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Article

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Original Article

The role of institutions at the nexus of logistic performance and foreign direct investment in Asia

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ABSTRACT

Foreign Direct Investment (FDI) plays an important part in the economic growth of developing Asia and logistics capability is a crucial factor in FDI location choice. Till today, research investigating Logistics Performance (LP) and FDI in Asia are still lacking and rather inconclusive and not standardised. Using a total of 31 Asian countries covering 2007 through 2017, the study critically investigates the impact of LP on FDI using static panel regression method. The results demonstrate that while LP significantly impact FDI, there is a threshold effect of institutional quality in the LP-FDI relationship. Specifically, this paper found that the impact of LP on FDI varies across the perceived level of institutional quality i.e., the effect is positive only before certain threshold level of institutional quality, after which the effect of LP on FDI is reversed. This finding suggests that the LP-FDI nexus is contingent on the perceived level of institutional quality, thus supporting the idea that innovations (i.e., creativity and flexibility embedded within a sound institutional framework) is potent in delivering long-run LP-FDI development in Asia.

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1. Introduction

A sizeable degree to attract investment is incorporated into the new economic policies of both developing and developed countries (UNCTAD, 2019). This is a far cry from the 50s and 60s when developing countries were suspicious of FDI and was regarded a threat to sovereignty when foreign companies set up manufacturing enclaves locally (Abbes, Mostéfa, Seghir, & Zakarya, 2014). However, when confronted with the globalisation of markets and monetary policies, an attitude change pervaded developing countries pushing them to embrace FDI (Jadhav, 2012). FDI is considered stable, less susceptible to financial crises, and generating funding opportunities without acquiring external debt and they also contribute to economic growth (Jadhav, 2012; Stehrer & Woerz, 2009; Tang & Tan, 2018; Wang, 2009). Therefore, FDI is welcomed and needed to support industrialisation, economic diversification and structural transformation of host countries (Adhikary, 2011; Bhavan, Xu, & Zhong, 2011).

However, with dwindling investments, attracting them is becoming competitive (UNCTAD, 2019). In this rivalry, Asia persisted as the largest global FDI recipient absorbing 39 per cent of global inward FDI in 2018, with a 33 per cent increase from 2017, and particularly in developing countries within Asia increased to US\$512 billion in 2018 or 3.9 percent based on UNCTAD's *World Investment Report 2019*. Simultaneously, growth rose in China, Hong Kong and Singapore. Moderately optimistic FDI flows forecasted for Asia in 2019 were attributed to continual efforts to improve the investment climate (UNCTAD, 2019). With the One Belt One Road (OBOR) initiatives underway and which will eventually involve 39 Asian countries (Chin & He, 2016), these can eventually further facilitate the trade and development and FDI of countries along this route.

FDI research and policies are popular because of the following reasons. First, the FDI data in transitioning countries are reliable as they were likely recorded and would accurately reflect economic performance. Second, foreign investors are outsiders and are not totally familiar with the host country. Therefore, host country information from FDI research would benefit potential investors (Brunetti, Kisunko, & Weder, 1997). Past literature in FDI shows mixed results offering conflicting arguments on the governance and inward FDI relationship (Yerrabati & Hawkes, 2016). This could be attributed to sectorial differences (Wang, 2009) and the various measurements, conceptual and methodological dissimilarities

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used across several studies (Yerrabati & Hawkes, 2016). The argument of one size cannot fit all countries (Curry, 2011) is convincing. This generates policy making uncertainty in attempting to create an investment climate attractive to foreign investors.

Logistics is a key priority in foreign trade, especially in the light of ongoing regional economic growth (Akbari & Ha, 2020). Some recent studies on FDI and logistics performance examine the linkages on the value chain perspective (Halaszovich & Kinra, 2018) and transportation aspect (Saidi, Mani, Mefteh, Shahbaz, & Akhtar, 2020). However, no connection was made to institutions (governance). This macroeconomic variable has a longstanding effect on FDI and deserves scrutiny. Further, the inconclusive findings arising from different measurements used in past literature is therefore essential to critically investigate institutions for the sake of advancing knowledge and policy making. In contrast to the earlier studies, this paper enriches literature in discovering the major determinants of inward FDI with special attention to logistic performance and institutions. Other factors identified from past literature which could influence FDI and supported by theory would also be included in the model to enrich the analysis. Specifically, FDI relies on market size (GDP), labour resource and quest for efficiency (which covers LPI, infrastructure, technology and quality of the host country's institutions. Therefore, an in-depth analysis of this topic would have significant implication on formulating effective policy to attract FDI and also promote sustainable economic growth.

This paper is organised in the following manner. Logistic performance, FDI and institutional quality literature review are captured in Section 2. Section 3 is methodology. Empirical results and discussions in Section 4. Section 5 is the conclusion.

2. Literature review

It is vitally important to know the factors which can impact inward FDI. It is even more important to know and understand the indicators used in the independent variables in this research because different indicators would give different results (Yerrabati & Hawkes, 2016). Policies derived from positive indicators would then be invested to promote inward FDI. Therefore, the following would briefly describe and explain the indicators in logistics performance, institutional quality and FDI.

2.1. Logistics performance

The usage of the term logistics performance at the country level refers to national logistics performance. Logistics operations are mostly executed by private companies and have significant impact on administrative and policy issues at the national level. The national LP is a critical factor to ascertain competitive power of a country (Katip, Universitesi, & Harun, 2011). Therefore, the World Bank established the LP index in 2007 to determine the logistics performance of each country. The index is derived from a survey among freight forwarders and carriers/hauliers operating in the country. Logistics actors has an influence on national logistics performance. One actor that has its role spanning along the supply chain is the hauliers. They interact with most stakeholders of the supply chain. Their performance could be affected by institutional quality (Wong & Tang, 2018), innovation of logistics networks (López-Ospina, Agudelo-Bernal, Reyes-Muñoz, Zambrano-Rey, & Pérez, 2021), queuing at the container depots/terminals (Suprata, Natalia, & Sugioko, 2020; Weng, Tan, & Bin Abdul Rahman, 2020), supply chain integration e.g., information exchange (Jacobsson, Arnäs, & Stefansson, 2020), operations and financials (Novais, Maqueira Marín, & Moyano-Fuentes, 2020). Gani (2017) found total logistic efficiency is positively and substantially associated with exports and imports. Other recent studies on LPI include (1)

Beysenbaev and Dus (2020) suggested an updated database, containing qualitative and quantitative views of the country's logistics networks and subsystems, as benchmarking methods for governments and (2) Cho and Kim (2015) analysed the attractiveness of container ports by cross-country research. The authors study the relationship between six variables: competitive port container, traffic rate, service quality, liner shipping access, operational performance and institutional impact.

The logistics SC is considered a life line of businesses in an economy because it has significant direct impact on the growth of domestic industries and trade (Khan et al., 2020). Managing logistics is to establish and maintain the linkage between point-of-origin and point-of-consumption for the efficient and effective movement of goods, services and information to satisfy customer needs (Zijm, Klumpp, Heragu, & Regattieri, 2019). This linkage requires integration. Naway and Rahmat (2019) found logistics integration is a significant mediator between SC capability (supplier partnership, IT capability and organisational culture) and SC operational performance. On the other hand, logistics prices also affects the supply chain performance. For instance, Dang and Yeo (2018) highlighted that the logistics prices in Vietnam is higher than the average Alliance of Southeast Asian Nations (ASEAN, which has limited its capacity to compete in the global supply chain.

Along the lines of logistics supply chain performance, Arvis et al. (2016) suggested the use of (1) the efficiency of customs and border clearance, (2) the quality of trade and transport infrastructure, (3) the ease of arranging competitively priced shipments, (4) the competence and quality of logistics services - trucking, forwarding, and customs brokerage, (5) the ability to track and trace consignments, and (6) the frequency with which shipments reach consignees within scheduled or expected delivery times as measures for national logistics performance. These represent the effectiveness and efficiency of a country's logistics supply chain. The World Bank logistics performance which comprises this set of six measurements has been consistently used biannually since 2007 to gauge national trade facilitation and are discussed in following paragraphs.

Customs: This refers to customs clearance process efficiency which is favourably correlated with exports and imports (Gani, 2016). In addition, merchandise exports globally hit US\$18,301 billion in 2013. Similarly, in the same year, global imports hit US\$18,409 billion (WTO, 2013). World trade rose as the global trading system integrated speedily aided by efficient logistics infrastructure and customs clearance (Gani, 2016).

Infrastructure: Logistics infrastructure feature is very important in trade and transport (Groh & Wich, 2012). Infrastructure such as information and communications technology (ICT) quality score higher than physical transportation infrastructure (Arvis et al., 2018). The study by Pham, Nguyen, McDonald, and Tran-Kieu (2019) revealed information sharing improves national logistics performance. The quality of these infrastructure and services are gateways to international logistics network and deserves greater attention (Arvis et al., 2018; Shepherd, 2016).

International shipment: This involves market pricing and competition. A free logistics services market allowing for free competition would allow logistics service prices to stay competitive. Licencing is usually required to do business and this includes logistics services starting from ports involving haulage, container depots to urban delivery and last-mile delivery. The anti-competition policy in developed and developing countries prohibits business to standardise their rates for their industry. Therefore, competitive pricing among international shippers can be enforced in the market (Arvis et al., 2018).

Logistics quality and competence: Supply chain reliability and service quality cannot be substituted with hard infrastructure because smooth operations require "soft" infrastructure of peo-

ple and administrative skills (Arvis et al., 2018). While the quality terminology is vague in shipment, it commonly includes on-time deliveries, damage risks, frequency, and reliability. Reliability in shipment delivery is essential in a global logistics environment and being more important, it commands a freight premium. Hence, supply chain predictability is vital to shipment quality (Arvis et al., 2018).

Tracking and tracing: This refers to the ability to monitor the passage of items during transport. Carriers or delivery firms in developed countries have real time tracking and tracing system for shipment. The World Bank logistics performance report noted tracking and tracing are poor for countries found in the three lowest quintiles (Arvis et al., 2018) and it surmises all countries have the technology to track and trace fairly accurately and in a timely manner and are attributed to automation (Arvis et al., 2018).

Timeliness: Timeliness is the duration of time between order placements and receipts which is similar to cycle time performance. From the 2018 logistics performance report, timeliness is an important contributing performance factor and least problematic since its scores outrank other logistics performance component and it slides down as one moves down the logistics performance quintiles. Since the movement of goods along the supply chain is upheld by logistics, the timeliness of clearance and delivery also reflect supply chain reliability and predictability (Arvis et al., 2018).

Besides the above discussion on the importance of LP elements, some researchers studied other national and domestic aspects that can influence the LP index of a country. Lin and Cheng (2019) found that countries' logistics performance index (LPI) and the per capita gross domestic product (GDP) do not necessarily correlate with one another, and instead, the LPI of a country is associated with those of its neighbours. On the other hand, Wong and Tang (2018) found countries with a stable political environment and low level of corruption display better logistics performance. A similar finding on the impact of social issues on national logistics performance (LP index) by Larson (2020) found a direct relationship of corruption and gender inequality to lowering LP. Hence, the LPI is affected by the role of institutions to develop infrastructure, improve governance, and take measures to control corruption and gender inequality.

2.2. Foreign direct investments

Developing nations desire growth and it could materialise by domestic investment or inward FDI. Domestic investment aside, attracting FDI is the preoccupation of emerging economies. By default, FDI requires the establishment of manufacturing and production activities by MNCs in the host country. The effects of FDI on host countries are numerous. They generally elevate development and living standards by providing employment in host countries and potentially raise real GDP in infrastructure and human capital. Other benefits to host countries include rolling out better wages and supplying financial capital, improving industrial standards, stimulating local inputs, labour mobility, and diffusing skills and knowledge to local partner, filling shortfalls between savings and investment capital, improving balance of payment positions (Khadaroo & Seetanah, 2010) and in the process host countries are absorbed into the global economy. In particular, greenfield FDI can contribute to development of host economy.

MNCs have spurred global trade and FDI flows (Bitzer & Gorg, 2009). As suggested by Dunning (1998), MNCs are motivated by four main types of factors: market-seeking, resource-seeking, efficiency-seeking and strategic asset-seeking. Hence, market size, natural resources, low-cost labour or tangible and intangible assets would attract FDI (Dunning, 1998) all of which are favourable to FDI investors. While MNCs consider several factors for their investments, one notable attraction is the host country's suitable

logistics infrastructure (Luttermann, Kotzab, & Halaszovich, 2020; Saidi et al., 2020). Conventionally, logistics comprise the integrative management of warehouse management, material handling and packaging, transportation, and supply chain management to support the complex global supply chain network (Saidi et al., 2020). Effective logistics infrastructure generate benefits by lowering inventories of firms, improving traffic volumes, and reducing travel time and cost. These benefits are interactive and not standalone and would sustain host country economic development and foster the retention of existing MNCs (Saidi et al., 2020). Therefore, the investigation into the nexus of logistics performance and FDI in host countries would forge development policies for a more attractive FDI destination.

2.3. Competitiveness

Recently there are a few studies which highlighted the relations between (i) LP and competitiveness (Kabak, Önsel Ekici, & Ülengin, 2019; Önsel Ekici, Kabak, & Ülengin, 2019) and (ii) FDI and competitiveness (Avioutskaa and Tensaout (2020). Önsel Ekici et al. (2019) highlighted that readiness for high-tech environment, training and education to develop efficient human resource, modernisation, market dynamics and infrastructure can expedite developments in LP. Meanwhile, Avioutskaa and Tensaout (2020) indicated that countries competitiveness in terms of good infrastructure and institutions will attract FDI inflow.

Competitiveness is deployed in this paper from the *Global Competitiveness Index* (GCI) in the Global Competitiveness Report of the World Economic Forum. Institutional quality is one of the indicators from GCI which features the competitiveness of a country (Cumming, Rui, & Wu, 2016). In other words, Institutional Quality is part of competitiveness. More precisely, Institutional Quality refers generally to "a measure which indicates the quality of governance and institutions in a country." It is claimed that countries with stronger institutions fare better in economic terms (Butkiewicz & Yanikkaya, 2006; Kayalvizhi & Thenmozhi, 2018). Intuitively, all rational FDI investors would want their investments to bring high returns. This is possible only if the host country has a strong institutional quality to assist the investors productively and effectively. The FDI attraction by institutional quality is evident in Daude and Stein (1997), Busse and Hefeker (2007), Ali, Fiess, and MacDonald (2010), Jude and Levieuge (2017) and Kayalvizhi and Thenmozhi (2018). Weak institutional quality can ward off investors, and decelerate productivity adversely affecting GDP per capita. These curtail progress on the economic front. On the other hand, good institutional quality can promote inward and local investments, improve resource allocation, create confidence, facilitate economic activities and growth (Cumming et al., 2016; Jude & Levieuge, 2017). The different strata of society will seize upon quality institutional like a public good as its engine of growth (Acemoglu & Robinson, 2008).

Man makes laws to govern society and limit or approve of human behaviour. Over time, the laws become entrenched and regulate acceptable behaviour and activities which will determine economic performance. Society regulations or legislation can promote or impede economic performance. Noting this, institutional quality will allude to the fitness-for-use (Juran, 1974) such as for the socio-economic growth and well-being of society. This surmises North's institutional theory.

Institutions with strong and prudent administrative and legal frameworks can influence investment decisions by both the public and private sectors. These will effectively influence the competitiveness and growth of a country. Similarly, fiscal policies and budgetary allocations to spur growth and generate and distribute wealth can contribute towards a sustainable society and retain inward FDI as well. With growth in production and services, these require infrastructure for its sustenance (Arvis et al., 2018;

Cumming et al., 2016; Groh & Wich, 2012). These infrastructure includes the efficient logistics, public transportation networks, telecommunications, banking and basic utilities to facilitate daily operations (Arvis et al., 2018; Sinnandavar, Wong, & Soh, 2018; Wong, Soh, Sinnandavar, & Mushtaq, 2018).

2.4. Other factors

This section gives a brief discussion on other factors identified from past literature which could influence FDI.

Labour can be trained and motivated to enhance its flexibility, efficiency and effectiveness. Effective labour management is important to ensure employees are suitably allocated according to skills and job requirements with adequate incentives. This labour market efficiency is a significant factor on the nexus of FDI and economic growth (Hammami & Zotto, 2020) with a direct impact on the former (Herlitah, Fawaiq, & Herlindah, 2020). In this respect, educational institutions should match their training with market requirements. Compensation should be merit-based to encourage labour put in their best effort for the tasks at hand. Gender biasness are demotivating forces and should be prohibited in promotion exercise and compensation packages. Taken together these factors are good measures with positive effects on worker performance and the economy. A country that provides for suitable and continual training and timely motivation will be attractive to investors (Arvis et al., 2018).

ICT is fundamental to modern day commerce. It facilitates transactions such as order, manufacture, delivery and payment of the supply chain. It integrates supply chain actors with lower costs, accuracy and timeliness especially in developed countries. FDI investors are attracted to such infrastructure and processes (Hammami & Zotto, 2020; Hsu & Tiao, 2015). However, this is not the case for developing countries. Surprisingly, the reverse causality relationship occurs indicating FDI helps in the development of ICT and production capabilities in developing countries. This is a clear case of FDI bringing with it its ICT capabilities and “forcing” or encouraging the developing host country to keep up with the ICT development. Employment opportunities in FDI companies are also expected to accelerate the ICT development of the host country (Gholami, Lee, & Heshmati, 2005).

The Internet opens up a world of international trade (B2B) because of lower transaction costs in developing countries (Matambalya & Wolf, 2001). With the Internet of Things (IoT), they facilitate transactions and lower their costs (Clemons & Row, 1991; Gurbaxani & Whang, 1991; Hitt, 1999; Jorgenson, 2001). This cyber technology overcomes geographic limitations. The trading platforms like Amazon, Lazada and even local fast food outlets utilise cyber technology for efficiency and accuracy. Therefore, ICT nurtures domestic and international trading relationships and strengthens competitive advantage for socio-economic development. The transfer of information through ICT and the cyber network lowers the costs of business for foreign investors. Therefore, cyber readiness and access will be attractive to FDI (Addison & Heshmati, 2004). However, poorer countries with weaker ICT inhibit FDI.

Lastly, Ho et al. (2013) also highlighted that the greater the market size of the host country, the more appealing it is to FDI. A broad market size is conducive to increase demand for goods and services, enables economies of scale and facilitates FDI. Low corporate tax rates attract FDI but Becker, Fuest, and Riedel (2012) argued that taxes affect both the quantity and quality of FDI which could provide corporate tax revenue and labour income.

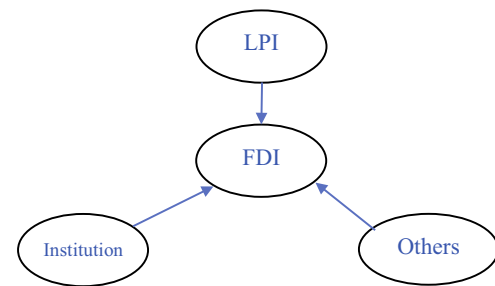


Fig. 1. Conceptual framework.

2.5. Conceptual framework

Institutions are defined as humanly invented restrictions, consisting of systemic, fiscal, political and social problem (North, 1990). They are structured with informal laws participated by business stakeholders for income and returns.

According to North (1990), strong institutions have an effect on economic practices across various mechanisms, such as reducing trade costs, logistics and productions costs. Government and private financial and administrative regulatory institutions are expected to assist in lowering the cost of doing business. Weaker institutions would require more resources to track shipments. Higher risk premium would accompany poorly secured ownership rights and compliance complexity would hinder economic growth. These unstable and uncondusive conditions are unattractive to foreign investors. On the contrary, strong and good institutions would contribute to better returns for FDI. In summary, the institutional quality of the host nation influences profitability, and institutionally stable countries may draw international investors by delivering high returns.

In a similar vein, Dunning (1998) suggested an eclectic model hypothesis that the choice of a foreign investor to invest in a host country depends on the size of the business, efficiencies in transport and warehousing sectors, labour costs, predictable national policies and their implementation. Investors are rightly cautious with cost and returns especially with unpredictable foreign markets. Therefore, locations with predictable economic and institutional services and facilities would be favoured such as rates of return and robust institutions (Dunning, 1998).

Centred on Dunning's eclectic paradigm theory and North's structural theory, inward FDI subscribes to market size (GDP), labour resource, the quest for efficiency (which covers logistics performance, infrastructure, technology and quality of the host country's institution.) Therefore, a conceptual framework resting on the foundation of both these classical theories specifies our model in Fig. 1. (Note: as this study focuses on FDI, LPI and quality of institution, the rest of the variables are grouped with others to match the mathematical formulation in Section 3)

3. Methodology

3.1. Empirical model and data sources

The aim of this research is to estimate the influence of logistic and the quality of institutions on inward foreign direct investment (FDI). However, following the practice of econometric modelling, the construction of an empirical model must take into account control variables in an effort to extract the genuine effect on the dependent variable. In light of this, an empirical model for inward FDI in Asia is constructed by considering logistic performance, institutional quality and other control variables with reference to the past inward FDI literature (e.g. Ang, 2008; Asiedu, 2002; Asongu,

Akpan, & Isihak, 2018; Kayalvizhi & Thenmozhi, 2018; Kumari & Sharma, 2017; Tang, Yip, & Ozturk, 2014) as presented below:

$$FDI_{it} = \beta_0 + \beta_1 LPI_{it} + \beta_2 INS_{it} + \gamma X_{it} + \lambda_i + \mu_t + \varepsilon_{it} \quad (1)$$

where FDI represents per capita real inward foreign direct investment, LPI represents logistic performance, INS represents the level of institutional development, and X is a vector of control variables such as the per capita real gross domestic product, corporate tax rate, labour market efficiency, technology readiness, and infrastructure development. λ_i is the country-specific unobserved fixed effect, μ_t is the time-specific unobserved fixed effects, and ε_{it} is the disturbance term. Given the aims of the present study is also to address the vital research question of whether the effect of logistic performance is likely depending on the development of institutions, we augment our inward FDI model as presented in Eq. (1) by incorporating the interaction terms of (LPI $\times$ INS) into the model. The augmented inward FDI model is presented below:

$$FDI_{it} = \beta_0 + \beta_1 LPI_{it} + \beta_2 INS_{it} + \theta_1 (LPI \times INS)_{it} + \gamma X_{it} + \lambda_i + \mu_t + \varepsilon_{it} \quad (2)$$

where θ_1 is the coefficient of the interaction term between logistic performance and the level of institutional development. Therefore, the effect of logistic performance on inward FDI depends on the level of development of institution. If the coefficient is estimated to be positive ($\theta_1 > 0$), then an increases in the level of institution would enhance the logistic performance's impact on inward FDI. On the other hand, $\theta_1 < 0$ implying that an increase in the level of institution would enlarge the negative impact of logistic performance on inward FDI and the impact can be computed by $\partial FDI_{it} / \partial LPI_{it} = \beta_1 + \theta_1 INS_{it}$.

This study uses the unbalanced panel data from 2007 to 2017 of 31 Asian countries to analyse the determinants of inward FDI based on data availability. Armenia, Azerbaijan, Bahrain, Bangladesh, China, Cyprus, Hong Kong, India, Indonesia, Iran, Israel, Japan, Jordan, Kazakhstan, Kuwait, Lebanon, Malaysia, Mongolia, Oman, Pakistan, the Philippines, Qatar, Saudi Arabia, Singapore, South Korea, Sri Lanka, Thailand (40/38), Turkey, the United Arab Emirate, Vietnam, and Yemen are the countries under review in the present study. This study recognised that some of these countries are transcontinental but the selection countries are primarily based on the geographical division of Asia rather than the cultural and/or the political aspects. The data of this study are collected from the *Global Competitiveness Reports*, *World Development Indicators*, and the *World Bank Logistics Performance Reports*.¹ The data used in this study are converted into natural logarithm for measurement uniformity and induce homoskedasticity in errors variance. In addition, the summary descriptive statistics and the unit of measurement are presented in Table 1.

3.2. Panel data estimation strategies

To estimate the models of this study as presented in Eqs. (1) and (2), the static panel data methods is chosen because the dataset is relatively small in both time series (i.e. $7 \leq T \leq 11$) and cross-sectional ($N = 31$). According to econometric literature, there are three common models under the static panel data methodology, for example, pooled ordinary least square (POLS) estimator, fixed effect (FE) estimator, and the random effect (RE) estimator. The estimator is selected with regards to the behaviour of country-specific (λ_i) and time-specific (μ_t) effects as shown in Eqs. (1) and (2). In the absence of both effects ($\lambda_i = 0$, $\mu_t = 0$), estimation

results with the POLS model are believed to be superior and unbiased. However, in the presence of country-specific effect ($\lambda_i \neq 0$), the estimation results with POLS model are likely to be biased. There are two popular statistical models used to tackle the problem of country-specific effect, namely FE and RE models. The FE model removes the country-specific effect from the model using the demeaned approach, while the RE model eliminates the country-specific effect based on the quasi-demeaned approach. The choice of model depends heavily on the estimation efficiency. This paper proposes the set of three models to choose from in performing the tests. For example, the F-test for poolability and the Breusch-Pagan LM test are used to make choice between: (a) POLS and FE models, and (b) POLS and RE models, respectively. If both tests consistently reject the POLS model, then the Hausman's model specification test should be used to decide between RE and FE models. Apart from that, the time-specific effect ($\mu_t \neq 0$) is accounted by accommodating time-specific dummies into the selected model. If the time-specific dummies are jointly significant, meaning that the two-way static panel data model is preferable, otherwise the one-way model is more appropriate for estimating our dataset.

4. Empirical results

The last section discussed the model specification, the source of data and the econometric approaches used to estimate the influential impact of logistic performance and the quality of institutions on inward FDI in Asia. The findings of the present study are reported and discussed in this current section as shown in Table 2. Prior to critically analysing the estimated results, it is essential to precede our analysis by choosing a suitable panel data model with the help from three popular specification tests mentioned in the earlier section. As shown in Table 2, the results suggest both the F-test for poolability and the Breusch-Pagan LM test reject the null hypothesis ($H_0 : \lambda_i = 0$) at the 1 per cent level of significant. It reveals that FE and RE models should be more appropriate than the POLS modelling approach. Therefore, it is necessary to adopt the Hausman test to make a choice between FE and RE models before proceeding to interpret the estimated coefficients. In contrast to the earlier studies on FDI (e.g. Shah, 2014), we find that RE modelling approach is superior to FE model as the Hausman test fails to reject the hypothesis of RE model is a consistent estimator. In the light of this, the estimation results with RE model based on the generalised least square (GLS) estimation will be used for further analysis.

Some diagnostic tests were also conducted to validate the selected model. Based on the computed goodness-of-fit tests such as the R-square and the Wald test, it was discovered that the data of the present study are well fitted by the models. Specifically, the results of R-square indicate that approximately 60 to 70 per cent of the fluctuations in Asia's FDI inflow are possible to be predicted by the explanatory variables specified in the model. Likewise, the goodness-of-fits are further confirmed by the highly significant results of the Wald test. Nonetheless, the estimation results may be biased if the estimated residuals are cross-sectionally correlated. To check for cross-sectionally correlated of the estimated residuals, the Pesaran's (2004) test for cross-sectional dependence (CSD) was conducted. Result of the CSD test shows no significant cross-sectional correlation between the estimated residuals. As all the diagnostic tests are satisfactory, it can be concluded that the findings with RE modelling approach are valid and thus this study can proceed to assess the estimated coefficients.

Considering the regression results portrayed in Table 1, it was found that the coefficients for control variables such as market size, infrastructure, labour market efficiency, and technology readiness in all the five models are significant at the 10 per cent level or smaller. These findings are supported in previous studies (e.g.

¹ It is important to point out here that the Logistic Performance Index (LPI) reported in the World Bank Logistic Performance Reports are the biennial dataset. Therefore, we have applied the mean imputation approach to derive the gap or missing values.

Table 1
Summary of descriptive statistics.

Variables	Source	Mean	Max	Min	Std. Deviation
Per capita real FDI (US\$ at 2010 prices)	WDI	64,212.09	2,680,748	36.72	312,630.7
Per capita real GDP (US\$ at 2010 prices)	WDI	16,748.27	72,670.96	666.40	17,633.59
Corporate tax rate (%)	GCR	33.699	105.2	10.7	14.732
Labour market efficiency index (scaled 1 to 7)	GCR	4.392	5.921	2.996	0.608
Technology readiness index (scaled 1 to 7)	GCR	4.061	6.214	2.041	0.988
Infrastructure index (scaled 1 to 7)	GCR	4.502	6.730	1.681	1.169
Logistics performance index (scaled 1 to 5)	WBLPR	3.083	4.190	2.085	0.491
Institutional quality index (scaled 1 to 7)	GCR	4.297	6.186	2.584	0.838

Note: WDI = World Development Indicators, GCR = Global Competitiveness Reports, and WBLPR = World Bank Logistic Performance Report.

Table 2
The results of random-effect model.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	1.589 (0.172)	1.194 (0.309)	2.318* (0.054)	−3.624** (0.046)	−2.879 (0.111)
Market size, GDP_{it}	0.875*** (0.000)	0.866*** (0.000)	0.711*** (0.000)	0.563*** (0.000)	0.606*** (0.000)
Corporate tax, TAX_{it}	−0.703*** (0.000)	−0.746*** (0.000)	−0.601*** (0.000)	−0.611*** (0.000)	−0.557*** (0.000)
Labour market, LAB_{it}	–	0.611* (0.064)	–	0.808** (0.015)	–
Technology readiness, TRE_{it}	–	–	0.569** (0.013)	–	0.416* (0.066)
Infrastructure, $INFRA_{it}$	0.728*** (0.000)	0.775*** (0.000)	0.627*** (0.000)	0.551** (0.011)	0.435** (0.046)
Logistic performance, LPI_{it}	−0.281 (0.355)	−0.283 (0.350)	−0.029 (0.927)	6.163*** (0.000)	5.512*** (0.000)
Institutions, INS_{it}	−0.219 (0.454)	−0.479 (0.139)	−0.476 (0.131)	4.560*** (0.000)	4.224*** (0.001)
$(LPI \times INS)_{it}$	–	–	–	−4.439*** (0.000)	−3.990*** (0.000)
<i>Marginal effects of LPI condition to the degree of institutional quality</i>					
$\beta_1 + \theta_1$ (INS = 1)				6.163*** (0.000)	5.512*** (0.000)
$\beta_1 + \theta_1$ (INS = 2)				3.085*** (0.000)	2.746*** (0.000)
$\beta_1 + \theta_1$ (INS = 3)				1.286*** (0.000)	1.128*** (0.008)
$\beta_1 + \theta_1$ (INS = 4)				0.008 (0.978)	−0.020 (0.948)
$\beta_1 + \theta_1$ (INS = 5)				−0.982** (0.011)	−0.910** (0.017)
$\beta_1 + \theta_1$ (INS = 6)				−1.792*** (0.000)	−1.638*** (0.002)
$\beta_1 + \theta_1$ (INS = 7)				−2.476*** (0.000)	−2.253*** (0.001)
<i>Diagnostic tests</i>					
Number of observations	323	323	323	323	323
R-squares	0.677	0.679	0.568	0.605	0.601
Wald test	622.84*** (0.000)	630.64*** (0.000)	413.85*** (0.000)	454.35*** (0.000)	448.07*** (0.000)
Poolability test (POLS vs. FEM)	419.64*** (0.000)	397.80*** (0.000)	371.03*** (0.000)	392.90*** (0.000)	390.52*** (0.000)
Breusch-Pagan LM test (POLS vs REM)	1459.08*** (0.000)	1421.78*** (0.000)	1367.93*** (0.000)	1439.31*** (0.000)	1388.62*** (0.000)
Hausman test (REM vs FEM)	3.26 (0.071)	4.66 (0.863)	6.99 (0.638)	10.93 (0.363)	10.17 (0.426)
Pesaran CSD test	−0.864 (0.387)	−0.717 (0.473)	1.034 (0.301)	−0.042 (0.966)	0.381 (0.709)

Note: The asterisks ***, ** and * denote the significance at the 1, 5 and 10 per cent levels, respectively. Figures in () are the p-values. The time-specific dummies are including in estimating the models.

Asiedu, 2002; Luttermann, Kotzab, & Halaszovich, 2017; Shah, 2014; Tang et al., 2014). More specifically, we find the estimated coefficients for these variables positive, thereby confirming that an increase in any of these variables would effectively attract additional FDI to Asia. In terms of magnitude, the results show that an increase of 10 per cent in these explanatory variables, on average, FDI to Asia is expected to increase by approximately 7.24 per cent, 6.23 per cent, 7.10 per cent, and 4.93 per cent attributed respectively to market size, infrastructure, labour market efficiency and technology readiness. On the contrary, it was found that the coefficient for corporate tax is negatively associated to FDI and highly significant. This result suggests that policy initiative aims to increase tax rate in an effort to enlarge tax revenue for the country would eventually jeopardise the inflow of foreign investment to Asia. A 10 per cent increase in corporate tax rate, on average, inward FDI would drop by approximately 6.40 per cent given other factors remain constant. This negative tax-FDI nexus is corroborated with the findings of Tang et al. (2014) and Ang (2008).

Going straight to the impacts of logistic performance and institutions, our estimated results show that they are highly significant and positively correlated with FDI as reported in Model 4 and Model 5. By and large, the estimates' coefficients for both logistic performance and institutions are reasonable and economically meaningful as the qualitative nature of the results are fairly the same over the two models. Importantly, the sign of the estimated

coefficients are consistent across the models. The positive relationship between institutions and FDI is in tandem with the findings of Tun, Azman-Saini, and Law (2012). Similarly, the findings of positive link of logistics and FDI is also closely associated with Loree and Guisinger (1995), and Coughlin, Terza, and Arromdee (1991). Moreover, the findings reveal that the interaction terms of $(LPI \times INS)$ is negative and significant at the 1 per cent level. Given this, the performance of logistic and institutions interacted and jointly explain the behaviour of FDI inflows. In this regards, the estimate coefficients for logistic performance on FDI inflows do not have direct interpretation and thus this study further the analysis by calculating the marginal effects of logistic performance with respect to different level of institutional development: $\partial FDI_{it} / \partial LPI_{it} = \beta_1 + \theta_1 INS_{it}$ in order to provide better policy guidance.

In calculating the marginal effects, the level of institutional development was segregated into seven with reference to the scale suggested in the *Global Competitiveness Reports*. The findings suggest the impact from logistic performance on FDI relies on the quality of institutions, despite the evidence on the magnitude of marginal effects changed gradually from positive to negative. More specifically, our study found that logistic performance has a significant impact on FDI range from 1.128 to 6.163 per cent, especially below the threshold of scale 4 in institutional development. However, after the threshold, the impact change to negative and the impact on FDI range from −0.910 to −2.476 per cent. This result indi-

cates that the positive impact of logistic performance on FDI is more prominent for low perceived level of institutional quality's countries compared to high perceived level of institutional quality in counterparts. A plausible rationale of this finding is that foreign investors tends to exploit the available resources at the recipients countries, thus countries with better institutional quality such as high degree of corruption control and rule of law will restrict their ability to exploit resources. This is because there is no sentiment of charity in foreign investments, thus they are not necessarily helpful to recipients countries (Griffin & Enos, 1970). In this regard, better institutions may not guarantee logistic performance due to the view that good institutions such as control of corruption is seen as "sand in the wheel" which eventually retard growth and efficiency (Koh, Wong, Tang, & Lim, 2018). In a similar vein, Luttermann et al. (2017) also discovered that foreign investors prefer a country with weak institutions as these will allow them to avoid bureaucracy delay and bypass inefficient regulation through corruption. In light of this, it is no surprise to find that the marginal effects of logistic performance on FDI varies across the perceived level of institutional quality.

5. Conclusions and policy recommendations

Utilising panel dataset across 31 Asian economies from 2007 to 2017, the present research work attempted to examine how *Global Competitiveness Index* and the *Logistics Performance* as well as the interaction effects of both would impact FDI. The major contribution of the paper is it found the nexus of institutional quality and logistics performance influences FDI in Asia. For institutions below the threshold, logistics performance has a significant positive impact on inward FDI. However, the positive impact of logistics performance turns negative (reverse) when institutions surpassed the threshold. This finding indicates that the nexus of logistics performance-inward FDI is contingent on institutions.

Further, logistics performance is contributed both by the larger civil service and logistics organisations. As an institution, the civil service formulates and implements policies for various sectors including logistics. The belief that increasing institutional quality with better or tighter policy formulation could better impact logistics performance cannot be assumed if effective implementation is not forthcoming. Some sources of poor implementation are compensation and working conditions, a lack of understanding and training in implementing new measures, and inequitable and unfair practices in countries with lower institutional quality. These would discredit seemingly improved institutional measures and could curtail logistics performance and erode investors' confidence to hinder new FDI or renewal. Political instability arising from instituting democratic reforms to strengthen governance and freedom but gone awry could also rob investor confidence. Therefore, policies to strengthen the implementation of newly formulated institutional though good on paper should be in place to promote investors' confidence and lower financial and non-financial burdens. These policies include ensuring continual discussion and monitoring of institutional reforms with all stakeholders such as the civil service, organisations, investors and the community. Some examples include injecting innovation and flexibility such as 'creating a 'one-stop centre to improve government efficiency and transparency directed at inward FDI growth.

As a policy, the three-dimensional sustainability should be institutionalised and pursued holistically as FDI source countries are from developed countries expecting sustainable progress on three fronts i.e. economic, environment and social. Investment policies (or sanctions) are frequently tied to the social and environmental performance of host countries. Therefore, Asian host countries should attend to both social and environmental agenda. The devel-

oping countries in this study could also learn from their advance Asian economies such as Japan, South Korea and Singapore in their pursuit to improve the interactions of institutional quality along with logistics performance in effective ways.

There are two major contributions associated with this study. In the theoretical aspect, the frontier of logistics knowledge is complemented with FDI and institutional quality with their associated theories such as Institutional Theory and Eclectic paradigm theory. Anchored on these theories, this paper shows the relationship impact of LP on FDI varies across the perceived level of institutional quality. The practical implication is through policy recommendations which if implemented could guarantee more capital inflows for the Asian economies. However, this paper is not without limitations. This research assumes that different logistics performance metrics can react differently to institutional efficiency and that different types of institutions may have a different impact on LP-FDI growth. This possibility would be a potential avenue for future studies on inward FDI and logistics.

Conflicts of interest

The author declares that he/she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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