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Chapter

Nonlinear Effect of Financial Development and Foreign Direct Investment in Integration Economies Among ASEAN-5 Countries Following IFRS Adoption

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Abstract

This chapter examines the role of financial development on foreign direct investment (FDI) inflows in ASEAN-5 countries over the period of 1980–2017. The ASEAN-5 countries include Malaysia, Thailand, Indonesia, Singapore, and the Philippines. The panel cointegration of second generation is used in order to address the existence of economic integration among ASEAN-5 as proven in cross-sectional dependency test. The results from fully modified ordinary least square (FMOLS) and cross-sectional dependency autoregressive distributed lag (CS-ARDL) consistently shows that the financial development has a nonlinear relationship with FDI of U-shape, whereby the financial development will benefit the FDI after it beyond the threshold point at 70% of total GDP. Investors will make decision based on the financial status as shown in the financial accounting report, whereby the quality of financial accounting representing transparent information that leads on reducing asymmetric information between investor and the financial institutions in host countries. In addition, the causality analysis based on panel vector error correction model (VECM) confirms the presence of both long-run relationship and short-run dynamic among FDI, financial development, consumer price index, and real gross domestic product per capita.

Keywords: foreign direct investment, financial development, cross-sectional dependence, nonlinear, financial information quality

1. Introduction

Following the financial liberalization attempted, especially during the 1980s, foreign direct investment (FDI) has being as more important catalyst for accelerating the economic growth. The economic activities are integrated during the transition economies among developing countries as well as ASEAN-5 countries. The formation of ASEAN Economic Community (AEC) at the Ninth ASEAN Summit in

October 2003 represented an important milestone in ASEAN economic cooperation. It stimulates FDI inflows by reducing business costs associated with multinational activities in the ASEAN region that has always been a primary objective of the economic cooperation. Strengthening the financial sector with remaining stable economic condition may establish an attractive business environment for multinational firms to invest in the ASEAN-5 countries.

The trend of FDI inflows in ASEAN-5 countries fluctuate from year 1980 to 2017 as shown in **Figure 1**. There is high volatility in FDI inflows after the Asian financial crisis in 1997–1998 that leads FDI inflows dropped for Singapore, Malaysia and Indonesia, but increased for Philippines and Thailand. While Malaysia and Philippines drop in 2001 in another event of crisis, that is, bubble.com, but the FDI inflows to Singapore, Thailand and Indonesia are increased. The trend of FDI inflows among ASEAN-5 countries are however increases following AEC formation in 2003. The trend of FDI inflows dropped after the global financial crisis in 2007–2008, which affected ASEAN-5 countries, but its effects are delayed for Malaysia and Indonesia. Fluctuation of FDI inflows may reliance on the uncertainty of its enabler such as financial development in ASEAN-5 countries.

To materialize the benefit of FDI, thus, the role of financial development was found as an enabler of the FDI performance. There are five major functions of a financial system: producing information and allocating capital; monitoring firms and implementing corporate governance; meliorating risk; pooling the savings; and easing exchange [1]. These functions contribute to the stimulation of economic growth. Thus, the financial institutions and financial markets can exert a strong influence on economic development, where the incremental of economic growth enabling the FDI to perform better. Financial development is discovered as assistance to the FDI especially in technology transfer that needed more capital to funding the technology expenses.

It is important to consider the effect of financial development on FDI inflows are influenced by the quality of financial information. The investors would review the financial strength via the bank's financial report in the host countries. A quality of financial reporting relies on regulatory accounting standards through the International Financial Reporting Standard (IFRS). In general, ASEAN-5 countries already

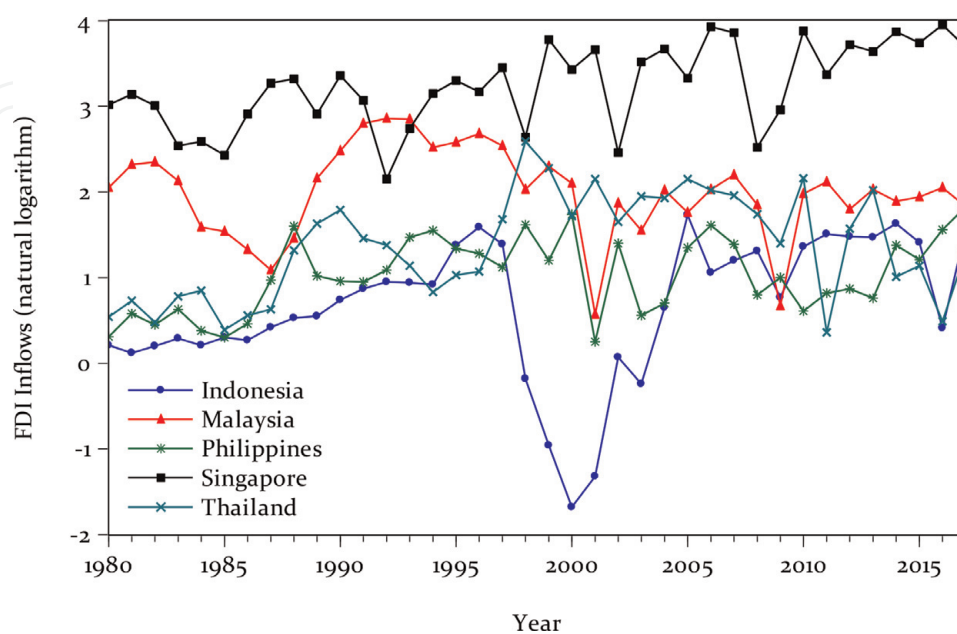


Figure 1. FDI inflows (% of GDP) in ASEAN-5 countries from 1980 to 2017. Source of data: UNCTAD website (Accessed on 9 March 2019).

complied the regulation starting from 2005 onwards. The effect of regulatory quality is found as an incentive for quality of accounting information that benefited to all stakeholders. Thus, improving the regulatory quality of financial reporting enhances transparency that reducing the asymmetric information between investors and the financial institution in host countries.

2. Literature review

Early theories of the determinants of FDI were encompassed in eclectic approach [2]. The key requirements for FDI as follows: the firm must possess stable specific advantages; the firm must find it beneficial to utilize these advantages directly instead of selling or leasing them (so called as internalization advantages); and the firm must find it profitable to combine these advantages with at least one factor input abroad (so that local production dominates exporting or locational advantages). These advantages include proximity to markets, specialized suppliers, evasion of protective barriers, and factor endowment advantages.

Financial development is found as one of the significant determinants of FDI [3, 4]. The financial markets are measured by the domestic credit provided by banks and domestic credit provided to the private sector as a percentage of GDP [5]. Domestic credit to the private sector refers to the financial resources provided to private sector through loans, purchases of non-equity securities, and trade credits and other receivable accounts. Meanwhile, the domestic credit provided by banks is nonguaranteed long-term commercial bank loans from private banks and other private financial institutions. The other measurement financial development is financial freedom as a catalyst for FDI inflows. Financial freedom is a measurement of banking security as well as independence from government control. The state ownership of banks and other financial institutions is seen as an inefficient burden, and political favoritism has no place in a free capital market [6]. Thus, the financial information quality also affected the investment efficiency because the investors need the information of financial health in the particular host countries [7].

Financial development, as better accounting and disclosure rules and better corporate governance, reduces the spread between domestic and foreign cost of capital [8]. It requires a sound financial reporting system that produces reliable and transparent accounting information for both domestic and foreign investors [9, 10]. Lack of financial reporting systems credibility is likely to have adverse effects on the ability of particular countries to attract foreign investments, because it retards the equity markets development [11]. In fact, the effect of financial development on economic growth, which enhances FDI inflows, is contingent the adoption of financial accounting quality by host countries [12].

The application of IFRS in host countries is considered a way to attract the FDI [13, 14]. IFRS leads to higher earnings quality and more foreign investment [15]. Furthermore, the short-run and long-run causality existed between IFRS adoption and FDI inflows [16]. The quality of financial reporting according to IFRS has potential to enhance transparency that reduces asymmetric information and cost for foreign investors [17]. IFRS adoption requires strong governance and internal controls within a bank to give confidence to the investors resulting in the quality financial information. The effect of regulatory quality is found as an incentive for quality of accounting information and compliance to the IFRS by firms. Hence, the financial statement act as organization's resume that indicate the strength of finance by banks in host countries. Quality of financial statement among banks in host countries will build good reputation that leads the confidence of decision maker from foreign firms. The information of financial development, that is, credit

market, through the financial reporting can reduce the asymmetric information that attracts the FDI inflows into the host countries.

The development of strong financial market can increase an economy's ability to absorb and efficiently manage FDI inflows and take advantage of potential FDI benefits [18]. Although recent studies discover that financial development influences FDI performance to be realized, the long run relationship between the variables including FDI, financial development and macroeconomic variables need adequately addressed in the field of study. This study is therefore attempting to contribute to the existing literature in the dimensions of nonlinearity and cross-sectional dependency dimensions. The investigation on the effects of financial development on the FDI inflows employs both linear and quadratic models in the estimations. Incorporating the cross-sectional dependency due to economic integration, financial openness, economic freedom and spillover effects among ASEAN-5 countries over the period 1980–2017, the panel cointegration for second generation is used and the long-run coefficient estimated by considering the cross-sectional dependence in this study.

3. Econometric model and data description

The effect of the financial development on foreign direct investment is investigated by using ASEAN-5 countries panel data with the econometric model specified as follows:

$$FDI_{it} = \beta_0 + \beta_1 FinDev_{it} + \beta' X_{it} + \omega_i + \varepsilon_{it} \quad (1)$$

where, the FDI in Eq. (1) represents foreign direct investment, and $FinDev$ indicating financial development. The domestic credit of private sector, liquid liabilities and private sector credit to deposit money are used as a proxy for financial development. Parameter X comprises with the vector of control variables: real gross domestic product per capita ($RGDPPC$) and consumer price index (CPI). The cross-sections are denoted by subscript i ($i = 1, 2, \dots, N$), the time period by subscript t ($t = 1, 2, \dots, T$), ω_i is the country fixed effect and ε is the stochastic random term.

Incorporating the nonlinear effect of financial development on FDI, Eq. (1) has been extended by using a quadratic specification as expressed in Eq. (2):

$$FDI_{it} = \alpha_0 + \alpha_1 FinDev_{it} + \alpha_2 FinDev_{it}^2 + \alpha' X_{it} + \theta_i + \mu_{it} \quad (2)$$

where $FinDev_{it}^2$ is a square term for financial development that indicates the nonlinearity of the relationship between financial development and FDI inflows. The focal parameters in the quadratic model in Eq. (2) are α_1 and α_2 . If there exists a nonlinear relationship between financial development and FDI, an anti-Kuznets curve is anticipated since higher the financial development indicating the financial health that can assist the foreign entrepreneur and thus attracting the FDI inflows in ASEAN-5 countries. The anti-Kuznets curve is verified by significantly negative sign in parameter α_1 and significantly positive in α_2 . The threshold level is computed by first order derivation ($\delta FDI / \delta FinDev$). Based on the quadratic model in Eq. (2), the turning point of financial development can be calculated as $-\alpha_1 / 2\alpha_2$.

This study uses FDI inflows as the percentage of GDP. Real GDP per capita in constant of US dollar (US\$) is used to measure economic development. Domestic credit to private sector by banks as a percentage share of GDP ($DCPS$), liquid liabilities as a percentage of GDP (LL) and private credit to deposit money ($PCDM$) are used as proxies for financial development. Five countries have been selected

among the ASEAN countries including Malaysia, Thailand, Indonesia, Singapore, and the Philippines. The study covers 38 years for the period of 1980–2017. The sources of the data are World Development Indicators, UNCTAD Database and Financial Structure Dataset.

The last few decades, the ASEAN-5 economies have witnessed an increasing economic freedom and financial integration implies a strong interdependence between these countries. To measure the existence of economic integration among ASEAN-5 countries, the cross-sectional dependency (CD) test is used for all variables [9]. The existence of cross-sectional dependency among ASEAN-5 countries are proven in **Table 1** indicated by the p-value of CD statistics which are lower than 0.01 for all variables that against the null hypotheses of cross-sectional independence among countries, $CD \sim N(0,1)$. Consumer price index is the highest absolute correlation among ASEAN-5 countries at 0.976, means the changes of price of one country closely affected price the other countries. Meanwhile, liquid liabilities are the highest absolute correlation in ASEAN-5 region among other proxies for financial development. This may involve the integrated economic process especially when the countries are neighbors. Furthermore, the cross-sectional dependence can arise for several reasons, such as spatial spillovers, financial contagion, and socioeconomic interactions [19].

Table 2 shows the descriptive statistics of the variables. Jarque-Bera for normality test shows that all variables are not normally distributed. The median for

Variable	CD test	Breusch-Pagan LM test	Absolute correlation
Foreign direct investment inflows	2.833***	17.103*	0.193
Domestic credit to private sector	10.776***	134.678***	0.553
Liquid liabilities	15.234***	239.532***	0.781
Private credit by deposit money	11.116***	146.326***	0.570
Real GDP per capita	17.571***	313.179***	0.901
Consumer Price Index	19.020***	361.854***	0.976

***Significant at 1% level.

*Significant at 10% level.

Table 1.
 Result of cross-sectional dependency test for ASEAN-5 countries.

	FDI	DCPS	LL	PCDM	RGDPPC	CPI
Minimum	-2.583	9.681	10.400	6.490	1230.840	5.554
25% quantile	0.979	34.884	39.500	33.940	1880.193	46.614
Median	2.269	75.908	72.295	74.725	3571.915	71.617
75% quantile	5.058	106.363	105.290	102.210	8635.566	95.117
Maximum	26.084	166.504	136.63	163.210	55,235.500	142.182
St. deviation	5.841	40.852	35.270	40.304	13,085.87	32.874
Skewness	1.997	0.230	0.062	0.193	2.066	-0.248
Kurtosis	6.389	1.875	1.733	1.782	6.224	2.237
Jarque-Bera	217.175	11.701	12.827	12.924	217.441	6.566
Probability	0.000	0.003	0.002	0.002	0.000	0.038

Table 2.
 Descriptive statistics of variables.

Variables	FDI	DCPS	LL	PCDM	RGDPPC	CPI
FDI	1.000					
DCPS	0.622***	1.000				
LL	0.620***	0.889***	1.000			
PCDM	0.651***	0.981***	0.901***	1.00		
RGDPPC	0.839***	0.665***	0.687***	0.700***	1.00	
CPI	0.489***	0.568***	0.764***	0.613***	0.551***	1.00

***Significant at 1% level.

Table 3.
Correlations of variables.

DCPS, LL and PCDM is 76, 72 and 75%, respectively indicating the small differences between all proxies. The kurtosis of FDI is the highest at 6.389 indicating the fluctuation of FDI as compared to other variables. The correlation matrix presented in **Table 3** reveals that the variables are positive correlated among other with more than 0.5. The highest correlation between DCPS and PCDM is at 0.981 since both variables are the proxies of same variable of financial development.

Table 4 presents the mean of all variables of each country in the ASEAN-5 economies. As shown in this table, there is a considerable variation in RGDPPC across these countries, ranging from as low as US\$2332.82 for Indonesia to as high as US\$32,385.13 for Singapore. The mean of financial development demonstrates that Malaysia is consistently the highest for DCPS and LL, but Singapore is the highest in PCDM.

Each country in ASEAN-5 region has different starting date on complying IFRS in accordance with IFRS Foundation's Jurisdictional Profiles as shown in **Table 5**. Philippines is the earliest country adopting IFRS since 2005, while Malaysia is most recent among others. In addition, **Table 6** shows the different scores for each

Country	FDI	DCPS	LL	PCDM	RGDPPC	CPI
Malaysia	4.08	106.60	107.67	95.93	6757.70	77.30
Indonesia	0.86	32.42	31.07	25.53	2332.82	51.41
Thailand	2.18	102.20	83.29	97.29	3566.14	72.54
Singapore	14.20	95.26	95.80	99.92	32,385.13	84.84
Philippines	1.34	31.72	44.63	31.88	1801.00	59.97

Table 4.
Mean of variables over 1980–2017 for each country.

ASEAN-5 countries	Year of IFRS adoption
Malaysia	2012
Indonesia	Has not adopted (public commitment in support of moving towards IFRS from 2012)
Thailand	2011
Singapore	2010
Philippines	2005

Source: Yousefinejad et al. [16].

Table 5.
The IFRS adoption date of ASEAN countries.

Score	Characteristics of IFRS adoption	Malaysia	Indonesia	Thailand	Singapore	Philippines
1	Has the jurisdiction made a public commitment in support of moving towards a single set of high-quality global accounting standards?	1	1	1	1	1
2	Has the jurisdiction made a public commitment towards IFRS Standards as that single set of high-quality global accounting standards?	1	1	1	1	1
3	For domestic companies are IFRS Standards required or permitted?	1	0	0	1	1
4	Are IFRS Standards also required or permitted for more than the consolidated financial statements of companies whose securities trade in a public market?	1	0	0	1	1
5	Are all or some foreign companies whose securities trade in a public market either required or permitted to use IFRS Standards in their consolidated financial statements?	1	0	1	1	1
6	Are IFRS Standards incorporated into law or regulations?	1	0	0	0	1
7	Has the jurisdiction adopted the IFRS for SMEs Standard for at least some SMEs?	1	0	0	1	1
Total		7	2	3	6	7

Source: Yousefinejad et al. [16].

Table 6.
IFRS adoption scores.

country. The score was constructed based on IFRS Foundation's Jurisdictional Profiles. Malaysia and the Philippines achieved full scores based on the characteristics that has been constructed. Although Indonesia has not adopted IFRS, however, this country has a score of 2 because it has made a public commitment in support of moving towards a set of high-quality global accounting. Hence, ASEAN-5 countries have financial information quality following IFRS on presenting the financial position for each country. The quality of financial reporting and financial development soundness would lead better decision among foreign investors.

4. Methodology

The flow of methodology started with the panel unit root test with cross-sectional dependency to ensure the variables are integrated at first difference before proceed with cointegration test of panel cointegration second-generation. Since the existence of cross-sectional dependency among ASEAN-5 countries, hence, this study considers the using Westerlund's cointegration test as the second-generation of panel cointegration. In addition, the fully modifies ordinary least square

(FMOLS) and cross-sectional dependency autoregressive distributed lag (CS-ARDL) are used to estimate the long run coefficient in the specification. FMOLS estimator is used to overcome the endogeneity and heterogeneity problem. Meanwhile, the cross-sectional dependency needs to take into account in the estimation by using CS-ARDL. The causality test by using panel vector error correction model (VECM) is used to investigate the direction of causality among the variables.

4.1 Panel unit root test

The panel unit root test of second-generation is used in order to incorporate the cross-sectional dependency. For the case of ASEAN-5 countries, the common stochastic trends may occur due to global developments and strong relationships between economies. The heterogeneous panel unit root test with cross-sectional dependence is employed for clarity [20]. The standard Dickey-Fuller (DF) or augmented Dickey-Fuller (ADF) regressions are augmented with the cross-section averages of lagged levels (x_{it-1}) and first-differences (Δx_{it-1}) of the individual series to eliminate cross-sectional dependence. Hence, the cross-sectional dependence ADF (CADF) test [20] expressed as follows:

$$\Delta x_{it} = \alpha_i + \rho x_{it-1} + v_{it} \quad (3)$$

where, $v_{it} = g_i \theta_t + \mu_{it} \cdot \theta_t$ is a common factor and is white noise.

The CADF model is given by, without the autocorrelation of μ_{it} can be written as follows:

$$\Delta x_{it} = \alpha_i + \rho x_{it} + c_i \bar{x}_{t-1} + d_i \Delta \bar{x}_{t-1} + \varepsilon_{it} \quad (4)$$

The cross-sectionally augmented Im, Pesaran and Shin (IPS) or CIPS [20] is given by:

$$CIPS(N, T) = \frac{1}{N} \sum_{i=1}^q t_i(N, T) \quad (5)$$

where t_i indicates the statistics from each CADF model for each individual i of the panel and significance level based on the critical value (see [20]). If the p-value of CIPS statistics is lower than 0.05 indicating the null hypothesis of non-stationary of the variables is rejected.

4.2 Panel cointegration test

The second-generation panel cointegration test with cross-sectional dependence has four error-correction-based tests, which allows for large degree of heterogeneity in both long-run cointegration and short-run dynamics [21]. The presence of cointegration is tested by determining whether or not the existence of error-correction for individual panel of also the panel as a whole. Transforming Eq. (1) to the error-correction model can be expressed as follows:

$$\begin{aligned} \Delta \ln FDI_{it} = & c_{1j} + \varphi_{i1} \sum_{j=1}^p \Delta \ln FDI_{it-j} + \varphi_{i2} \sum_{j=0}^p \Delta \ln FinDev_{it-j} + \varphi'_i \sum_{j=0}^p \Delta X_{it-j} \\ & + \theta_i [\beta_{1i} (\ln FDI_{it-1}) - \beta_{2i} (\ln FinDev_{it-1}) - \beta'_i (X_{it-1})] + \varepsilon_{it} \end{aligned} \quad (6)$$

where θ_i measures the speed of error-correction towards the long-run equilibrium, $FDI_{it} = -(\varphi_i/\theta_i) \times x_{it}$ for the series i . The null hypothesis, $H_0 : \theta_i = 0$ for all i

versus $H_1: \theta_i < 0$ for at least one i for the G_α and G_τ statistic tests. If H_0 is rejected, it means that cointegration exists for at least one of the cross-sectional units. Meanwhile, the P_α and P_τ test statistics pooled the information over all the cross-sectional units to test $H_0: \theta_i = 0$ for all i versus $H_1: \theta_i < 0$ for all i . The rejection of H_0 indicating the evidence of cointegration for the panel as a whole.

4.3 Long-run estimation

The long-run coefficient estimation is proceeded if the evidence of cointegration among the variables is proven. Fully modified ordinary least square (FMOLS) estimator is used to estimate the long-run coefficient for financial development and FDI inflows relationship. The long-run coefficients are further estimates by using cross-sectional dependency autoregressive distributed lag (CS-ARDL) in order to considering the element of cross-sectional dependency among ASEAN-5 countries for robustness.

4.3.1 Fully modified ordinary least square (FMOLS)

The FMOLS estimator allows for cross-sectional heterogeneity in the alternative hypothesis. The endogeneity and serial correlation problems are allowing in the FMOLS long-run coefficients estimation in order to obtain consistent and asymptotically unbiased estimates of the cointegrating vectors [22, 23]. The definition of in FMOLS estimator can be expressed as follows:

$$\hat{\beta} = N^{-1} \sum_{i=1}^N \left[\sum_{t=1}^T (X_{it} - \bar{X}_1)^2 \right]^{-1} \left[\sum_{t=1}^T (X_{it} - \bar{X}_1) Y_{it}^* - T \hat{\tau}_i \right] \quad (7)$$

where, $Y_{it}^* = (Y_{it} - \bar{Y}) - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} \Delta X_{it}$, $\hat{\tau}_i \equiv \hat{\Gamma}_{21i} + \hat{\Omega}_{21i}^0 - \frac{\hat{L}_{21i}}{\hat{L}_{22i}} (\hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^0)$ and \hat{L}_i is a lower triangular decomposition of $\hat{\Omega}_i$. The associated t-statistic is assumed to be normally distributed and given by:

$$t_{\hat{\beta}^*} = N^{-1/2} \sum_{i=1}^N t_{\hat{\beta}^*, i}; \text{ where } t_{\hat{\beta}^*, i} = \left(\hat{\beta}_i^* - \beta_0 \right) \left[\hat{\Omega}_{11i}^{-1} \sum_{t=1}^T (X_{it} - \bar{X})^2 \right]^{1/2} \quad (8)$$

The long-run relationship between financial development and FDI inflows is measured by the coefficient ($\hat{\beta}$) from FMOLS estimator.

4.3.2 Cross-sectional dependency autoregressive distributed lag (CS-ARDL)

Cross-sectional dependency autoregressive distributed lag (CS-ARDL) estimator is used for robustness that allows for cross-sectional dependency among ASEAN-5 countries in the alternative hypothesis. The dataset shows cross-sectional dependency existed for all variables (refer to **Table 1**), which might be due to integrational economies among neighbor countries in ASEAN-5. This element needs to consider in estimating the long-run coefficient by using CS-ARDL estimator [24]. The baseline model for generic ARDL (p, q) can be expressed as follows:

$$\bar{y}_{i,t} = \sum_{k=1}^p \varphi_{i,k} \bar{y}_{i,t-k} + \sum_{l=0}^q \beta'_{i,l} \bar{x}_{i,t-1} + u_{i,t} \quad (9)$$

while its cointegrating form would be:

$$y_{i,t} = \theta_i x_{i,t} + \alpha'_i(L) \Delta x_{it} + \tilde{u}_{i,t} \quad (10)$$

In CS-ARDL, Eq. (9), the errors (u) is postulated a common unobserved factor structure for the errors. It can be written as:

$$u_{i,t} = \gamma'_i F_t + \varepsilon_{i,t} \quad (11)$$

CS-ARDL is an augmented model from generic ARDL (p,q) by averaging cross-sectional of the dependent and explanatory variables, as well as their lags, which are supposed to proxy for the unobserved common factors.

4.4 Panel vector error-correction model

The panel Granger causality in the framework of the panel VECM is employed to analyze the direction of the causal effect among FDI, financial development and the control variables, CPI and GDP per capita. The long-run model specified in Eq. (1) is estimated by using FMOLS to obtain the estimated residual, followed by Granger causality model estimation based on the error-correction model as follows:

$$\begin{aligned} \Delta \ln FDI_{it} = & \alpha_{1i} + \sum_{k=1}^m \lambda_{11ik} \Delta \ln FDI_{i,t-k} + \sum_{k=1}^m \lambda_{12ik} \Delta \ln FinDev_{i,t-k} \\ & + \sum_{k=1}^m \lambda_{13ik} \Delta \ln RGDPPC_{i,t-k} + \sum_{k=1}^m \lambda_{14ik} \Delta \ln CPI_{i,t-k} + \phi_{1i} EC_{i,t-1} + \mu_{1it} \end{aligned} \quad (12)$$

$$\begin{aligned} \Delta \ln FinDev_{it} = & \alpha_{2i} + \sum_{k=1}^m \lambda_{21ik} \Delta \ln FinDev_{i,t-k} + \sum_{k=1}^m \lambda_{22ik} \Delta \ln FDI_{i,t-k} \\ & + \sum_{k=1}^m \lambda_{23ik} \Delta \ln RGDPPC_{i,t-k} + \sum_{k=1}^m \lambda_{24ik} \Delta \ln CPI_{i,t-k} + \phi_{2i} EC_{i,t-1} + \mu_{2it} \end{aligned} \quad (13)$$

$$\begin{aligned} \Delta \ln RGDPPC_{it} = & \alpha_{3i} + \sum_{k=1}^m \lambda_{31ik} \Delta \ln RGDPPC_{i,t-k} + \sum_{k=1}^m \lambda_{32ik} \Delta \ln FinDev_{i,t-k} \\ & + \sum_{k=1}^m \lambda_{33ik} \Delta \ln FDI_{i,t-k} + \sum_{k=1}^m \lambda_{34ik} \Delta \ln CPI_{i,t-k} + \phi_{3i} EC_{i,t-1} + \mu_{3it} \end{aligned} \quad (14)$$

$$\begin{aligned} \Delta \ln CPI_{it} = & \alpha_{4i} + \sum_{k=1}^m \lambda_{41ik} \Delta \ln CPI_{i,t-k} + \sum_{k=1}^m \lambda_{42ik} \Delta \ln FinDev_{i,t-k} \\ & + \sum_{k=1}^m \lambda_{43ik} \Delta \ln RGDPPC_{i,t-k} + \sum_{k=1}^m \lambda_{44ik} \Delta \ln FDI_{i,t-k} + \phi_{4i} EC_{i,t-1} + \mu_{4it} \end{aligned} \quad (15)$$

where, EC is error-correction term comes from the FMOLS estimation, and m is the lag length. The short-run causality is determined by the statistical significance of the F -statistic associated with the corresponding right hand side variables. The presence or absence of long-run causality can be established by examining the significance of the t -statistic on the coefficient ϕ , in Eqs. (12)–(15).

5. Empirical findings

The result of the second-generation panel unit root for the option of with and without trend are presented in **Table 7**. The panel unit root of CIPS using one lag order due to parsimony principle. The null hypothesis of non-stationary is fail to rejected in level in lag 1 ($q = 1$) for both variables option without trend (Z_α) and with trend (Z_τ), but rejected in first difference indicating that all series are integrated of order one or $I(1)$ for the panel of ASEAN-5 countries.

Variable	Level				First difference			
	Z_α		Z_τ		Z_α		Z_τ	
	$q = 0$	$q = 1$	$q = 0$	$q = 1$	$q = 0$	$q = 1$	$q = 0$	$q = 1$
FDI	-4.0*	-1.5	-4.3*	-1.4	-10.0*	-8.3*	-9.7*	-7.5*
DCPS	-1.0	-1.0	0.6	0.5	-8.5*	-5.0*	-8.0*	-4.4*
LL	0.8	-0.8	0.9	-1.5	-4.6*	-5.1*	-3.6*	-4.3*
PCDM	-0.2	-2.0	1.9	-0.3	-3.7*	-4.0*	-3.7*	-3.4*
RGDPPC	2.2	1.0	4.4	3.1	-3.5*	-3.1*	-3.8*	-4.2*
CPI	1.0	-0.8	1.0	0.0	-5.5*	-3.7*	-4.7*	-3.2*

*Significant at 1% level.

Table 7.
 Second-generation panel unit root test of CIPS.

	Model 1: FinDev = DCPS		Model 2: FinDev = LL		Model 3: FinDev = PCDM	
	Statistics	<i>p</i> -value	Statistics	<i>p</i> -value	Statistics	<i>p</i> -value
G_τ	-2.975***	0.003	-3.054***	0.002	-3.398***	0.000
G_α	-8.162	0.450	-9.576	0.264	-8.249	0.438
P_τ	-5.701**	0.018	-5.240**	0.040	-6.038***	0.009
P_α	-6.939	0.172	-7.178	0.152	-7.051	0.162

***Significant at 1% level.
 **Significant at 5% level.

Table 8.
 Second-generation panel cointegration results.

Since all variables are integrated of order one, the panel cointegration test is employed to measure the existence of long-run relationship in Eq. (1). The results of second-generation of panel cointegration presented in **Table 8**. The panel cointegration test shows that P_α and P_τ test statistics reject the null hypothesis of no cointegration at 1, 5 and 10% significance level for both models using DCPS and PCDM, for the specification without trend. The P_α and P_τ test statistics have the highest power and are the most robust to cross-sectional correlation [21]. Thus, the evidence from the second-generation panel cointegration test supports the presence of a cointegrating relationship among FDI, financial development, price and economic development in ASEAN-5 countries.

Due to the existence of cointegration among variables in the region, the FMOLS estimator is used to estimate the long-run equilibrium. **Table 9** reports that Model 1–3 estimates the linear and nonlinear relationship between financial development and FDI in the long-run, by using DCPS, LL and PCDM as a proxy for financial development, respectively. Long-run covariance estimates pre-whitening with lag 1, where the automatic bandwidth selection is based on Newey-West fixed bandwidth and Bartlett kernel. In the linear specification, the relationship between financial development and FDI are not significant in all models. However, in contrast, there is significant of nonlinear relationship between financial development and FDI. The nonlinear relationship between these variables is anti-Kuznets or U-shape curve, where α_1 the coefficient of financial development and α_2 the financial development square coefficient (Eq. (2)) is negative and positive,

	Linear model			Quadratic model		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
FinDev	0.21	0.07	0.03	-7.98*	-3.78	-8.46*
FinDev ²	—	—	—	0.93*	0.34	0.93*
RGDPPC	2.38***	1.92***	2.44***	2.57***	1.84***	2.69***
CPI	-2.22***	-1.58***	-2.11***	-2.80***	-2.05***	-2.29***
Threshold value (% of GDP)				73.00	—	94.48

DCPS is used as a proxy in Model 1, while PCDM in Model 2.
***Significant at 1% level.
*denotes significant at 10% level.

Table 9.
Panel FMOLS long-run estimation (dependent variable: FDI).

respectively. The U-shape curve indicating that the financial development exceeded the threshold level, its incremental will attract more FDI inflows.

The result show that the negative effect of low level of financial development below the threshold level, in general at 70% of GDP that portrays the financial illness in host country. Initially, the negative relationship associated with the under-developed financial sector that may discourage the investor's decision to invest to the host country for those investors who are preferring on resource-seeking and market-seeking. Low level in credit market will reduce the purchasing power of parity among the citizens, and as a result, the innovative products produced by foreign firms may become unmarketable or over-supplied in the host country.

In the other hand, the high financial development reflects high financial strength that might attracts the inflows of FDI that related to assist them to set-up new business in host country and survival in their day-to-day business. When the level of financial development that above the 70% of GDP threshold point, it influences the positive impact on FDI inflows. Specifically, based on the quadratic specification of Model 1 in **Table 7**, the financial development threshold point is 73% of GDP ($-7.98/(0.93(2))$), and Model 3 is 94.48% of GDP ($-8.46/(0.93(2))$). The result showed that the DCPS surpassed the threshold point at median value to accelerate inflows of FDI, while PCDM should beyond the 75% quantile. The nonlinear relationship between financial development and FDI in this study is however differed from those of previous studies which examined the linear relationship (see [25–27]). The U-shape curve commensurate with the argument that well-developed financial market benefited FDI in host country [28].

The result from FMOLS is however not considering the cross-sectional dependency among ASEAN-5 countries. The long-run coefficients are further estimated by using CS-ARDL for robustness check as shown in **Table 10**. Similar with **Table 9** previously, the relationship between financial development on FDI inflows are not significant by using linear specification for all models in short-run and long-run estimations as shown in **Table 10**. The relationship between financial development and FDI inflows is however absence in the short-run estimation. But the relationship is existed in quadratic model specification, but result shows that only Model 2 has significant U-shape relationship between LL and FDI inflows in the long-run. The relationship is significant only in the long-run due to time lag effect in materializing the benefit of FDI inflows influenced by financial development. The U-shape relationship indicates by the negative coefficient for $\hat{\alpha}_1$, and positive coefficient for $\hat{\alpha}_2$ (refer to Eq. (2)), which both coefficients are significant at 1% level. It means, when the level of liquid liabilities as a percentage of GDP beyond the

	Linear model			Quadratic model		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Short-run estimation						
FinDev	0.61	0.32	-0.11	10.36	-3.42	9.20
FinDev ²	—	—	—	-1.34	0.54	-1.27
RGDPPC	7.11***	5.39***	5.86***	10.02	5.73	4.89
CPI	2.69	2.85	2.98*	2.16	1.88	1.76
Long-run estimation						
FDI	-0.96***	-1.00***	-0.96***	-1.04***	-1.12***	-1.16***
FinDev	-0.05	-0.07	-0.53	1.33	-29.34***	-4.16
FinDev ²	—	—	—	-0.21	3.46***	0.38
RGDPPC	4.66**	2.37	3.93**	8.90	4.92	6.55
CPI	1.85	2.03	1.07	2.00	0.66	-0.73**
R ²	0.64	0.65	0.65	0.74	0.72	0.76
CD statistic	-3.91	-3.86	-3.60	-3.55	-3.91	-3.80
p-value	0.00	0.00	0.00	0.00	0.00	0.00
RMSE	0.37	0.36	0.36	0.33	0.34	0.31
Threshold value (% of GDP)				—	69.66	—

DCPS is used as a proxy in Model 1, while LL and PCDM in Model 2 and Model 3, respectively.
 ***denotes significant at 1% level.
 **denotes significant at 5% level.

Table 10.
 Cross-sectional dependence ARDL (CS-ARDL) estimation (dependent variable: FDI).

threshold point at median level, it will attract the FDI inflows to ASEAN-5 countries. Specifically, by considering the cross-sectional dependency among ASEAN-5 countries the liquid liabilities threshold point is 70% of GDP ($-29.34/(3.46(2))$) in long-run.

Although the more financial development can attract the FDI inflows, but the quality of financial reporting is important channel of its information for investors, since the ASEAN-5 countries are committed in complying IFRS rules. The information in financial reporting provided by firms and financial institution in host countries as a canal on presenting it financial position that leads better decision for foreign investors. The foreign investors may unable to make decision of lacking information on financial condition in host countries. A superior financial reporting system lowers the cost of capital and improves capital allocation efficiency [29]. The quality of financial reporting would lead to transparent and clear information that reducing asymmetric information between foreign investors and financial institutions in ASEAN-5 countries.

In further investigation, the causality between variables are tested by using Granger causality test based on VECM model as shown in **Table 11**. The lag length is based on Akaike information criterion. All models shown the negatively significant of error-correction term for the FDI equation, that suggesting the existence of long-run relationship when the FDI is dependent variable. Similarly, there are exists the long-run causality when financial development and CPI as a dependent variable for all models. The causality between financial development and FDI inflows is however occurred only in the long-run. As shown in **Table 11**, there is a unidirectional causal effect running from real GDP per capita to DCPS and PCDM, CPI to FDI, CPI

Dependent variable	Independent variables				ECT _{t-1}
	ΔFDI	$\Delta FinDev$	$\Delta RGDP$	ΔCPI	Coefficient (t-statistic)
Wald F-statistics					
Model 1: FinDev = DCPS					
ΔFDI	—	2.106	0.935	2.201	-0.136 ^{***} (-4.292)
$\Delta FinDev$	0.052	—	0.345	3.213	-0.016 ^{***} (-2.375)
$\Delta RGDP$	2.263	24.223 ^{***}	—	0.902	-0.001 (-0.55)
ΔCPI	17.821 ^{***}	23.688 ^{***}	4.793 [*]	—	-0.012 ^{***} (-4.064)
Model 2: FinDev = LL					
ΔFDI	—	0.331	1.021	1.871	-0.081 ^{***} (-3.921)
$\Delta FinDev$	4.542	—	0.726	0.996	-0.005 [*] (-1.923)
$\Delta RGDP$	2.929	3.101	—	1.827	-6.947 (-0.047)
ΔCPI	17.615 ^{***}	1.287	3.332	—	-0.010 ^{***} (-5.375)
Model 3: FinDev = PCDM					
ΔFDI	—	2.210	1.029	2.224	-0.084 ^{***} (-3.588)
$\Delta FinDev$	1.300	—	0.254	1.420	-0.011 ^{***} (-3.489)
$\Delta RGDP$	2.000	44.048 ^{***}	—	2.940	-0.001 (-0.342)
ΔCPI	14.846 ^{***}	9.414 ^{***}	4.079	—	-0.011 ^{***} (-5.106)

ECT is error-correction term.
^{***} Significant at 1% level.
^{*} Significant at 10% level.

Table 11.
Granger causality based on panel VECM estimation.

to DCPS and PCDM and CPI to real GDP per capita. The linkage is however broken between financial development-FDI nexus in short term. The error-correction terms presented in the last column of all models demonstrated that the burden of the short-run endogenous adjustment (in long-run trend) to bring the system back to its long-run equilibrium borne by the FDI, financial development and CPI equations.

6. Conclusion

The financial development, FDI, CPI and real GDP per capita is cointegrated by considering cross-sectional dependence. The relationship between the financial development and FDI in ASEAN-5 countries is found nonlinear of U-shape over the period from 1980 to 2017. Based on the findings from the quadratic model, financial development contributed towards promoting FDI after surpassed the threshold level at 70% of GDP or median score. It is important to understand how the financial development affects FDI. The results demonstrated that there exists cross-sectional dependence among ASEAN-5 countries which this supports the argument of geographic influence on financial integration as well as FDI inflows. Economic integration has a direct effect on internationalization by reducing transaction costs and partial information costs [30].

Financial integration among the ASEAN-5 countries strengthened financial development as well as ease transaction activities among the regional players [31]. The integration in the AEC Blueprint 2015 towards strengthening the financial institutions, enhance commitment in implementation and in monitoring and evaluation of finance. Since all ASEAN-5 countries are complying the financial accounting standards of IFRS (including Indonesia who committed to comply the IFRS), the quality of financial information is needed in order to monitor and evaluate the financial position. In addition, ASEAN seeks to achieve a well-integrated and smoothly functioning ASEAN region financial system, as well as the IFRS accounting standard, that characterized by more liberalized capital account regime and inter-linked capital markets. Strengthening financial integration as well as financial market infrastructure with the quality of financial reporting are therefore aimed at facilitating intra-ASEAN trade and investment by increasing the role of ASEAN indigenous banks. It also augmenting the integrated insurance and capital markets that leading to safe, cost-efficient and more connected regional economy. The attraction of FDI inflows is an important goal of the AEC and largely conditional to the success of the ASEAN-5 economies efforts.

Conflict of interest

This chapter has been declared as no conflict of interest.

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