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Foreign Direct Investment, Financial Development and Economic Growth: A Panel Data Analysis

(Pelaburan Langsung Asing, Pembangunan Kewangan dan Pertumbuhan Ekonomi: Analisis Data Panel)

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ABSTRACT

This study investigates the effects of financial development in enabling foreign direct investment to promote economic growth. A sample of 65 developing countries is examined over the period of 2009 to 2015 with the dynamic panel estimation by using Generalized Method of Moment (GMM). Financial development is measured using three financial indicators and an index of financial development is constructed based on the following indicators: domestic credit to private sector, liquid liabilities and private credit by banks. The results demonstrate that the financial development index contributes positively and higher than each financial development proxy in influencing the effects of FDI on economic growth. However, FDI influence negative effect in the group of countries of low level of financial development. Thus, it suggests that financial development need to be increased and serves as a form of absorptive capacity that enable the positive growth effects of FDI in the recipient countries.

Keywords: Financial development; economic growth; foreign direct investment; developing countries

ABSTRAK

Kajian ini bertujuan untuk melihat kesan pembangunan kewangan sebagai pemangkin kepada pelaburan langsung asing (FDI) untuk menggalakkan pertumbuhan ekonomi. Sampel 65 buah negara sedang membangun bagi tempoh 2009 hingga 2015 digunakan dalam kajian ini. Penganggaran kajian adalah dengan menggunakan panel dinamik, iaitu Kaedah Momen Teritlak (GMM). Pembangunan kewangan diukur dengan menggunakan tiga petunjuk kewangan dan indeks pembangunan kewangan dibina berdasarkan penunjuk berikut: kredit domestik kepada sector swasta, liabiliti kecairan dan kredit swasta oleh bank. Hasil kajian menunjukkan bahawa indeks pembangunan kewangan menyumbang positif dan lebih tinggi daripada setiap proksi pembangunan kewangan secara individu dalam mempengaruhi kesan FDI ke atas pembangunan ekonomi. Walau bagaimanapun, FDI berhubungan secara negatif kepada pertumbuhan ekonomi di kumpulan negara yang mempunyai tahap pembangunan kewangan yang rendah. Oleh itu, kajian ini mencadangkan bahawa pembangunan kewangan perlu dipertingkatkan yang mana ia berfungsi sebagai satu bentuk kapasiti penyerap yang membantu meningkatkan kesan pertumbuhan positif FDI di negara penerima.

Kata kunci: Pembangunan kewangan; pertumbuhan ekonomi; pelaburan langsung asing; negara membangun

INTRODUCTION

In recent years, policymakers, especially those in developing countries, have come to the conclusion that foreign direct investment (henceforth, FDI) is needed to boost growth in their economy. It is claimed that the FDI can create employment, increase technology development, knowledge transfer and improve the economic condition in host country. FDI inflow to developing countries is assumed to produce positive externalities through technology transfer and spill-over effect (Carkovic & Levine 2005). Developing countries received 55 percent, more than half of FDI inflows in 2010, thus increases the opportunities for strategic investment targeting, promotion and protection policies in developing countries (see UNCTAD 2015b).

There are numerous FDI-growth studies in the literature covering various dimensions. Several studies reported that FDI generates positive externalities in the form of technology transfer and contributes to economic growth (e.g., Carkovic & Levine 2005; Liu 2008; Chakraborty & Nunnenkamp 2008). On the other hand a study by Konings (2001) found negative effects of FDI on domestic firms that caused 'crowd-out' effect which led to negative consequence on productivity of domestically owned plants (Aitken & Harrison 1999). Grög and Greenaway (2004) concluded in their study that FDI effects on growth are mostly negative. Meta-analysis study by Iamsiraroj and Ulubaşoğlu (2015) found that fewer than half of related studies were found positively significant and nearly one-third reported negative effects of FDI on

growth. The effect of FDI-growth is still irreconcilable due to its reliant on other factors as an absorptive capacity that influenced FDI in promoting economic growth.

Recent empirical literature highlighted that financial development is a key explanation for the inconclusive and ambiguous findings in the FDI-growth nexus. Financial development is recognized as a form of absorptive capacity as well as a precondition that enables the positive growth effects of FDI to be realized. According to Levine (2005), growing evidence shows that financial institutions and financial markets can exert a strong influence on the economic growth. Alfaro, Kalemli-Ozcan and Sayek (2009) provided evidence that financial markets serves as a channel in facilitating the positive growth effects of FDI. The study found that countries with well-developed financial markets gain significantly from FDI through total factor productivity improvements. An improvement in the financial sector increases the number of entrepreneurs in society effecting the increases in social marginal product of FDI (Alfaro et al. 2009).

In the finance-growth nexus literature, a large body of research has shown that financial development exerts a positive impact on economic growth. The importance of financial development is theoretically acknowledged through its functions and services rendered in the process of economic growth (Levine 2005; Hermes & Lensik 2003). Five major functions of the financial system that contributed to promoting economic growth were highlighted in a study by Levine (2005). From the theoretical perspectives, FDI also contributes to growth through its spillovers. There are studies that found FDI generates positive externalities in the form of technology transfer and contributes to economic development (see, for examples Liu 2008; Sadik & Bolbol 2001; Chakraborty & Nunnenkamp 2008). Thus, both FDI and financial development are shown to be important and complement in their relationship in promoting economic growth. However, contingent effect is crucial if financial development as an absorptive capacity is fragile, e.g., too high or too low, as subsequently it will cause the fragility of FDI on growth.

Recent studies have shown that there must be a limitation on how much financial development need to be generated. The study by Arcand, Berkes and Panizza (2012) found that financial development will benefit economic growth up to a certain point, but after surpassed the threshold point of financial development it will start to harm economic growth. The other nonlinearity studies such as those by Cechetti and Kharroubi (2012), Law and Singh (2014), and Samargandi, Fidrmuc and Ghosh (2015) found similar results that inverted U-shaped relationship between financial development and economic growth. These findings present a dilemma to policymakers tasked with making the right decisions to optimize financial resources and in promoting economic growth.

The objective of this study is to examine the impact of FDI on economic growth contingent with the level of financial development among 65 selected developing countries over the period 2009 to 2015 following the global financial crisis in 2008. This study considered FDI and financial development as intertwined variables that may affect economic development since the two factors are among the most important variables for measuring development. The national economy can benefit from an increase in FDI inflows augmenting the level of financial development. This paper aims at contributing to the existing literature in the following different dimensions.

This study differs from other existing studies in five ways. First, this study attempts to examine the role of financial development in the relationship between FDI and economic growth by comparing the effects between financial indicators and the level of financial development index. Second, it focuses on the period following the 2008 global financial crisis in developing countries where the sampling period started from 2009 until 2015. Over the last three decades in the aftermath of the crises, policymakers emphasized policies and reforms to pursue and attract more FDIs to boost economic growth for developing countries (Alfaro et al. 2004). Third, the calculation of financial development index uses three procedures as employed in Malaysia Well-being Index (2013) rather than conventional methods such as minimum-maximum and principle component analysis. Fourth, this study utilizes the function of marginal effect in interaction terms by using Brambor, Clark and Golder (2006) standard error to evaluate the changes effect of financial development in FDI-growth relationship. The marginal effect was also illustrated by using fitted value with 95 percent confidence interval in linear prediction based on the level of financial development. Finally, the sample of countries was disaggregated into four quartiles to address the level of financial development. The purpose of disaggregation is to investigate the different effects of FDI on economic growth and to evaluate which level of financial development that enables FDI to perform the best or vice-versa.

To achieve the objectives of the study, the dynamic panel data analysis were used. This paper is organized as follows: Section II provides the discussion on the past literature of FDI to growth, financial development to growth, and FDI-finance-growth. Section III presents data description, econometric model and methodology. Section IV and Section V discuss the empirical findings and the managerial implication, respectively. Finally, Section VI provides the summary and conclusions.

LITERATURE REVIEW

In the early literature, Markusen (1984) and Markusen and Venables (1998) showed that horizontal FDI is market-seeking or that firms expand overseas to avoid trade costs, leading to a substitutionary relationship with trade. On the other hand, Helpman (1984) and Helpman and Krugman (1985) showed the possibility of a complementary relationship when vertical FDIs are involved due to geographical fragmentation of the production processes

which results in the location of different stages of production in host economies which offer the best cost advantages for a particular stage of production. From the theoretical perspective, Aghion and Howitt (1992), who significantly contributed to the new growth theory, highlighted the fact that the innovations generated from technological knowledge take one step ahead in the form of new goods, new markets or new processes towards sustaining a positive growth rate of output per capita in the long run. Thus, leaning on the features of capital and its spillovers, FDI is seen as another potential source for economic growth where it would generate direct and indirect impacts through the positive spillovers.

In another perspective of causality, Gao (2005) in his theoretical study of FDI and economic growth in a two-country endogenous growth model, views that although positive correlations are often noted between inward FDI and economic growth, the relationship may not be causal. He found that in the core-periphery or developed country, the economic integration which gives rise to FDI leads to an expansion of research and development activity, as well as the fact that it increases the growth rate, while periphery or less developed countries benefit from the increases in the living standards. Liu (2008) proposes that FDI spillovers could decrease the short-term level of productivity but increase the long-term productivity growth rate of local firms. In the long run, technology spillovers serve as a source of knowledge that can make productivity growth rate sustainable, as well as the fact that it can function as an ultimate engine of economic growth.

Extensive literature has discovered the absorptive capacity is a key explanation to the ambiguous results in the FDI-growth nexus. Financial development has been introduced as a crucial channel or contingent factor that would enable the growth effects of FDI to be realized (Alfaro et al. 2009; Jayaraman, Choong & Ng 2017; among others). Collectively past studies empirically found that higher levels of financial development serve as precondition to stimulate positive growth effects of FDI. The work of Hermes and Lensink (2003) discovered that the development of banks and stock markets is an important pre-requisite to realized positive growth effects of FDI. Hermes and Lensink (2003) utilized the regressions of growth equation and a cross section of the data set of 67 less developed countries for the period of 1970 to 1995. They were followed by Alfaro et al. (2004), Azman-Saini et al. (2010) and Choong (2012) who also found similar results on the important role of financial development in the FDI-growth nexus. Alfaro et al. (2004) used a cross-country data for the period of 1975-95 for OECD countries. Meanwhile Azman-Saini et al. (2010) utilized a cross-country observation for 91 countries for the period of 1975-2005. Other related studies such as Lee and Chang (2009) and Ang (2009), also consistently established similar findings on the positive link of FDI-growth nexus with the financial development as a precondition. In addition, recent studies show that FDI creates new jobs for educated labor to develop and marketing innovative products (Rozen-Bakher 2017).

Theoretically, financial development would serve as an effective precondition in the FDI-growth nexus due to its major functions. The role of the financial development in the economy has been well acknowledged over the decades. Studies by Levine and Zervos (1996) and Levine (1997) convinced that the level of financial development serves as a good predictor for future economic growth, capital accumulation and technological change. According to Levine (1997), major functions of the financial system provide different implications in every dimension of activities in the economy. Levine (1997) highlighted five functions of financial system i.e. facilitate risk management, allocate resources, exert corporate control, mobilize savings and ease trading of goods and services which consequently channel the accumulated capital as well as technological innovation to growth. The efficiency of these functions will lead to more financial development that may ameliorate market resistance relating to information and transaction costs. As a result, the economic growth can be promoted through the well-functioning and advanced financial development.

A recent study by Desbordes and Wei (2017) found that source and destination countries' financial development have a large positive influence on green-field, mergers and acquisitions, and expansion FDI. The influenced by direct and indirectly, through increasing access to external finance and boosting manufacturing activity, respectively. Financial market development has an impact on the relationship between FDI and business start-up, which is a salient feature of entrepreneurship (Munemo 2016). His study found that financial market development above threshold enabled FDI to crowd-in new businesses. Improving financial conditions in developing countries is important as a precondition for facilitating the positive effect from FDI inflows which stimulate entrepreneurship and boosting economic growth.

Meta-analysis study by Iamsiraroj and Ulubaşoğlu (2015), on a global sample of 140 countries between 1970 to 2009, concluded that FDI positively affects the economic growth. Their study aimed at overcoming the ambiguity on the effect of FDI based on various findings on FDI-growth study by exploring 108 related studies using meta-analysis. They also found that the relationship between FDI on economic growth via the financial development was more relevant in developing countries as opposed to developed ones. The appropriate absorptive capacity indicators for positive growth are identified as trade openness and financial development rather than schooling. The positive effect of FDI on growth depended on nonlinearity of financial development up to a certain point. Beyond this threshold point however FDI influence was negative on growth.

The nonlinearity of financial development on economic growth have thus to be considered when investigating the FDI-finance-growth relationship. Arcand et al. (2015) studied the nonlinearity pattern of financial

development on economic growth which described an inverted U-shaped. The period of their study covered from 1960 to 2010, where this duration comprising the occurrence of several economic crises. Similarly, Cechetti and Kharroubi (2012), Law and Singh (2014) and Samargandi et al. (2015) investigated the nonlinear effect of financial development on growth by using panel data which covered the period from 1980 to 2009, 1980 to 2010 and 1980 to 2008, respectively. They also found the consistent result of inverted U-shaped relationship between financial development and economic growth. These four studies which covered long time period encompassed with several economic crises such as the third commodity crisis in 1985-1986, Gulf war crisis in 1990-1991, Asian financial crisis in 1997-1998, bubble dot.com crisis in 2000-2001, and the recent global financial crisis in 2007-2008.

Although recent studies discovered that financial development serves as a precondition of positive growth effects for FDI to eventuate, the relationship between FDI and economic growth based on the level of financial development has not been adequately addressed, in particular regarding how FDI works to positively impact on economic growth (Lemi & Asefa 2003). The influence arises from its absorptive capacity of FDI in the host country. Although quite a number of extant studies have dealt with some aspects of this issue, our study contributes to the extension of literature in four points. Firstly, the study focuses on selected 65 developing countries based on availability of data. According to Alfaro et al. (2004), developing countries welcomed FDI since 1980s due mainly to the debt crises which they believe can be mitigated through investment. In addition, multinational enterprises are likely to get cheaper labor in developing countries thus reducing production cost. As such, the study of FDI in developing countries is more meaningful compared to that in developed countries. Second, data in the present study were collated from 2009 to 2015, a period that did not include any major economic crisis. The studies of nonlinearity of financial development on growth were mostly conducted from 1980 until 2010 (see Cechetti & Kharroubi 2012; Law & Singh 2014; Samargandi et al. 2015), a time span which include several economic crises. In addition, study by Said and Karim (2016) found that the structural parameters are stable for output and investment after the 2008 global financial crisis for the case of Malaysia. Third, financial development index is constructed by using standard score and base year. The marginal effect of financial development index and it components may different based on each percentile. Finally, we homogenized our data into four quartiles to get clearer picture on how the financial development impact on FDI through promoting economic growth based on different levels of financial development. The different effects were predictable due to the nonlinearity of relationship between financial development and economic growth.

METHODOLOGY

DATA DESCRIPTION

This study utilized macro panel data from 65 selected developing countries (as listed in Table 1) spanning a 7-year period, from 2009 to 2015. The selection of countries was primarily dictated by availability and reliability of data over the sample period. The total number of observations made by using balanced panel was 455. The variable used in this study is the real GDP per capita to indicate economic growth and FDI inflows (% of GDP) for investment. Meanwhile, domestic credit to private sector (% of GDP) (DCPS), liquid liabilities (% of GDP) (LL) and private credit to deposit money (% of GDP) (PC) were used as proxies for financial development in accordance with Law and Singh (2014) and Adeniyi et al. (2012). The control variables used were gross fixed capital formation (GFCF) to indicate domestic investment, consumer price index (CPI) to indicate inflation, and the average years of schooling as a proxy for human capital (HC). All data are in the logarithm form except for human capital[1]. These data were obtained from World Databank Indicators, UNCTAD Database, Financial Structure Dataset, and the Barro and Lee website.

We homogenized our data by disaggregating them into four quartiles based on the level of financial development, where Quartile 1 indicates the highest level of financial development while Quartile 4 is the lowest level. As may be observed from Table 1, Malaysia has the highest financial development index in our sample and most Southeast Asia countries belonged to Quartile 1 and Quartile 2. Quartile 1 indicates the highest financial development following Quartile 2 (upper-middle-IFD group) and Quartile 3 (lower-middle-IFD group) with the lowest financial development at Quartile 4 (lowest IFD group). There are a few issues to be highlighted in descriptive statistics as shown in Table 2. GDP and financial development increase as we move from countries in Quartile 4 to Quartile 1, but the trends are different for FDI, domestic investment, inflation and human capital. Variations in FDI are largest in Quartile 4 countries, followed by those of Quartile 2 and Quartile 3 countries. Surprisingly, FDI is lowest in Quartile 1 countries but domestic investment is largest in Quartile 1 countries. The trend may have bearing on crowd-in effect of FDI in Asia as highlighted by Agosin and Machado (2013). The largest human capital in Quartile 2 countries. In the reverse relationship with GDP, Quartile 4 countries have the highest inflation while Quartile 1 countries recorded the lowest. The descriptive statistics and data sources for overall data are shown in Table 3.

FINANCIAL DEVELOPMENT INDEX CONSTRUCTION (IFINDEV)

The selection of financial components is crucial for measurement of financial development but it is subject to the objective of study. Domestic credit to private sector is

TABLE 1. Country list and the levels of financial development

Quartile 1		Quartile 2		Quartile 3		Quartile 4	
Country	IFD	Country	IFD	Country	IFD	Country	IFD
Malaysia	0.67	Indonesia	0.33	Guatemala	0.23	Mozambique	0.12
Brazil	0.66	Kazakhstan	0.33	Botswana	0.22	Nicaragua	0.12
Thailand	0.63	Namibia	0.31	Romania	0.21	Burundi	0.11
South Africa	0.61	Mongolia	0.31	Pakistan	0.21	Togo	0.11
Russia	0.59	Egypt	0.30	Albania	0.21	Ghana	0.11
China	0.56	Moldova	0.28	Honduras	0.21	Senegal	0.11
Turkey	0.50	Vietnam	0.28	Bolivia	0.20	Cambodia	0.11
Jordan	0.44	Bangladesh	0.27	Armenia	0.20	Tanzania	0.10
Colombia	0.43	Sri Lanka	0.27	Nepal	0.17	Benin	0.10
India	0.41	Costa Rica	0.26	Kenya	0.17	Niger	0.10
Mauritius	0.41	Ecuador	0.25	Cote d'Ivoire	0.17	Mali	0.10
Morocco	0.41	Ukraine	0.24	Guyana	0.15	Uganda	0.10
Peru	0.40	Tunisia	0.24	Dominican Rep.	0.15	Cameroon	0.09
Mexico	0.39	El Salvador	0.24	Lesotho	0.15	Malawi	0.08
Philippines	0.36	Serbia	0.24	Paraguay	0.14	Congo, Dem. Rep.	0.07
Panama	0.33	Belize	0.23	Algeria	0.13	Sudan	0.07
						Sierra Leone	0.06

Note: The level of financial development is based on financial development index (IFD) by IMF (2017 version)

TABLE 2. Descriptive statistics based on the level of financial development

Variable	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
GDP					
Mean	3,752.35	6,947.65	4,150.06	3,293.55	802.50
Std. Dev.	3,155.62	3,165.13	2,355.48	2,223.66	449.97
FDI					
Mean	9.18	6.45	9.56	6.90	13.53
Std. Dev.	10.36	4.05	12.01	5.33	14.28
IFD					
Mean	0.26	0.49	0.27	0.18	0.10
Std. Dev.	0.16	0.11	0.03	0.03	0.02
CF					
Mean	23.91	25.75	23.37	22.92	23.61
Std. Dev.	7.24	7.23	6.65	7.77	7.02
CPI					
Mean	114.27	109.84	113.92	112.15	120.86
Std. Dev.	23.04	11.93	16.79	13.34	37.75
HC					
Mean	2.49	3.10	3.41	2.39	1.14
Std. Dev.	1.42	0.87	1.56	1.17	0.70

TABLE 3. Descriptive statistics and source of data for 65 selected developing countries

	Mean	Std. Dev.	Min	Max	Source of data
Real GDP per capita (constant at 2010 USD)	7.794	1.024	5.331	9.376	WDI
Foreign Direct Investment (% of GDP)	1.839	0.849	-0.934	4.506	UNCTAD
Financial Development Index (IFinDev)	4.665	0.120	4.343	4.911	Author's calculation
Domestic credit to private sector (% of GDP)	3.549	0.700	1.367	5.033	GFDD
Liquid liabilities (% of GDP)	3.762	0.554	1.902	5.238	GFDD
Private credit by deposit money (% of GDP)	3.496	0.722	1.025	5.006	GFDD
Gross fixed capital formation (% of GDP)	3.130	0.297	2.192	3.927	WDI
Consumer price index (base year 2010)	4.724	0.159	4.451	5.855	WDI
Average year of schooling (secondary)	2.487	1.420	0.190	6.870	Barro & Lee

Notes: All data are in natural logarithm except average years of schooling proxy for human capital.
All data in the table are used in estimation
WDI=World Bank Database Indicator; UNCTAD=United Nation Conference for Trade and Development; GFDD=Global Financial Structure Dataset; Barro & Lee=Barro and Lee website.

one of the proxies to measure financial development that provides the financial resources to channel funds for private sector to generate economic activities in a productive manner, and this proxy is used by Hassan et al (2011), Law and Singh (2014) and Munemo (2016), among others. The liquid liabilities incorporate the quantum of liquid liabilities of financial system, including banks, central banks and other financial intermediaries representing the financial services (Demetriades & Hussein 1996; Favara 2003; Otchere, Soumare & Yourougou 2016). The higher liquid liabilities would indicate more transaction in the financial system leading to a high velocity of economic cycle which may attract investors for 'market-seeking.' Private credit by deposit money was widely used as an alternative measure of financial development (see Alfaro et al. 2004; Arcand et al. 2015; Jayaraman et al. 2017; King & Levine 1993; among others). This indicator signifies the ability of the financial system to channel funds from depositors to investors. This measure accounts for credit granted to the private sector, such as loans, trade credits, purchases of non-equity securities, and other account receivables, that enable firms to establish a claim for repayment and utilization of funds and their allocation to more efficient and productive activities (Alfaro et al. 2004). The higher private credit tends to attract FDI inflows as 'resource-seeking' for green-field investment and facilitate financial assistance for brown-field investment.

The IFinDev is therefore calculated as a component index of three chosen indicators that closely follow financial development measures used by Law and Singh (2014), namely, domestic credit to private sector, liquid liabilities and private sector to deposit money by banks. The expected sign of all indicators are positive on economic growth. These three variables are chosen based on their relevance to FDI activities. In practice however, financial development affected not only the financing the investment, but also the day to day conduct of business. The construction of IFinDev does not include all financial indicators as highlighted by Čihák, Demirgüç-Kunt, Feyen and Levine (2012), but our main focus is to examine the role of financial development in the relationship between FDI and growth by comparing the role of IFinDev and its components. All indicators of IFinDev are defined by World Bank as follows:

Domestic Credit to Private Sector as the Percentage of GDP (DCPS) DCPS indicating financial depth. It refers to the financial resources provided to the private sector.

Liquid Liabilities (% of GDP) (LL) LL indicating financial depth. Liquid liabilities are also known as broad money or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travelers' checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.

Private Credit by Deposit Money Banks to GDP (%) (PC) PC indicating financial depth. It refers to the financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise of commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.

By using the three financial components, this study suggests that the calculation of IFinDev involves a three-step process, in accordance with the Malaysian Well-Being Index (2013). The calculation of IFinDev is different from those of other studies that typically use minimum maximum approach and principle component analysis. The advantage on using this procedure constituents with four reasons; first, the procedure minimize the scale by using standard score to standardize the value of each component; second, the procedure addresses the positive and negative signs for consistent reading; third, this formula involves base year from an initial year as comparable based on time; lastly, the formula is applicable for panel data and time series analysis. The first step is to obtain the standard score for each indicator; step two to obtain the index score for the indicator; and step three seeks to derive the component indices to gain IFinDev.

Step 1: Obtain the Standard Score of each Indicator in Year$_t$. The standard score expresses an observation in terms of the deviation units above or below the mean that is, the transformation of an observation by subtracting the mean and dividing by the standard deviation. The calculations are as given below:

$$z = \frac{x_{jt} - \mu_j}{\sigma} \quad (1)$$

where x_{jt} indicate the indicator j value at time t, μ is the mean value of indicator, σ is the standard deviation of data series, and z is the standard score.

Step 2: Obtain the Sub-Index for Each Indicator in (I_{tj}) The index of each indicator for each year (I_{tj}) is then obtained by multiplying the standard score by 10, and adding 100 for positive indicators such as the domestic credit to private sector. The trend for negative indicator was corrected in order to have a consistent reading.

Sub-index of a positive indicator:

$$I^{+}_{tj} = 100 + (z * 10) \quad (2)$$

Sub-index of a negative indicator:

$$I^{-}_{tj} = 100 - (z * 10) \quad (3)$$

where t is referred to year and j is the indicator.

Once this step is completed, the sub-index must start from the base year. In our case, data collation commenced from year 2009. The value for year 2009 will always be 100 for each country. Therefore, the sub-index value can be compared to the initial year or the base value, where the standard score (z) is divided by the base value. For example, to gain the sub-index for year

2015, the calculation of index with the base-value 2009 is as follows:

$$I_{2015j} + (I_{tj}^{+/-} / I_{2009j}) * 100 \quad (4)$$

Step 3: Obtain the Index for Financial Development (IFinDev) in Year$_t$ The index of financial development component is then obtained by averaging the value of indicator indices or sub-index with base value for 2009 for the respective component as follows:

$$IQBD = \frac{1}{N} \Sigma_{j=1} I_{tj} \quad (5)$$

where I_c is the component index, N is the number of indicators, and I_{tj} is the index indicator j with base-value 2009 for year$_t$.

MODEL SPECIFICATION AND EMPIRICAL STRATEGY

The panel data analysis employed dynamic panel estimations. Panel data models examine group (country-specific) effects, time effects, or both in order to deal with heterogeneity or country effect that may or may not be observed. Since our empirical analysis involves a panel of countries, the baseline model equation can be written in a panel data form as follows:

$$y_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 IFinDev_{it} + \beta' X_{it} + \eta_i + \varepsilon_{it}; \quad (6)$$

where,

y = natural logarithm of real gross domestic product (GDP) per capita
FDI = natural logarithm of foreign direct investment
IFinDev = natural logarithm of financial development
X = vector of other conditional variables that effect real GDP per capita
ε = error term
i = country effect, $i = 1, 2, \ldots, N$
t = time effect, $t = 1, 2, \ldots, T$
η = unobserved country-specific term

The impacts of β_1 and β_2 are expected to be a positive sign on economic growth. The group of financial development includes three proxies: domestic credit to private sector (DCPS), liquid liabilities (LL) and private credit to deposit money by banks to GDP (PC). All proxies are tested and also comprised by constructing the financial development index (IFinDev) to avoid multicollinearity in estimation. DCPS, LL, PC and IFinDev are tested in separate models, namely Model a, Model b, Model c, and Model d, respectively. The group of control variables comprised of variables frequently used in the FDI-growth literature including gross fixed capital formation (GFCF), consumer price index (CPI), and human capital (HC).

The extension of model specification is for interaction between the FDI and financial development in order to investigate the role of the financial development in FDI-growth. The model can be specified as follows:

$$y_{it} = \beta_1 FDI_{it} + \beta_2 IFinDev_{it} + \beta_3 (FDI\ X\ IFinDev)_{it} + \beta' X_{it} + \eta_i + \varepsilon_{it} \quad (7)$$

where β_3 is the coefficient for interaction between the FDI and financial development including DCPS, LL and PC by a separate model. The marginal effect for the interaction term between FDI and IFinDev is calculated by using the first order derivation,

$$\partial y / \partial FDI = \beta_1 + (\beta_3 \times IFinDev) \quad (8)$$

To confirm the significance of marginal effect, we employ the standard error as proposed by Brambor, Clark and Golder (2006) to evaluate the relationship between FDI on economic growth contingent on financial development[2]. Using covariance matrix in the case of the model in Equation (7) and the marginal effect in Equation (8), the variance (i.e., standard error) is computed as:

$$\hat{\sigma}^2_{\frac{\partial y}{\partial FDI}} = var(\hat{\beta}_1) + IFinDev^2 var(\hat{\beta}_2) + 2IFinDev\ cov(\hat{\beta}_1 \hat{\beta}_3) \quad (9)$$

To investigate the effect of FDI on economic growth is contingent on the level of financial development by creating the dummy variables for Quartile 1, Quartile 2, Quartile 3 and Quartile 4. Quartile 1 countries were assigned a value of 1 and 0 otherwise. A similar procedure is applied to Quartile 2 and Quartile 3. Quartile 4 is the base outcome or omitted group. The FDI then interacts with three dummy variables specified as follows $\beta_0 FDI + \beta_1 (FDI \times Quartile\ 1) + \beta_2 (FDI \times Quartile\ 2) + \beta_3 (FDI \times Quartile\ 3)$. According to this specification, the effect of FDI on economic growth in the Quartile 1 is measured as $\beta_0 + \beta_1$; in the Quartile 2 as $\beta_0 + \beta_2$; in the Quartile 3 as $\beta_0 + \beta_3$; and FDI in the Quartile 4 measured as β_0. For robustness check, we aggregate the quartiles into two groups, namely IFinDev High comprising Quartile 1 and Quartile 2 while IFinDev Low aggregates with Quartile 3 and Quartile 4. The coefficients for these groups are estimated by using linear specification in Eq. (6).

GENERALIZED METHOD-OF-MOMENT (GMM)

It is impossible to estimate using panel estimation models, such as pooled OLS or fixed and random effect, when dealing with potential endogeneity of independent variables, with the inclusion of lagged dependent variable and the presence of the country-specific effects (Sarmidi, Nor & Ridzuan 2015). The problems aforementioned would lead Nickell (1981) bias if we use the static panel data estimation. The generalized method of moment (GMM) estimation as proposed by Arellano and Bond (1991) has the capability to eliminate these problems. Although panel 2SLS enables us to overcome the endogeneity bias, GMM is however more preferred in interpreting the results, for the three following reasons: First, panel 2SLS caters only for one endogenous regressor, while system GMM which allows for more than one variable are assumed to be

endogenous variables. For example, financial development and FDI are possibly endogenous, because of the feedback from economic growth to both variables. Therefore, GMM ables to solve the endogeneity and simultaneity bias associated with fixed effects in short panels (Nickell 1981). Second, GMM addresses the bias due to presence of the lagged dependent as dynamic effect, where the dependent variable in previous year is also connected to the current period. Third, GMM can cater for autocorrelation problem in panel data, which is not addressed in panel 2SLS.

By using dynamic panel data, Equations (6)-(7) can be expressed as follows:

$$y_{it} = \alpha y_{it\text{-}1} + \beta_1 FDI_{it} + \beta_2 IFinDev_{it} + \beta' X_{it} + \eta_i + \varepsilon_{it}; \text{ and (10)}$$

$$y_{it} = \alpha y_{it\text{-}1} + \beta_1 FDI_{it} + \beta_2 IFinDev_{it} + \beta_3 (FDI\ X\ IFinDev)_{it} + \beta' X_{it} + \eta_i + \varepsilon_{it} \quad (11)$$

where α indicates the dynamic effect, i.e. real GDP per capita in current year associated with real GDP per capita in previous year. If the lagged dependent and the explanatory variables are persistent over time or close to unity, these variables are weak instruments for the regression equation in differences (Alonso-Borrego & Arellano 1999; Blundell & Bond 1998). Therefore, Blundell and Bond (1998) suggested a system GMM estimator by estimating the different equation and the level equation as a system. In the system estimation, the instruments for the regression in levels are the lagged first-differenced variables. We adopt the two-step system GMM in this study because the two-step GMM is preferred over the one-step GMM in estimating the coefficient with attendant lower bias and standard errors (Windmeijer 2005).

However, system GMM can generate moment conditions prolifically as highlighted by Roodman (2009). Too many instruments may over fit the number of groups and it weakens the Hansen test of the instruments' joint validity. Therefore, the number of 65 developing countries in our sample is sufficient to estimate the model using system GMM estimation to overcome an increment of instruments' matrix. However, if the number of instruments still exceed the number of groups, two techniques are used to limit the number of instruments. First, certain lags are used instead of all available lag for instruments. Second, collapsing the block of the instrument matrix in certain lags into smaller sets of instruments. These two techniques were applied into previous studies such as by Beck and Levine (2004), Roodman (2009), Azman-Saini, Baharumshah and Law (2010), and Karim, Zaidi and Karim (2013).

Past literature proved that financial development and economic growth have a feedback relationship (see Calderón & Liu 2003; Luintel & Khan 1999; Pradhan et al. 2014; among others). Finance-growth nexus is associated with both hypotheses of 'supply-leading' and 'demand-following.' Similarly, the literature on FDI-growth nexus has been widely discussed (e.g., Adams & Opoku 2015; Ang 2008; Bahri, Nor & Nor 2016; Fedderke & Romm 2006; Seyoum, Wu & Lin 2015; Shakar & Aslam 2015; Sunde 2017: among others). Hence, finance-growth nexus and FDI-growth nexus create the endogeneity bias in determining the real factor affecting the dependent variable in the estimation. To overcome the endogeneity problem, a set of instrument variables are needed. Standard treatments of instrumental variables regression stress that for instruments to be valid they must be exogenous (Baum, Schaffer & Stillman 2003). System GMM estimator therefore has a capability to overcome the endogeneity problem. The lagged variables are used as instrumental variables in system GMM estimator in this study. The validity of our instruments are tested using the Hansen over-identification restrictions. Failure to reject the null hypothesis of over-identification indicates that the instruments are valid and endogeneity bias can be solved. In terms of the serial correlation test, the null hypothesis of absence of the serial correlation can be rejected in AR(1) but not rejected in AR(2) (Arellano et al. 2001)[3]. Failure to reject null hypothesis of Hansen J-test and AR(2) test indicates that the GMM estimator is consistent, efficient, lack of bias and the instruments are valid (Arellano & Bond 1991; Arellano & Bover 1995: Blundell & Bond 1998).

RESULTS

The empirical findings are discussed in four ways: (i) model without interaction by comparing among IFinDev and its components (Model 1a-1d) in Table 4; (ii) model with interaction by comparing the financial components with IFinDev (Model 2a-2d) in Table 4; (iii) model with dummy variables to indicates the different level of financial development is shown in Table 5; and (iv) model without interaction splitting into two groups, namely, IFinDev High and IFinDev Low as reported in Table 5.

The estimated results for the model without interaction (Model 1a-1d) are reported in Table 4. The first column in the table shows the coefficient estimated for model with DCPS, followed by LL, PC and IFinDev. The results show that FDI is positively significant only for Model 1a and 1d. These positive signs are consistent with the studies by Carkovic and Levine (2005), Chakraborty and Nunnenkamp (2008) and Shakar and Aslam (2015), who found that FDI generates positive externalities in the form of technology transfer and benefits to economic growth. However, FDI is not significant for Model 1b and 1c. Meanwhile, financial development is positively significant only for Model 1a and 1c that supports the 'supply-leading' hypothesis as reported in other studies (e.g., Rousseau & Wachtel 2000; Jalil, Faridun & Ma 2010; Luintel & Khan 1999; Pradhan et al. 2014; among others).

The role of financial development as an absorptive capacity in FDI-growth relationship is reported in Model 2a-2d (see Table 4). The relationship between FDI on economic growth is consistently negative and significant for all models. Nevertheless, when FDI interacts with financial development, the relationship is positively

significant and robust with all financial indicators. The positive sign in interaction term indicates that financial development plays a role as an absorptive capacity in enabling FDI to promote economic growth. These results indicate that financial development acts as a channel in actualizing positive growth effects of FDI, which is consistent with findings in previous studies (Alfaro et al. 2009; Suliman & Elian 2014; Adeniyi et al. 2015; Jayaraman et al. 2017). Interestingly, IFinDev showed the highest contribution which enabled FDI to promote economic growth at 0.014 in Model 2d as compared to its component. Thus, the IFinDev that we constructed was successfully tested and has influenced the FDI to accelerate growth faster.

The marginal effects calculated in the model with interaction terms by using first order derivation, as shown in Model 2a-2d indicates that the marginal effects increases when financial development increases. The marginal effects correspond by financial indicators and IFinDev increases simultaneously following each percentile subsequently towards the maximum level of financial development also described in Figure 1. This suggests that at the higher marginal effect, economic growth derivatives benefit from FDI instantaneously. The marginal effects at minimum, mean and maximum level derived in Model 2d (IFinDev) are statistically significant at 1 percent level by using Brambor et al. (2007) standard error. These results shows the important role of financial development in FDI-growth relationship as highlighted by Alfaro et al. (2009), Munemo (2016), Jayaraman et al. (2017).

The comparison between without and with the interaction model for FDI and IFinDev is shown in Table 5. To investigate the performance of FDI based on the difference of the financial development level, Least Square Dummy Variable 2 (LSDV2) is employed to avoid multicollinearity, where Quartile 4 is used as base outcome. The effect of FDI on economic growth in the Quartile 1 is 0.013 which is the highest performance as compared to Quartile 2 (0.005), followed by Quartile 3 (0.000), and lastly Quartile 4 (-0.004). The performance of different quartiles are illustrated in Figure 2. Then, the splitting sample into two groups, namely financial development high and low, comprising Quartile 1-2 and Quartile 3-4, respectively. In contrast the effect of FDI on growth in high level of financial development is positively significant at 5 percent level while FDI influence negatively on economic growth in low level of financial development. The difference of these relationships is portrayed in Figure 3.

The marginal effect as shown in Figure 1 showed IFinDev with the highest results as compared to its components until 90 percentile. The changes in marginal effect from minimum to 10 percentile is higher than that the other percentiles. Among financial development components the effect was parallel after the 50 percentile, and IFinDev and its' components are slightly converged at maximum level. Figure 1 shows that IFinDev and its components need to surpass certain level of percentile to attain a positive marginal effect in the relationship between FDI and economic growth. For example, IFinDev needs to surpass the 25 percentile, while its component DCPS, LL and PC have to exceed 90 percentile, 50 percentile and 75 percentile, respectively, for economic growth to benefit from FDI via financial development.

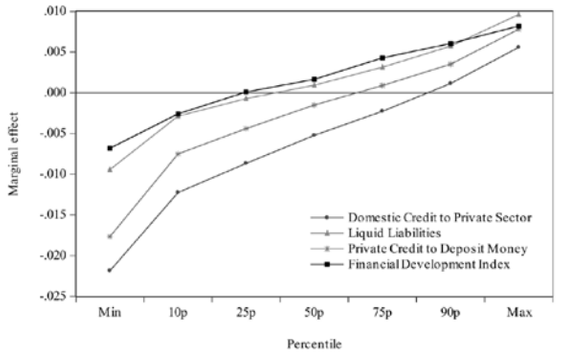

FIGURE 1. Marginal effect FDI on growth contingent with financial indicators base on percentile

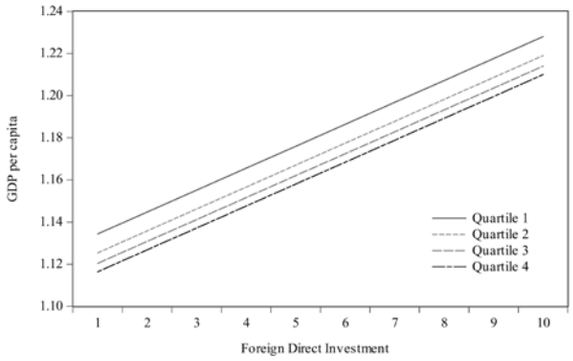

FIGURE 2. FDI-growth based on the level of financial development

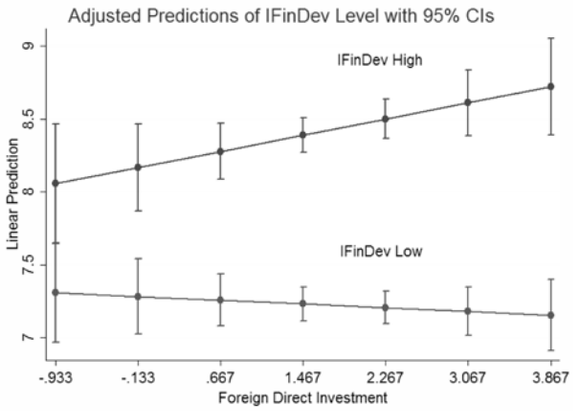

FIGURE 3. The marginal effect of FDI on growth contingent with the level of financial development

TABLE 4. The role of financial development in FDI-Growth nexus: Two-step system-GMM (Dependent Variable: GDP per capita)

Explanatory variable	Model 1a: DCPS	Model 1b: LL	Model 1c: PC	Model 1d: IFinDev	Model 2a: DCPS	Model 2b: LL	Model 2c: PC	Model 2d: IFinDev
GDPPC (-1)	0.987***	0.985***	0.990***	0.996***	0.986***	1.000***	0.990***	0.991***
INF	-0.016***	-0.016***	-0.020***	-0.020***	-0.044***	-0.033***	-0.022***	-0.025***
CF	0.031***	0.048***	0.024***	0.030***	0.041***	0.036***	0.052***	0.057***
HC	0.006***	0.006***	0.006***	0.002**	0.007**	0.001	0.006***	0.003***
FDI	0.002*	0.001	0.000	0.007***	-0.032***	-0.020*	-0.024***	-0.121***
DCPS	0.007***	-	-	-	-0.001	-	-	-
LL	-	0.003	-	-	-	-0.021**	-	-
PC	-	-	0.005***	-	-	-	-0.017***	-
IFinDev	-	-	-	0.001	-	-	-	-0.074***
FDI DCPS	-	-	-	-	0.007**	-	-	-
FDI LL	-	-	-	-	-	0.006*	-	-
FDI PC	-	-	-	-	-	-	0.006***	-
FDI IFinDev	-	-	-	-	-	-	-	0.026***
Constant	0.066***	0.042*	0.093***	0.040	0.212***	0.147***	0.098***	0.369***
AR(1) (p-value)	0.342	0.314	0.339	0.315	0.330	0.330	0.320	0.290
AR(2) (p-value)	0.205	0.217	0.201	0.191	0.233	0.203	0.217	0.233
J-test (p-value)	0.459	0.316	0.601	0.213	0.648	0.079	0.575	0.262
No. of groups	65	65	65	65	65	65	65	65
No. of instruments	61	55	63	62	43	38	63	57
Threshold value					4.571	3.333	3.500	4.654
Marginal effect:								
Minimum	-	-	-	-	-0.022*	-0.009	-0.018***	-0.007***
Mean	-	-	-	-	-0.006	0.001	-0.002	0.002**
Maximum	-	-	-	-	0.006	0.010	0.008	0.008***

Notes: The estimation of GMM use xtabond2 in STATA 14.
***, ** and * denotes significant level at 1%, 5% and 10%, respectively.
Standard error as proposed by Brambor et al. (2006) is used to calculate the t-statistic for marginal effect. Covariance matrix of coefficients are available upon request.

TABLE 5. The role of financial development in FDI-Growth nexus in different models (Dependent Variable: GDP): Two-step system-GMM

Explanatory variable	Without interaction	With interaction	Interaction with dummy variable	Splitting sample	
				High IFinDev (Quartile 1 & 2)	Low IFinDev (Quartile 3 & 4)
GDPPC (-1)	0.996***	0.991***	0.995***	0.974***	0.997***
INF	-0.022**	-0.025***	-0.020***	-0.064***	-0.033**
FCAPITAL	0.040***	0.057***	0.025***	0.071***	0.093***
HC	0.000	0.003***	-0.001	0.004*	-0.026***
FDI	-0.005	-0.121***	-0.004*	0.005**	-0.011*
IFinDev	-0.022	-0.074***	-0.005	-	-
FDI IFinDev	-	0.026***	-	-	-
FDI – Quartile 1	-	-	0.018***	-	-
FDI – Quartile 2	-	-	0.009***	-	-
FDI – Quartile 3	-	-	0.004**	-	-
Constant	0.157*	0.369***	2.185***	0.302***	-0.020
F-test (p-value)	0.000	0.000	0.000	0.000	0.000
Hansen J-test (p-value)	0.629	0.262	0.480	0.251	0.464
AR(1) (p-value)	0.283	0.290	0.337	0.009	0.710
AR(2) (p-value)	0.235	0.233	0.192	0.447	0.233
No. of groups	65	65	65	32	33
No. of instruments	29	57	63	27	28

Note: ***, ** and * denotes significant level at 1%, 5% and 10%, respectively.

Increase in financial development leads to economic growth gains as accruing benefits from FDI, which function as an absorptive capacity. FDI performance based on the difference of financial development level is illustrated in Figure 2. Different intercept indicates the efficiency of financial development at different level. The intercept of Quartile 1 measured by financial development index is on the top level followed by Quartile 2, Quartile 3 and Quartile 4. This trend indicates that the higher level of financial development is able to accelerate economic growth by FDI thus supporting the 'more finance, more growth' proposition as pointed out by Levine (2003). Figure 3 displays the fitted value of marginal effect of FDI on economic growth contingent to the level of financial development within the range of 95% confidence interval. The Delta-method standard error is used to evaluate the significance level of the marginal effect of estimated fitted value[4]. Interestingly, the marginal effect of IFinDev High has positive slope while IFinDev Low is negative. The effect of FDI on growth contingent with high and low of financial development is commensurate with the results on splitting sample as reported in Table 5. The different trend of these two groups lead the possibility of nonlinear effect of V-shaped in FDI-finance-growth relationship, which contrast with the findings by Iamsiraroj and Ulubaşoğlu (2015) who found that FDI has negative effect on growth after financial development exceeded the threshold level.

MANAGERIAL IMPLICATION

The findings of this study may have important policy implications. Developing countries believe that FDI can contribute to the economic development efforts of the host country. Since it is clearly evident that financial development significantly enhances FDI's ability to boost the economic growth, policy makers should therefore counsel for expanding financial depth with tightening financial control to sustain the benefits of finance. Our findings supports the 'more finance, more growth' proposition as suggested by Levine (2003) regarding the utilization of benefits in financial sector on FDI-growth as opposed to the hypothesis of 'too much finance harm economic growth' as highlighted by Arcand et al. (2015) and Law and Singh (2014). Therefore, policy makers should not increase restriction on lending and borrowing to private sector by limiting the expansion of financial allocation according to the 'too much finance harm economic growth' proposition.

The policy of financial incentives is thus necessary to attract FDI on "cost of doing business" and in improving local business environment (see UNCTAD 1999). FDI also benefits economic growth through technology spillovers, but local conditions in the host countries can limit the extent to which its benefits can be materialized. Hence, financial development can play a role as mechanism in facilitating adoption of new technologies in the host countries. The provision of efficient credit and financial services by the financial system may thus greatly facilitate technology transfer and induce spillover efficiency. An appropriate financial sector reforms after 2008 global financial crisis may help to fulfill this objective. More prudent policies for local firms need to be designed to eliminate barriers to domestic firms in the role of 'forward' and 'backward' linkages; thus improving their access to inputs, technology and financing, establishing adequate linkages, and streamlining the procedures associated with selling inputs. The investment policy should bring together the types of parties with complementary interests: firm seeking opportunities and countries seeking investors (UNCTAD 2015a).

Developing countries should enhance the level of financial development to facilitate FDI boosting on economic growth. Since financial sector conditions can either limit or expand the potential benefits from investment policy makers; therefore they need to design the appropriate policy to expand the amount of financial resources with control and monitoring the financial activities to avoid the effect of 'too much finance' hypothesis as highlighted in previous study (see Arcand et al. 2015). It is vital for developing countries to revise the financial policy to enhance the level of financial development as well as increase the quality of financial sector. The 2008 global financial crisis has led many countries to tighten the regulation of banks (Niemeyer 2016). For example, compliance of regulatory framework was suggested in Basel III to monitor the liquidity risk to ensure the capability of banking sector to provide sources of funding. The strength of financial resources may represent the size of the economy, thus providing attraction to investors looking for 'market-seeking' and 'asset-seeking' to survive the day to day of doing business. At the administrative level, through appropriate implementation and institutional mechanisms, policy makers can ensure the continued relevance and effectiveness of financial and investment policies.

This study also suggests that the financial development index is a better measurement for financial development than the financial components itself. For example, IFinDev measurement results in the highest coefficient in interaction model (Model 2d) and is also statistically significant at 1 percent level in evaluating the marginal effect. Although three components were used, a procedure of calculation approach in constructing the financial development index is important. This approach also can be used for academicians and researchers for future research. In term of data structure, balance panel data used in this study provides better estimation. As such, data transformation into natural logarithm form with conditional positive values has been solved by using an inverse hyperbolic sine (IHS) as formulated by Johnson (1949) and proposed by Burbidge, Magee and Robb (1988) to transform negative values into positive ones. As pointed out by Alfaro et al. (2004), the quality of data is one of the reasons of mixed finding in FDI-growth relationship. The

different periods of data sampling may lead to different results. For example, a study which spanned a period of economic crises suggests that more finance will dampen economic growth (see Arcand et al. 2015; Law & Singh 2014; Samargandi et al. 2015), while a study without economic crises prove otherwise when more finance stimulates more economic growth as shown in present study. In addition, marginal effect is important when we are dealing with the interaction model because there is no direct translation on interpreting the results by using coefficient by itself. The discussion aforementioned is an important consideration in conducting future research.

CONCLUSION

This study examines the impact of FDI on economic growth through financial development among 65 selected developing countries. Panel data were used by pooling the time series and cross-sectional data. The use of panel data is appropriate since we can increase the data points and the degree of freedom, thereby providing the most robust estimation. The result from GMM estimator demonstrated that FDI inflow has a negative and significant relationship on economic growth. However, FDI becomes a positively significant relationship with economic growth if interacted with financial development and the results are consistent among financial indicators and IFinDev. Empirical evidence in the present study advocates that FDI plays an important role in contributing to economic growth contingent with the level of financial development. The higher the level of financial development, the higher the FDI can promote economic growth (see Figure 2). We can conclude that FDI can accelerate economic growth, depending on the level of financial development. The aforementioned results support the 'more finance, more growth' proposition (Levine 2003) against the 'too much finance harm growth' hypothesis as highlighted by Arcand et al. (2015), Checetti and Kharroubi (2012), Law and Singh (2014), and Sarmargandi et al. (2015), which influence the negative effect of FDI on growth after surpassed the threshold point of financial development (Iamsiraroj & Ulubaşoğlu 2015). Developing countries therefore need higher financial development as precondition to elicit better FDI performance in boosting economic growth.

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ENDNOTES

1 Data transformation into natural logarithm is not workable for negative value. This study uses the transformation of negative value in FDI inflow data formulated by Johnson (1949) as a precondition and avoid missing value when the data is transformed into natural logarithm, which not being addressed in previous study. Therefore, we have to transform the negative value data to positive value before proceeded the natural logarithm transformation by using IHS by Johnson's (1949) formula, $y = x + \sqrt{x^2 + 1}$.

2 To evaluate the marginal effect of FDI on the economic growth depends on the values of financial development, we compute the standard error as proposed by Brambor et al. (2006). This formula enable us to substitute the values in various level, i.e., minimum, 10 percentile until maximum. The value for each percentile are available upon request.

3 Post-estimation specification test in GMM would expect first order serial correlation, i.e.

$$E[(\Delta\varepsilon_{i,t}\Delta\varepsilon_{i,t-1})] = [(\varepsilon_{i,t} - \varepsilon_{i,t-1})(\varepsilon_{i,t-1} - \varepsilon_{i,t-2})] = E[\varepsilon^2_{i,t-1}] = -\sigma^2_s$$

But second order serial correlation would not expected, i.e.

$$E[(\Delta\varepsilon_{i,t}\Delta\varepsilon_{i,t-1})] = [(\varepsilon_{i,t} - \varepsilon_{i,t-1})(\varepsilon_{i,t-1} - \varepsilon_{i,t-2})] = 0$$

Thus, the presence of second order serial correlation indicates a specification error.

4 Marginal effect as demonstrated in Figure 3 applied the delta method standard error by using marginsplot in STATA 14. However, it marginal only restrict on mean value.

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