test based on the research process in chapter three. It begins with results of descriptive statistics and correlations analysis between the independent variable. It is followed by regression analysis results that are ordinary least squares and panel data regression.

4.1 Descriptive Statistics

A description of standard statistical data analysis such as mean, standard deviation, minimum and maximum values is described in table are used to estimate and explain the general statistical attributes of all samples and all selected variables.

Table 4.1 shows the descriptive statistics for all variables including dependent and independent variables for all countries over 2004 until 2014. The dependent variable used is depth which is measured by proportion of deposit money bank assets to deposit money bank assets and central bank assets. There are five independent variables measured in this study which are financial integration (FI), economic growth rate (GDP), inflation rate (CPI), real interest rate (RIR), income group (D4IG).

DEPTH shows the means 56.185 and the standard deviations 37.829. It shows that there is a very high deviation between countries within specified period. The highest DEPTH value shows more than 100% while the minimum is only 4%. As for financial integration, the average value is -0.12% with a minimum value of -1.9% and maximum of 2.4%. over the 11 years' period mean is -0.118 and standard deviation is 1. 302. Overall, the annual economic growth rate for the sample countries ranged from 3.09% to 9.3%.

Basically, the mean of annual economic growth (5.8%) is slightly lower than inflation rate (5.9%). The third variable is inflation rate which reports a negative percentage for the whole sample period and countries. However, there are country (ies) that exhibit a high inflation rate (35%). Finally, for real interest rate, the overall sample shows that there is country which experience a loss in purchasing power. This is indicated by a minimum of -5.6%. However, the highest purchasing power is 29%.

Table 4.1
Descriptive statistics of all variables for all countries over 2004-2014

	DEPTH	FI	GDP	CPI	RIR	D4IG
Mean	56.185	-0.118	5.834	5.904	3.710	0.337
Minimum	4.040	-1.895	3.083	-0.846	-5.616	0.000
Maximum	127.070	2.389	9.333	35.025	28.544	1.000
Standard Deviation	37.829	1.302	1.977	5.667	5.436	0.475

A descriptive statistics based on countries are produced in Table 4.2. Based on the table below, it shows that minimum value of depth is 7.743 which is in Myanmar. The maximum value of depth is 99.379 which is in Malaysia. The result infer that Malaysia is the most developed country in terms of its financial depth among ASEAN countries during the period. On the other hand, Myanmar is the least developed country. Accordingly, they have the highest and lowest economic growth respectively. In terms of financial integration, Singapore leads the ranking (2.389) than Malaysia and other countries while Myanmar remains as country which has the least financial integration (-1.895). The minimum value of inflation result shows 2.541 which is in Malaysia while maximum value

of 11.12745 which is in Myanmar. For real interest rate result, it shows a minimum value of 0.000 which is in Cambodia and maximum value of 12.517 in Laos.

Table 4.2
Descriptive statistics based on countries over 2004-2014

	Malaysia	Indonesia	Thailand	Singapore	Cambodia	Myanmar	Philippines	Vietnam	Laos
Depth	99.379	83.642	24.255	97.935	23.396	7.743	28.200	79.633	9.143
FI	-0.402	0.648	-0.802	2.389	1.020	-1.895	-0.414	-0.513	-1.189
GDP	8.998	7.756	8.387	4.585	4.553	3.807	4.531	4.583	5.254
CPI	2.541	7.126	2.998	2.572	6.148	11.127	4.629	9.928	6.080
RIR	1.529	3.146	3.412	3.774	0.000	4.862	3.695	1.256	12.52
D4IG	1.000	0.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000

This study adopts categories of countries income group from the world bank. there are two categories used to group income status of a country. High income country includes Malaysia, Singapore, Thailand while low income countries Indonesia, Cambodia, Myanmar, Philippines, Vietnam and Laos.

4.2 Pearson correlation

Table 4.3 presents the results of correlation among variables. Pearson correlation is used to identify the relationship among independent variables. The results are shown in the table below. Based on the results, it is shows that financial integration, economic growth and income group has positive relationship with financial depth. However, among the variables, financial integration shows the strongest relationship with financial depth (0.4250). This indicates that a country with high degree of financial openness will increase the financial development of a country. Besides, income group shows the second highest correlation with financial depth (0.3673). It shows that a high and middle income country will leads to high level of financial development. GDP also show a positive relationship

with financial depth (0.3192). This also shows that economic growth will contribute to financial development of a country. In contrast, other independent variables such as inflation (-0.0329) and real interest rate (-0.3067) are negatively correlated with financial depth. This indicates that increase in inflation will reduce the level of financial development. Similar with real interest rate, the result indicates that high real interest rate will drop the level of financial depth.

Table 4.3
Correlation result

	Depth	FI	GDP	CPI	RIR	D4IG
Depth	1					
FI	0.4250*	1				
GDP	0.3192*	-0.0486	1			
CPI	-0.0329	-0.1816	-0.3109*	1		
RIR	-0.3067*	-0.2567*	-0.1573	-0.2907*	1	
D4IG	0.3673*	-0.1816	0.5395*	-0.4044*	-0.1061	1

4.3 Diagnostic Test

For pooled OLS, there are a few important assumptions that has been fulfilled and corrected. Firstly, the Normal Probability Plot (P-P) of the Regression Standardised Residual is generated to check for normality of a study. According to Julie Pallant (2016, p.160), in the Normal P-P Plot, the points will lie in a reasonably straight diagonal line from bottom left to top right. Thus, this will suggest no major deviations from normality. Based on the result, it shows that there is no major deviation of normality in this study.

Secondly, the Scatterplot is generated in order to check for the presence of outliers in this study. Tabachnick and Fidell (2013) define outliers as cases that have a standardised

residual of more than 3.3 or less than -3.3. Based on the results, it indicates that there are no outliers in this study. The result for Normal P-P plot and Scatterplot is attached in Appendix B and C respectively.

4.3.1 Multicollinearity Analysis

Results of multicollinearity test depicted in Table 4.4, results revealed that there is no multicollinearity problem with the independent variables because all the variables show VIF values of below 10.

Table 4.4
Summary of Multicollinearity Test

	Collinearity Statistics	
	VIF	1/VIF
FI	1.45	0.6920
GDP	1.82	0.5502
CPI	1.40	0.7140
RIR	1.38	0.7230
D4IG	2.01	0.4972
Mean VIF	1.61	

CPI: inflation rate, GDP: Growth per capita, RIR: Real interest rate, FI: financial integration, Income: Income group for ASEAN country (1= High Income countries; 0=Low income countries)

4.3.2 Heteroscedasticity Test

Modified Wald Test is used for this study to measure Heteroscedasticity test. The probability result should be more than 0.05 to show that there is no heteroscedasticity problem (Holgersson & Shukur ,2004). The result for this study shows the probability is 0.000 which is less than 0.05. This means that there is heteroscedasticity problem in this study.

Chi^2 (9)	2691.27
Prob>Chi^2	0.0000

4.3.3 Auto-Correlation Test

Woolridge test used in this study to test the auto-correlation for panel data. The P-value result of less than 0.05 levels indicate that there is auto-correlation problem occurred on this study. Below is the result for auto correlation test.

F(1,7)	120.662
Prob > F	0.0000

To sum, results as described in subsection 4.3.2 and 4.3.3 of Modified Wald Test and Woolridge Test respectively shows the existence of heteroscedasticity and autocorrelation problems. Hence, to correct these problems, an OLS with Heteroscedasticity & Serial correlation robust standard error is employed using the Stata software.

4.4 Regression Analysis

Table 4.5 summarizes regression analysis result from pooled OLS and panel data. Result for pooled OLS and Random Effect (GLS) model is presented in model (a) and model (b) of Table 4.3 respectively. The result shows that in Model (a), financial integration is positively significant with financial development. The coefficient is 13.736 with p-value of 0.000. The results also indicate that financial integration among ASEAN member countries help to boost financial development. Thus, it is consistent with the study of Baltagi et.al (2007), Acikgoz et al (2012), Odhiambo (2005) and Laurenceson and Chai (1998) who proved that there is a positive relationship between financial integration and financial development. Other than that, GDP also shows a positively significant relationship with financial development. The coefficient is 6.719 with p-value is 0.005. This results support the evidence is the study of Kwan et. al., (1998) which shows positive relationship between financial development and economic growth. However, other variables such as inflation, real interest rate and income group are not significantly affect the financial development. It is not consistent with a study of Boyd et al. (2001) which shows that there is a significant negative relationship between inflation and financial development. The result for real interest rate also shows an insignificant result with financial depth. This is also inconsistent with the previous studies which proved that a positive significant relationship between financial development and real interest rate is from Bayar (2014). Finally, income group indicates an insignificant effect on financial depth and it is also not supported the existing literature of Hagmayr et al. (2007) who investigated the relationship between finance and growth in four emerging economies of Southeastern Europe during the period 1995-2005. This study also performs OLS with

Heterocedasticity & Serial correlation robust standard error test and finds that financial integration is significant with financial depth at 10%. The coefficient is 13.376 with the p-value of 0.083. However, economic growth is no longer significant with financial depth. Furthermore, other variables such as inflation, real interest rate and income group remains insignificant with financial depth.

Model (b) is regressed in order to test whether Random Effect (GLS) model is necessary in this study instead of Pooled OLS. Thus, the Breausch & Pagan LM test is run to search whether the datasets have specific-effect or heterogeneity (λ). The result shows that the Chi^2 =250.06 with p-value of 0.000. Since the p-value is below than 0.05, it shows that the random effect model is more appropriate than Pooled OLS model. In model (b), the financial integration shows a significant result with financial development. The coefficient is 7.644 with p-value of 0.018. This results indicates that financial integration can help to increase the financial development in ASEAN countries. Besides, the result for GDP also shows a significant effect towards financial development since the coefficient is 16.753 with p-value of 0.002. However, other variables such as inflation, real interest rate and income group shows an insignificant result with financial development.

Model (c) is conducted to examine whether random effect and fixed effect is appropriate in this study. The significant results remain as in Model a. but we test whether Random effect or fixed effect is necessary. In order to determine which method, Hausman test is used. The results show that Chi^2 is 3.48 with p-value of 0.4816. Since the p-value is higher than 0.05, thus it is concluded that random effect model is more appropriate in this study.

Our overall model reveals that result shows that financial integration and GDP are significant with 0.000 and 0.005 respectively while other independent variables show an insignificant result with financial development. F- statistics of independent variables is significant and implying that there is an association among dependent and independent variables. The R-squared in the table above explains by percentage of how much the influence of the independent variables and the dependent variable. Our overall model shows R-square 0.3174 or 31.74 percent (%) of variation in depth can be explained by inflation rate (CPI), growth rate (GDP), real interest rate, income group and financial integration. The remaining percent is explained by other variables.

We also test if differences in the ASEAN countries is statistically significant. This is known when joint test is performed. After running the Least Square Dummy Variable, the joint test shows that all countries have different intercept which implies that there is a country effect. Therefore, the null hypothesis of common intercept for all countries is rejected since the test shows F (7,74) =56.15 and p-value of 0.000. However, there is no time effect recorded in the results.

Table 4.5
Summary of regression results

Variables	Model (a) Pooled OLS	Model (b) Random Effect	Model (c) Fixed-Effect	Model (d) OLS with Heteroscedasticity & Serial correlation robust standard error
Constant	7.846 (0.618)	-43.630 (0.165)	-86.889** (0.050)	7.846 (0.790)
FI	13.736*** (0.000)	7.644*** (0.018)	8.152*** (0.020)	13.736* (0.083)
GDP	6.719** (0.005)	16.753*** (0.002)	23.575*** (0.002)	6.719 (0.146)
CPI	0.864 (0.362)	-.157 (0.730)	-.139 (0.760)	0.864 (0.392)
RIR	-0.277 (0.707)	.643 (0.229)	.638 (0.244)	-0.277 (0.822)
D4IG	9.845 (0.318)	-9.67 (0.754)	omitted	9.845 (0.659)
F-statistics	9.00 (0.000)		3.41 (0.0130)	15.60 (0.0006)
Wald chi2		14.02 (0.0155)		
Adjusted R-squared	0.32			0.35
Observation	87	87	87	87
Breusch-Pagan LM test	Chi2 =250.06 (0.000)			
Hausman test		Chi2 =3.48 (0.4816)		

*, **, *** significant at 10 percent, 5 percent and 1 percent level respectively.
For each variable, the first row represents the coefficient while the second row represents the p-value. (refer Appendix D)

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

Financial integration is a situation where a country's local financial system integrates with international financial markets. In the integration process, it usually involves liberalization of domestic financial sector and the capital account. Financial integration, thus, entails increase in cross-country capital movement, which involves an active participation of local borrowers and lenders in international markets and a widespread use of international financial intermediaries and instruments (Bussiere, 2004).

Financial integration normally occurs in a situation which financial markets countries are closely linked together in financial market system. It is a process of removal of various constraints in the financial sector including the restriction on interest rate and banking regulations (Chauhan, 2012). In particular, financial integration brings advantages to emerging markets economies with the better mobilization of savings either in local or foreign market. Besides, financial integration also can strengthen the domestic financial system by leading to a more efficient allocation of capital, thereby promoting international risk-sharing (Yang, 2012).

There are two main objectives in conducting this study. The first objective is to determine the impact of financial integration on financial development in ASEAN countries while the second objective is to investigate the effect of macroeconomic variables on financial development in ASEAN countries. In order to fulfill the objectives, this study employs the pooled ordinary least square (OLS) and panel data regression method. The data and sample selected in this study includes the 11 years' panel data from 2004 to 2014

involving 9 ASEAN countries which are Malaysia, Indonesia, Philippines, Singapore, Thailand, Vietnam, Myanmar, Cambodia and Laos leaving with 87 observations.

This chapter provides a summary of the findings that is described in Section 5.1. Subsequently, it is followed by implications of study which described in Section 5.2 while Section 5.3 describes potential contribution from the findings. Finally, limitations and directions for future research is described in Section 5.4.

5.1 Summary of findings

This study finds that financial integration has a positive effect to financial development in ASEAN countries. The findings show that financial integration improves financial deepening by increasing total asset deposits money bank and central banks for each bank. Thus, it is consistent with Chinn and Ito (2005) found that a higher level of financial integration contributes to the development of stock markets only if a threshold level of general legal systems and institutions is attained and that trade openness is a precondition for financial market integration.

Another notable finding in this study postulated that annual economic growth of ASEAN countries influences positively to financial deepening. This is consistent with extant literature that find economic growth are robustly correlated with financial development. We find evidence of bi-directional causality when we split the sample into developing and industrial countries. This implies that financial depth stimulates growth and, simultaneously, growth propels financial development (Calderón & Liu, 2002). Other than that, there is a positive relationship between financial development and economic growth in developing countries. Moreover, short-term multivariate analysis provides mixed results: a two-way causality relationship between finance and growth for most

regions (Hassan, Sanchez, & Yu, 2011). Thus, it is similar with Kwan et al, (1998), found the relationship between economic growth and financial development having simultaneous and causal relationship.

However, other financial macroeconomic variables used in this study show an insignificant relationship with financial development. Therefore, it indicates that inflation, real interest rate and income group are not a factor to determine the financial development for ASEAN countries. From this study, important conclusions can be drawn. First, through financial integration, the development of the size of financial institutions and markets in ASEAN countries can be expanded. Next, economic growth proves to accelerate the level of financial depth in individual ASEAN country. Thus, the findings of this study is consistent with Levine (2001), which proved that financial integration leads to more comprehensive, stable, and effective financial markets and, as a result, increases economic growth and development (Levine, 2001).

5.2 Policy Implications

A few policy implications can be drawn from the outcomes of this study. Firstly, ASEAN countries should continue to develop and strengthen its financial markets since the financial integration initiatives is proved to have a positive and significant effect in promoting financial development. Secondly, regulators of each country also need to improve the rules and regulations of their country in order to reduce the restrictions of external account into the country. For instance, the central bank also need to control the real interest rate of the country in order to attract more foreign investor to invest in the country. Thus, it will encourage the financial integration of the country and subsequently leads to an increase in the level of financial development of a country. Thirdly, with high

levels of financial depth, certain sectors within a country could be developed. This is because some industries are more dependent on external finance. Finally, with financial deepening, poverty could be reduced by increasing opportunities for entrepreneurship that could benefit society within a country.

5.3 Contributions of study

There are few contributions emerge from this study. Firstly, the findings would add to the existing literature on financial integration and macroeconomic variables to financial depth specifically for the research in ASEAN countries. Secondly, for the regulators of a country especially for ASEAN countries, the findings could assist the regulators in the future policy making efforts and also concerning about economic growth of a country. Lastly, this study will also provide information to the management of banking industry, thus would assist them in formulating more competitive banking strategies.

5.4 Limitations and directions for future research

There are some limitations occurs in this study. Firstly, in terms of sample selection, there are only 9 countries included in this study, thus the scope of study is limited. Hence, for future research, it is suggested to expand the scope of study such as including countries in Asian region. Furthermore, this study only focus on depth as an independent variable. Thus, the result will not completely explain the effect of financial integration to the financial development since there are many other aspect of financial development that can be studied such as financial accessibility, stability and efficiency. In that case, it is recommended that future research will explore the effect of financial integration on financial development with specific focus on financial accessibility, stability and efficiency. Presently, the measurement of financial depth is only limited to total asset hold

by financial institution. The results could be varied if alternative measurements for financial depth is employed. Finally, this study only focuses on ordinary least square (OLS) and panel regression method. Therefore, other research methodology can be adopted in future research such as short-run and long-run regression, cointegration, two step estimation and generalized method of moment to study relationship of financial deepening and other macroeconomic factors.

5.5 Conclusion

Taken as a whole, this study concludes that financial integration spurs financial depth. Financial integration improves financial deepening by increasing total asset deposits money bank and central banks for each bank. Other than that, economic growth also found to have a positive influence on financial development while other financial macroeconomic variables did not affect the financial development. Finally, this thesis concludes with some highlights on contributions, limitations and directions for future research.

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Appendix A

Construction of KAOPEN

KAOPEN is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).* Up to 1996, we assign dummy variables for the four major categories on the restrictions on external accounts.

These variables are:

- variable indicating the presence of multiple exchange rates (*k1*);
- variable indicating restrictions on current account transactions(*k2*);
- variable indicating restrictions on capital account transactions (*k3*); and
- variable indicating the requirement of the surrender of export proceeds (*k4*).

In 1996, the classification method in the *AREAER* changed and these four categories were disaggregated further, in an effort to better reflect the complexity of capital controls policies.7 For the extension of the four binary classifications after 1996, we followed Mody and Murshid (2005).

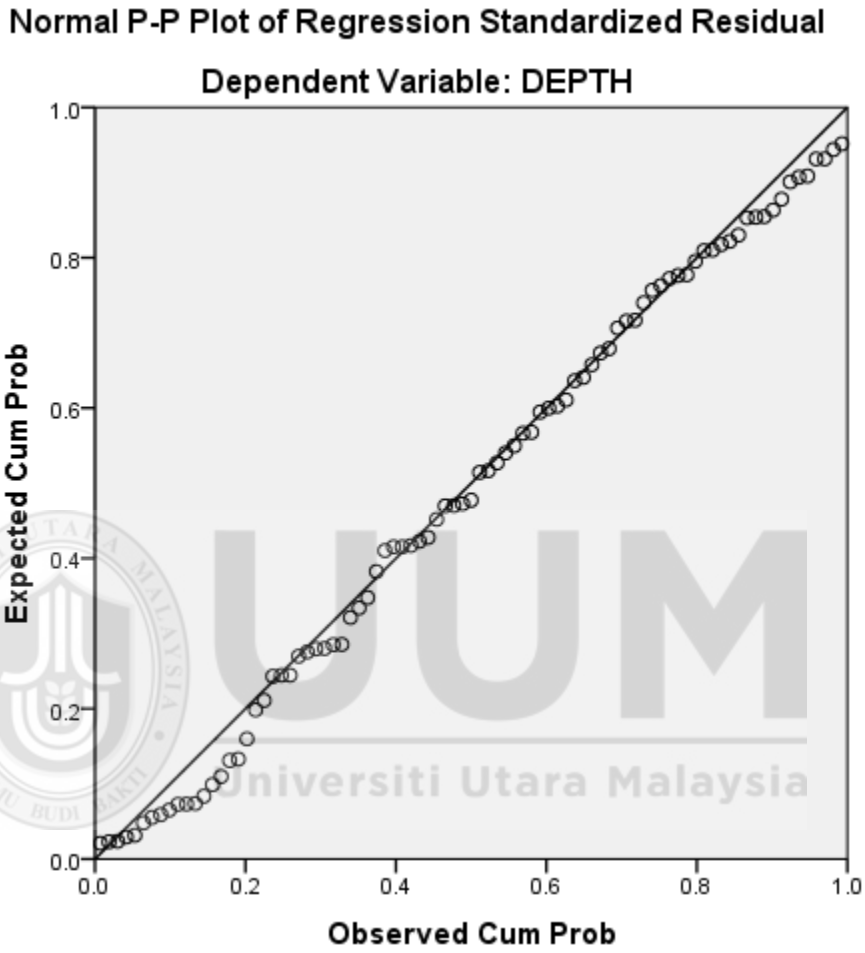
In order to focus on the effect of *financial openness* – rather than *controls* – we reverse the values of these binary variables, such that the variables are equal to one when the capital account restrictions are non-existent. Moreover, for controls on capital transitions (*k3*), we use the share of a five-year window (encompassing year *t* and the preceding four years) that capital controls were not in effect (*SHAREk3*).

$$SHAREk_{3,t} = \left(\frac{k_{3,t} + k_{3,t-1} + k_{3,t-2} + k_{3,t-3} + k_{3,t-4}}{5} \right)$$

Then we construct an index for capital "openness" (*KAOPENt*), which is the first standardized principal component of *k1t, k2t SHAREk3, k4t*. This index takes on higher values the more open the country is to cross-border capital transactions. By construction, the series has a mean of zero.The first eigenvector for KAOPEN was found to be (SHAREk3, k1, k2, k4)' = (0.57, 0.25, 0.52, 0.58)', indicating that the variability of KAOPEN is not merely driven by the SHAREk3 series.

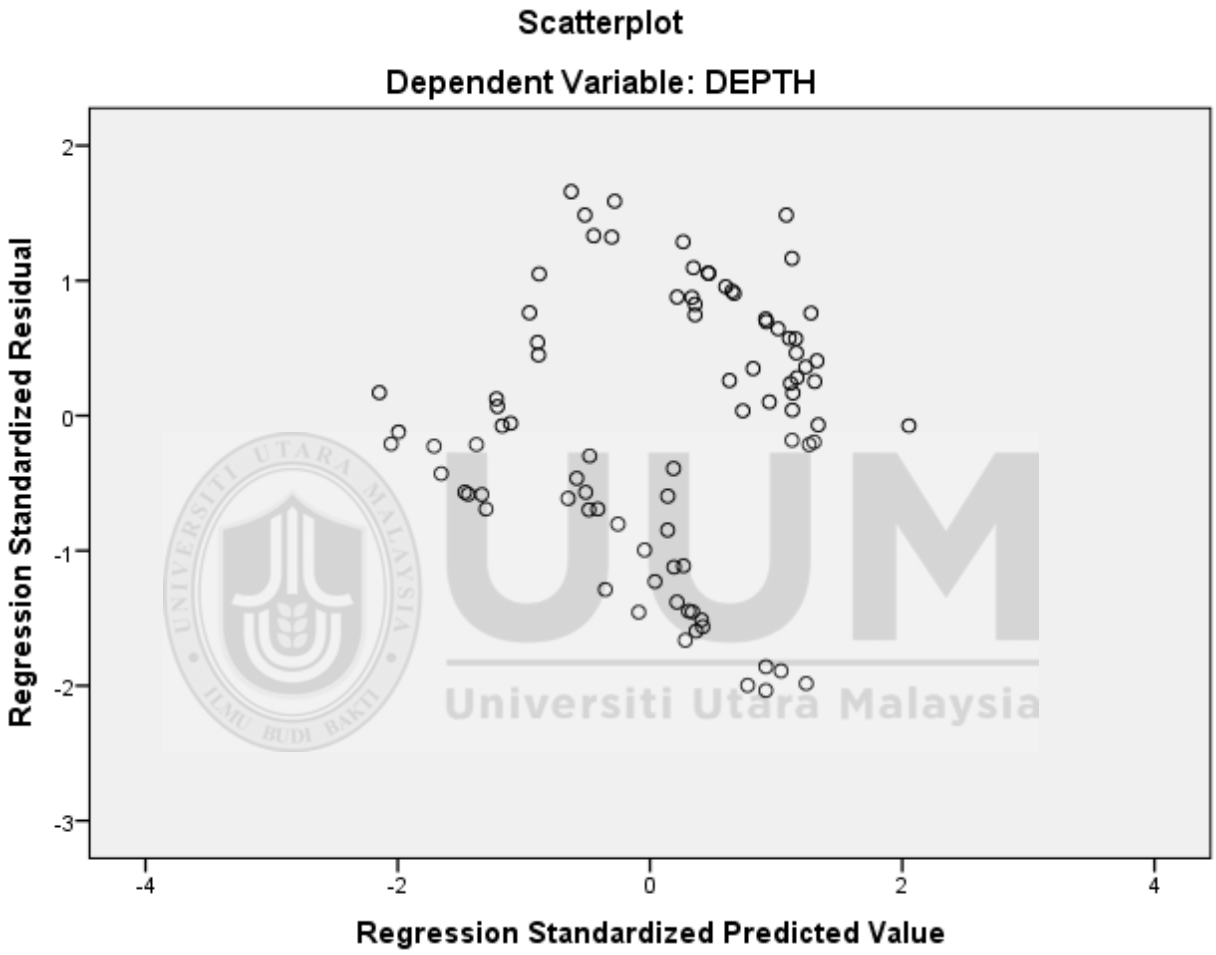
Appendix B

Diagnostic test: Test of Normality



Appendix C

Diagnostic test: Test of outliers



Appendix D

```
tsset country v3
       panel variable:  country (unbalanced)
        time variable:  v3, 2004 to 2014
                delta:  1 unit
```

```
. xtsum depth2 chinnito lngdp cpi dforinc realinterest
```

Descriptive statistic

Variable		Mean	Std. Dev.	Min	Max	Observations
depth2	overall	56.18471	37.82864	4.04	127.07	N = 87
	between		38.80297	7.743333	99.37909	n = 9
	within		13.13794	27.29199	134.5793	T = 9.66667
chinnito	overall	-.1177736	1.30181	-1.894798	2.389193	N = 98
	between		1.287581	-1.894798	2.389193	n = 9
	within		.4498565	-.9314607	1.375326	T-bar = 10.8889
lngdp	overall	5.833968	1.976902	3.083284	9.333183	N = 98
	between		1.972836	3.806905	8.998211	n = 9
	within		.6169422	4.834636	9.180671	T-bar = 10.8889
cpi	overall	5.903768	5.66651	-.8457	35.0246	N = 98
	between		3.11329	2.541227	11.12745	n = 9
	within		4.828704	-3.756086	29.80091	T-bar = 10.8889
dforinc	overall	.3367347	.4750231	0	1	N = 98
	between		.5	0	1	n = 9
	within		0	.3367347	.3367347	T-bar = 10.8889
realin~t	overall	3.710045	5.436347	-5.6163	28.544	N = 98
	between		3.60176	0	12.5174	n = 9
	within		4.310041	-8.807355	19.73665	T-bar = 10.8889

Pooled OLS estimation

```
. regress depth2 chinnito lngdp cpi dforinc realinterest

      Source |       SS           df       MS      Number of obs   =        87
-------------+----------------------------------   F(5, 81)        =      9.00
       Model |  43940.1941         5  8788.03882   Prob > F        =    0.0000
    Residual |   79126.346        81  976.868469   R-squared       =    0.3570
-------------+----------------------------------   Adj R-squared   =    0.3174
       Total |   123066.54        86  1431.00628   Root MSE        =    31.255

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |    13.7357   3.267912     4.20   0.000     7.233579    20.23782
       lngdp |   6.719365   2.338341     2.87   0.005       2.0668    11.37193
         cpi |    .8642905    .941818     0.92   0.362    -1.009632    2.738213
     dforinc |   9.844775   9.794383     1.01   0.318    -9.642974    29.33252
realinterest |   -.2766298   .7344997    -0.38   0.707    -1.738054    1.184794
       _cons |   7.846248   15.68912     0.50   0.618    -23.37019    39.06268
------------------------------------------------------------------------------

. estimates store ols
```

Random effect

```
. xtreg depth2 chinnito lngdp cpi dforinc realinterest ,re

Random-effects GLS regression                   Number of obs     =         87
Group variable: country                         Number of groups  =          9

R-sq:                                           Obs per group:
     within  = 0.1490                                         min =          3
     between = 0.2686                                         avg =        9.7
     overall = 0.1639                                         max =         11

                                                Wald chi2(5)      =      14.02
```

```
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0155

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |   7.643583   3.219922     2.37   0.018     1.332651    13.95451
       lngdp |   16.75338   5.527003     3.03   0.002     5.920656    27.58611
         cpi |  -.1566282   .4536677    -0.35   0.730    -1.045801    .7325442
     dforinc |  -9.665462   30.83853    -0.31   0.754    -70.10787    50.77695
realinterest |   .6430161   .5350043     1.20   0.229     -.405573    1.691605
       _cons |  -43.63006   31.42162    -1.39   0.165    -105.2153    17.95519
-------------+----------------------------------------------------------------
     sigma_u |  37.988205
     sigma_e |   13.01574
         rho |  .89494071   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        depth2[country,t] = Xb + u[country] + e[country,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                  depth2 |   1431.006       37.82864
                       e |   169.4095       13.01574
                       u |   1443.104       37.98821

        Test:   Var(u) = 0
                                chibar2(01) =   250.06
                            Prob > chibar2 =   0.0000
```

Fixed Effect

```
. xtreg depth2 chinnito lngdp cpi dforinc realinterest ,fe
note: dforinc omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =         87
Group variable: country                         Number of groups   =          9

R-sq:                                           Obs per group:
     within  = 0.1555                                         min =          3
     between = 0.2663                                         avg =        9.7
     overall = 0.1626                                         max =         11

                                                F(4,74)            =       3.41
corr(u_i, Xb)  = -0.6675                        Prob > F           =     0.0130

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |   8.152431   3.428585     2.38   0.020     1.320827    14.98404
       lngdp |   23.57529   7.292154     3.23   0.002     9.045355    38.10522
         cpi |  -.1390341   .4540365    -0.31   0.760    -1.043722    .7656533
     dforinc |          0  (omitted)
realinterest |   .6383494   .5437896     1.17   0.244    -.4451751    1.721874
       _cons |  -86.88849   43.62878    -1.99   0.050    -173.8207    .0437489
-------------+----------------------------------------------------------------
     sigma_u |  43.343918
     sigma_e |   13.01574
         rho |  .91728475   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(8, 74) = 49.86                     Prob > F = 0.0000

.
. estimates store panelfixed
```

```
. xtreg depth2 chinnito lngdp cpi dforinc realinterest ,re

Random-effects GLS regression                   Number of obs     =         87
Group variable: country                         Number of groups  =          9

R-sq:                                           Obs per group:
     within  = 0.1490                                         min =          3
     between = 0.2686                                         avg =        9.7
     overall = 0.1639                                         max =         11

                                                Wald chi2(5)      =      14.02
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0155

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |   7.643583   3.219922     2.37   0.018     1.332651    13.95451
       lngdp |   16.75338   5.527003     3.03   0.002     5.920656    27.58611
         cpi |  -.1566282   .4536677    -0.35   0.730    -1.045801    .7325442
     dforinc |  -9.665462   30.83853    -0.31   0.754    -70.10787    50.77695
realinterest |   .6430161   .5350043     1.20   0.229     -.405573    1.691605
       _cons |  -43.63006   31.42162    -1.39   0.165    -105.2153    17.95519
-------------+----------------------------------------------------------------
     sigma_u |  37.988205
     sigma_e |   13.01574
         rho |  .89494071   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Hausman test

```
. hausman panelfixed

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |   panelfixed       .          Difference          S.E.
-------------+----------------------------------------------------------------
    chinnito |    8.152431     7.643583        .5088478        1.177834
       lngdp |    23.57529     16.75338        6.821906        4.756863
         cpi |   -.1390341    -.1566282         .017594        .0182954
realinterest |    .6383494     .6430161       -.0046667         .097353
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.48
                Prob>chi2 =      0.4816
                (V_b-V_B is not positive definite)


. regress depth2 chinnito lngdp cpi dforinc realinterest

      Source |       SS           df       MS      Number of obs   =        87
-------------+----------------------------------   F(5, 81)        =      9.00
       Model |  43940.1941         5  8788.03882   Prob > F        =    0.0000
    Residual |   79126.346        81  976.868469   R-squared       =    0.3570
-------------+----------------------------------   Adj R-squared   =    0.3174
       Total |   123066.54        86  1431.00628   Root MSE        =    31.255

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
    chinnito |    13.7357   3.267912     4.20   0.000     7.233579    20.23782
       lngdp |   6.719365   2.338341     2.87   0.005       2.0668    11.37193
         cpi |   .8642905    .941818     0.92   0.362    -1.009632    2.738213
     dforinc |   9.844775   9.794383     1.01   0.318    -9.642974    29.33252
realinterest |  -.2766298   .7344997    -0.38   0.707    -1.738054    1.184794
       _cons |   7.846248   15.68912     0.50   0.618    -23.37019    39.06268
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
     dforinc |      2.01    0.497157
       lngdp |      1.82    0.550150
    chinnito |      1.45    0.691977
         cpi |      1.40    0.713990
realinterest |      1.38    0.722983
-------------+----------------------
    Mean VIF |      1.61

.
```

```
. xtreg depth2 chinnito lngdp cpi dforinc realinterest ,fe
note: dforinc omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =        87
Group variable: country                         Number of groups   =         9

R-sq:                                           Obs per group:
     within  = 0.1555                                         min =         3
     between = 0.2663                                         avg =       9.7
     overall = 0.1626                                         max =        11

                                                F(4,74)            =      3.41
corr(u_i, Xb)  = -0.6675                        Prob > F           =    0.0130

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |   8.152431   3.428585     2.38   0.020     1.320827    14.98404
      lngdp |   23.57529   7.292154     3.23   0.002     9.045355    38.10522
        cpi |  -.1390341   .4540365    -0.31   0.760    -1.043722    .7656533
     dforinc |          0  (omitted)
realinterest |   .6383494   .5437896     1.17   0.244    -.4451751    1.721874
       _cons |  -86.88849   43.62878    -1.99   0.050    -173.8207    .0437489
-------------+----------------------------------------------------------------
     sigma_u |  43.343918
     sigma_e |   13.01574
         rho |  .91728475   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(8, 74) = 49.86                     Prob > F = 0.0000

. xtserial depth2 chinnito lngdp cpi dforinc realinterest
```

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       7) =    120.662
           Prob > F =      0.0000
.
. xtreg depth2 chinnito lngdp cpi dforinc realinterest ,fe
note: dforinc omitted because of collinearity

Fixed-effects (within) regression               Number of obs     =         87
Group variable: country                         Number of groups  =          9

R-sq:                                           Obs per group:
     within  = 0.1555                                         min =          3
     between = 0.2663                                         avg =        9.7
     overall = 0.1626                                         max =         11

                                                F(4,74)           =       3.41
corr(u_i, Xb)  = -0.6675                        Prob > F          =     0.0130

------------------------------------------------------------------------------
      depth2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    chinnito |   8.152431   3.428585     2.38   0.020     1.320827    14.98404
       lngdp |   23.57529   7.292154     3.23   0.002     9.045355    38.10522
         cpi |  -.1390341   .4540365    -0.31   0.760    -1.043722    .7656533
     dforinc |          0  (omitted)
realinterest |   .6383494   .5437896     1.17   0.244    -.4451751    1.721874
       _cons |  -86.88849   43.62878    -1.99   0.050    -173.8207    .0437489
-------------+----------------------------------------------------------------
     sigma_u |  43.343918
     sigma_e |   13.01574
         rho |  .91728475   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(8, 74) = 49.86                     Prob > F = 0.000
```

```
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (9)  =     2691.27
Prob>chi2 =      0.0000


.
. pwcorr depth2 lngdp cpi dforinc chinnito realinterest, sig star(5)

             |   depth2    lngdp      cpi  dforinc chinnito realin~t
-------------+------------------------------------------------------
      depth2 |   1.0000
             |
             |
       lngdp |   0.3192*  1.0000
             |   0.0026
             |
         cpi |  -0.0329  -0.3109*  1.0000
             |   0.7620   0.0018
             |
     dforinc |   0.3673*  0.5395* -0.4044*  1.0000
             |   0.0005   0.0000   0.0000
             |
    chinnito |   0.4250* -0.0486  -0.1816   0.2821*  1.0000
             |   0.0000   0.6343   0.0735   0.0049
             |
realinterest |  -0.3067* -0.1573  -0.2907* -0.1061  -0.2567*  1.0000
             |   0.0039   0.1219   0.0037   0.2985   0.0107
```