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The Impact of China's Belt and Road Initiative on Malaysia's Construction Sector

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ABSTRACT

The Belt and Road Initiative aims to connect Eurasia, African and Asian countries in several ways. To achieve this objective, huge investments in the construction sector funded by China in various participating countries are underway. Some megaprojects had achieved great success. However, dissenting voices were expressed in some participating countries. As such, there is a need to study the real benefits of BRI by the receiving countries. This study therefore aims to examine the impact of the BRI on Malaysia's construction sector by identifying the long-run relationship between foreign direct investment (FDI) inflows from China to Malaysia and the development of Malaysia's construction sector during the period 1991-2018 using the autoregressive distributed lag (ARDL) approach. The empirical results signify positive impact of FDI inflows from China on the development of Malaysia's construction sector. This finding suggests that Malaysia should continue to implement an open-door policy for the influx of FDI from China and collaborate with China in planning and executing construction projects in order to stimulate the development of construction sector and to sustain the long-run economic growth. It is highly likely that the FDI inflow from China, in particular the FDI involving high-technology, enable the local labours to gain from the benefits of technology transfer and subsequently enjoy the upliftment of skill-set. In order to ensure the success of BRI-linked projects in stimulating the development of Malaysian construction sector, a competent team should be formed in Malaysia to monitor the progress of each BRI-linked project to avoid falling into any debt trap situation, any loss of national sovereignty, as well as to ensure adherence to the spirit of the agreements signed between the donor and recipient of BRI projects.

Keywords: Belt and Road Initiative; Construction Sector; China; Economic Growth; Malaysia; ARDL approach

JEL Classification: H54; O11; F10

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El Impacto de la Iniciativa China "Belt and Road" en el Sector de la Construcción de Malasia

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RESUMEN

La Iniciativa de la Franja y la Ruta pretende conectar Eurasia, los países africanos y asiáticos de varias maneras. Para lograr este objetivo, se están realizando enormes inversiones en el sector de la construcción financiadas por China en varios países participantes. Algunos megaproyectos han logrado un gran éxito. Sin embargo, en algunos países participantes se han expresado voces discordantes. Por ello, es necesario estudiar los beneficios reales de la BRI por parte de los países receptores. Por lo tanto, este estudio tiene como objetivo examinar el impacto de la BRI en el sector de la construcción de Malasia mediante la identificación de la relación a largo plazo entre las entradas de inversión extranjera directa (IED) de China a Malasia y el desarrollo del sector de la construcción de Malasia durante el período 1991-2018 utilizando el enfoque de retardo distribuido autorregresivo (ARDL). Los resultados empíricos indican un impacto positivo de las entradas de IED de China en el desarrollo del sector de la construcción de Malasia. Esta conclusión sugiere que Malasia debería seguir aplicando una política de puertas abiertas para la entrada de IED procedente de China y colaborar con este país en la planificación y ejecución de proyectos de construcción para estimular el desarrollo del sector de la construcción y mantener el crecimiento económico a largo plazo. Es muy probable que la afluencia de IED de China, en particular la que implica alta tecnología, permita a los trabajadores locales beneficiarse de las ventajas de la transferencia de tecnología y, por consiguiente, disfrutar de la mejora del conjunto de competencias. Para garantizar el éxito de los proyectos vinculados a la BRI a la hora de estimular el desarrollo del sector de la construcción malasio, debería formarse un equipo competente en Malasia para supervisar el progreso de cada uno de los proyectos vinculados a la BRI para evitar caer en cualquier situación de trampa de la deuda, cualquier pérdida de soberanía nacional, así como para garantizar la adhesión al espíritu de los acuerdos firmados entre el donante y el receptor de los proyectos de la BRI.

Palabras clave: Iniciativa de la Franja y la Ruta; sector de la construcción; China; crecimiento económico; Malasia; enfoque ARDL

Clasificación JEL: H54; O11; F10

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1. Introduction

Deng Xiaoping's Open-Door Policy encouraged China to participate in globalisation, a process that promoted "Growing international economic interdependence and an exclusive increase in foreign direct investments, international trade, global movements of people, ideas, and technologies," (Khan, Sandano, Pratt, & Farid, 2018). In light of the above, China acceded to the World Trade Organisation (WTO) in December 2001. This accession that removed China's export quotas, boosted the nation's economic growth tremendously (Ianchovichina & Martin, 2004), and caused rapid growth in foreign direct investment (FDI) and international trade (Naughton, 2007, as cited by Zhang, 2014). According to Wang and Li (2017), after China's accession to the WTO, the average annual export growth rate of China was 27.3% between 2002 to 2008. The authors further noted that China exceeded the United States of America and emerged as the world's leader in international trade in 2013. China also won the accolade of being "The World's Factory", as China's merchandise is seen everywhere in the world (Wang & Li, 2017).

However, Wang and Li (2017) stated that China's trade performance has deteriorated in recent years due to a significant decline in demand for the country's exported goods. Based on UNCTAD (2020) report, China export growth rate in 2019 was about 2% compared to 2-digit growth rate in 2000s. The report also revealed that China export growth rate in the first three quarters of 2020 was similar to the same period of 2019. Thus, it is vital for China to integrate with the World to promote outward FDI.

In light of the above, the Belt and Road Initiative (BRI), formerly known as One Belt One Road was formally announced by President Xi Jinping in the year 2013. The BRI intends to resuscitate China's ancient Silk Road via commercial and cultural links with Eurasia (Kong, Cochrane, Meighan, & Walsh, 2019) and African countries. According to Chen, Fan, Zhang, and Mo (2019), the BRI is a grand vision which includes a wide range of developments, particularly, infrastructure and regional integration. As of October 2021, 141 countries and 32 international organisations participated in BRI (Advisory Council of the Belt and Road Forum for International Cooperation, 2021). All in all, Siu (2019) argued that the Chinese government aims to regain the country's past prosperity through the establishment of the BRI. Siu (2019) also stated that the majority of participating BRI countries suffered from poverty and, therefore, lacked capital for economic development. As a result, capital inflows and technological transfers, as well as support rendered by infrastructure construction from China, will encourage these countries to play their part in the BRI and benefited from it. In fact, infrastructure is imperative in stimulating production activities as well as to spur global and regional economic growth and provide spillover effects on local welfare (Advisory Council of the Belt and Road Forum for International Cooperation, 2021). Based on World Bank WDI Databases, the quality of port infrastructure of the BRI participating countries on average is below the world average. Thus, it is argued that BRI has the potential to close the infrastructure gap of the participating countries. According to Reed and Trubetskoy (2019), BRI projects which stretch along different continents will make the network denser and thus enhance the global economic growth.

In view of the importance of infrastructure development, construction sector plays a crucial role in Malaysian economy and contributes significantly to Malaysia economy. From the statistics as illustrated in Table 1, the contribution of construction sector has exceeded 4 per cent since 2013 and, generally, it has demonstrated a stable and increasing trend. Likewise, Malaysia's construction sector also plays an essential role in employment, as the employment statistics for the construction sector showed a similar increasing trend during the period 2000-2018 and the amount of people employed in the sector has surpassed 2 million since 2000 and recorded close to 2.5 million in 2018.

Table 1 The Contribution of the Construction Sector to Malaysia's GDP and Employment from 2010 to 2018

Year	Total GDP (RM Million)	GDP contributed by Construction Sector (RM Million)	Percentage of GDP contributed by Construction Sector	Employed person in Construction Sector (in thousand)
2010	821,434	28,213	3.43	2,108.5
2011	911,733	30,892	3.39	2,244.0
2012	971,252	37,909	3.90	2,263.7
2013	1,018,614	42,692	4.19	2,315.8
2014	1,106,443	48,650	4.40	2,372.5
2015	1,176,941	55,382	4.71	2,322.7
2016	1,249,698	61,089	4.89	2,390.6
2017	1,371,648	66,552	4.85	2,513.3
2018	1,446,914	70,111	4.85	2,499.9

Source: Department of Statistics, Malaysia (2020)

Since Malaysian government is fully aware of the importance of infrastructure development, as a participating country in the BRI, Malaysia engaged in a BRI-linked construction project, namely; the East Coast Rail Link (ECRL), which is managed by Malaysia Rail Link Sdn. Bhd. Originally, it was planned to span 668km and was one of the earliest transport projects financed by China's BRI, costing RM65.5 billion. Following a change of government in Malaysia on 9 May 2018, the original ECRL contract was cancelled by the new administration.

A revised contract at a reduced cost amounting to RM44 billion (a decrease of RM21.5 billion against the original cost of RM65.5 billion) albeit with a reduced scope of work, was signed on 12 April 2019 (Malaysia Rail Link, 2020). This episode reflects the many challenges that both Malaysia and China face in implementing BRI-led infrastructure projects. In addition, past literatures such as Wang, Lim, Zhang, Zhao, and Lee (2020) revealed that transport infrastructure was imposing significantly negative spillover effects in East Asia-Central Asia BRI participating countries. Similarly, Fang, Kleimann, Li, and Schmerer (2021) revealed that BRI-linked railway project in Europe did not bring significant positive impact on the regional economic outcome.

In view of the contradiction as evidenced from past literature and revised BRI-led construction project in Malaysia, the study aims to fill the research gap by examining the impact of the BRI on Malaysia's construction sector by identifying the long-run relationship between FDI inflows from China to Malaysia and the development of Malaysia's construction sector during the period 1991-2018 using the ARDL approach. Besides, to provide a more comprehensive study, this paper also investigates the impact of the labour force of the construction sector, infrastructure, and bilateral trade between China and Malaysia on the development of Malaysia's construction sector, respectively. Malaysia is selected in this study as China is the top trading partner of Malaysia (MITI, 2019) and Malaysia is the active member of BRI. In addition, based on Francis and Tham (2021), Malaysia was one the pioneering countries supporting BRI back then in 2013 and has received substantial inflows of BRI-related funds for infrastructure.

The contribution of this study is two-fold. Firstly, this study contributes to the current BRI literature. Secondly, the outcome of this study would provide insights for the Malaysian government whether they should continue to explore new infrastructure development projects under the umbrella of BRI.

The remainder of this study is organised as follows: Section 2 illustrates a literature review; Section 3 explains the theoretical framework and methodology; Section 4 displays and discusses the empirical result; and Section 5 concludes the paper and provides policy recommendations.

2. Literature Review

The construction sector involves immense investment as a country aspires to grow (Alaloul et al., 2020b). Construction and engineering services play a cardinal role in driving the economic growth by producing millions of job opportunities (Musarat, Alaloul, & Liew, 2021) as well as raising the foreign trade in construction materials and engineering services (Khan, 2008). They are not only benefiting the construction sector, but also generating multiplier effects through its extensive backward and forward linkages with other sectors of the economy (Park, 1989; Musarat & Ahad, 2016; Alaloul, Liew, Zawawi, & Kennedy, 2020a). Regrettably, the attention given to the construction sector in government policies is relatively small (Oladinrin, Ogunsemi, & Aje, 2012).

BRI hopes to revitalise or further the nations globalisations (Liu & Dunford, 2016; Gu, 2020). It offers mutual benefits and opportunities by promoting the constructions in participating countries. Projects of the Belt and Road constructions emphasises on two main areas, which are infrastructure development and international capacity cooperation (Hu, 2019). The BRI is similar to the work of international regimes between developed or developing countries (Liu & Dunford, 2016). The BRI helps to expedite the trade and FDI via the construction of infrastructure in participating countries. As Malaysia is one of the active participants in BRI, it raises the interest to study the impact of FDI inflows from China on the development of Malaysia's construction sector.

Cobb-Douglas production function examines the importance of labour and capital to the output (Cobb & Douglas, 1928). However, omitting relevant variables causes the parameters to be biased and unreliable (James, 1980). Therefore, this study modifies the Cobb-Douglas production function and employs an augmented Cobb-Douglas production function to study the effect of FDI inflows from China on Malaysian construction sector. Besides the labour and capital, this study adopts infrastructure and international trade as its importance has been mentioned in the past literatures (Hussain, Naqvi, Makhdum, & Shah, 2019; Ranjan & Bhanumurthy, 2019; Ivanova & Masarova, 2013; Silberbergera & Königerb, 2016; Zahonogo, 2016; Grossman & Helpman, 1991).

Cornucopia of research studies have examined the impact of FDI inflows on the construction sector. For instance, Babatunde, Awodele, and Adeniyi (2018) found that FDI inflows is important for knowledge spillovers, capital for new investment as well as resilience during financial crises. Meanwhile, Babatunde et al. (2018) also realised a significant nexus among the contributions of FDI inflows in the construction sector and the economic growth of the developing countries. However, by conducting semi-structured interviews of 12 domestic construction firms in Trinidad and Tobago, Gajadhar (2018) affirmed that there is only a low incidence of knowledge and technology spillovers occurring, but comes with a high competition effect. The findings of Gajadhar (2018) were further supported by Saha, Kravchuk, and Kirchner (2018), who revealed that the positive productivity differentials are small in construction industry even when there is a huge inflow of FDI. Furthermore, the study of Prah (2019) pointed out that the contribution of FDI inflow on the secondary sector (manufacturing as well as building and construction) is lower than the tertiary sector (export trading, service, tourism, liaison, as well as general trading and export trading) in economic growth although the secondary sector receives the most inflows. The reason that results the low impact of FDI on secondary sector could be inefficiencies at that sector (Prah, 2019). Conversely, Auzairy, Kek, Pang, and Yong (2020) revealed that the Chinese FDI inflows bring a negative impact on Malaysian construction and industrial sectors. According to Corkin (2012), Fessehaie (2012), Sarah (2018) and Abd Rahman (2019) as cited by Auzairy et al. (2020), the inverse impact is due to the sourcing behaviours of the Chinese contracts and infrastructure and therefore, Auzairy et al. (2020) suggested that the Malaysian authorities and local business partners should be careful on the matters before signing the contract to ensure a win-win situation for all parties.

As negligence of some other important variables in the regression causes the result to be bias (James, 1980), this study therefore includes the infrastructure as one of the determinants of the construction development. In the study of Cantos (2005), the transport infrastructure was found to be significant in private sector, agricultural sector, industrial sector and business services sector except

the construction sector. When disaggregate the total infrastructure capital by functions, Cantos (2005) found that the construction sector is negatively affected by the stock in roads. On the other hand, the empirical findings of Estache, Perrault, and Savard (2012) showed that road investment causes an increase in output in all sectors, in which the mining, export agriculture and construction sectors benefit the most. In addition, Mansell, Philbin, Broyd, and Nicholson (2019) also claimed that the infrastructure investment and the corresponding projects create a major opportunity for the construction sector to establish sustainable building practices in the industry. Concurrently, it also helps to maintain the competitiveness of the construction firms (Mansell et al., 2019).

Construction sector is a labour-intensive sector (Alaghbari, Al-Sakkar, & Sultan, 2017). Traditionally, the construction sector takes up a large percentage in the nation's total employment and it contributes significantly to the nation's revenue (Attar, Gupta, & Desai, 2012). The labour performance is one of the cardinal influencing factors for the construction industry to grow (Hafez, Aziz, Morgan, Abdullah, & Ahmed, 2014). By using data envelopment analysis (DEA) in the case of Iran, Sepehrdoust (2013) found that there is a huge difference between the efficiency scores of the states using more migrant labourer and those with a lower concentration of these labourers in construction activities. The migrant labourers have higher chances to contribute themselves to the construction activities in the states that are technically efficient (Sepehrdoust, 2013). In the case of Hong Kong studied by Chiang, Tao, and Wong (2015), the correlations of employment with GDP and construction industry suggested that the employment can be a medium or a mediating or intervening factor of GDP growth. It implied that the employment in construction sector is playing a crucial role in promoting the construction industry as well as the economic growth. Nevertheless, contradicting result was encountered by Aksoy (2013). The study of Aksoy (2013) employed the Toda-Yamamoto method to examine the relationship between growth and employment in aggregate and industrial respects for Turkish economy, and uncovered that there is no Granger causality nexus among the employment and construction industry. It showed that the employment is not a significant factor to the construction industry.

BRI is likely to change the existing international trade network pattern, which may influence both global supply chain management as well as logistics development (Cui & Song, 2019). In accordance with Sha, Yang, and Song (2008), the study noted that the higher competition results from the construction market liberalisation raises the awareness on the need to enhance the competitiveness of the firm in construction sector. In another words, the market liberalisation promotes the development of construction sector indirectly in order to increase the competitiveness of local firms. Similarly, Ab Rani, Ismail, Mohamed, Hussain, and Ghafourian (2018) claimed that the awareness of competitiveness in the Malaysian construction sector is higher as a result of the market liberalisation, and the study suggested that Malaysian local contractors should enhance their competitiveness by engaging in educational programmes such as seminars, workshops conducted by the responsible agencies and others. Furthermore, Siddiqui (2019) mentioned that the competitiveness and efficiency of the construction firms in BRI participating countries will be increased with the entry of Chinese construction firms due to the considerable experience in construction as well as the massive amount of capital backed by the Chinese government. In conclusion, globalisation helps the local construction firms to grow by enhancing their competitiveness and efficiency in the sector.

Plethora of the studies were conducted in the past to examine the factors affecting the construction sector. However, the findings of past studies were incongruent. To the best of our knowledge, there was no prior study being conducted to investigate the impact of BRI on construction development in the case of Malaysia. Therefore, it has raised the interest to study whether the Malaysian construction sector enjoys positive impacts from the BRI. The hypotheses of the study are as follows:

H_1: FDI inflows from China to Malaysia is significant to the Malaysian construction sector development.

H_2: Labour in the construction sector is significant to the Malaysian construction sector development.

H_3: Infrastructure is significant to the Malaysian construction sector development.

H_4: Total bilateral trade between China and Malaysia is significant to the Malaysian construction sector development.

3. Theoretical Framework and Methodology

3.1. Theoretical Framework

This study modifies the Cobb-Douglas production function and uses the augmented Cobb-Douglas production function to identify the impact of FDI inflows from China to Malaysia on the development of the construction sector, in the case of Malaysia. A typical Cobb-Douglas production function consists of a minimum of two inputs, namely; labour (L) and capital (K) to describe the output, as shown below:

$$Y_t = f(K_t, L_t) \quad (1)$$

where *Y* denotes the output, or the GDP, which represents economic growth, *K* denotes capital, *L* denotes the labour force and *t* represents the time series.

Since the construction sector contributes significantly to the economic growth, it serves as the proxy for economic growth. Meanwhile, FDI inflows from China to Malaysia will bring abundant capital into the country. Therefore, FDI inflow is the proxy for capital in this study.

Furthermore, both infrastructure and international trade play essential roles in economic growth as growth literature has documented the importance of both infrastructure (see, Hussain et al., 2019; Ranjan & Bhanumurthy, 2019; Ivanova & Masarova, 2013) and international trade (see, Silberbergera & Königerb, 2016; Zahonogo, 2016; Grossman & Helpman, 1991). Therefore, this study adopts both variables. Taking into account all of the considerations above, an augmented Cobb-Douglas production function has been transformed into the following equation:

$$DC_t = f(FDI_t, L_t, I_t, TRADE_t) \quad (2)$$

where *DC* denotes the development of the construction sector, *FDI* denotes FDI inflows, *I* denotes infrastructure and *TRADE* denotes international trade.

3.2. Data

This study adopts time series data (annual data) ranging from 1991 to 2018 to examine the impact of China's BRI on Malaysia's construction sector. To achieve its objectives, this study identifies the real GDP of the construction sector (*DC*) in the base year of 2010, as the proxy for development in the construction sector; FDI inflows from China to Malaysia (*FDI*) as the proxy for investment inflows from China to Malaysia; total roads (*I*) as the proxy for infrastructure; the labour force in the construction sector (*L*) as the proxy for the labour force; and, the total bilateral trade between China and Malaysia (*TRADE*) as the proxy for the trade variable. The three variables (*DC*, *FDI* and *TRADE*) are in the national currency, RM in millions, and Table 2 below shows the details of the variables:

Table 2 Data description

Variable	Name	Description	Sources of Reference
Dependent	*DC*	Ratio of GDP for construction (current price in RM million) to GDP deflator	Cobb-Douglas production function
Independent	*FDI*	Foreign direct investment inflow from China to Malaysia (in RM million)	Cobb-Douglas production function
	I	Total roads = Paved roads + Non-paved roads	Hussain et al. (2019); Ranjan and Bhanumurthy (2019); Ivanova and Masarova (2013)

	L	Labor force in construction sector	Cobb-Douglas production function
	TRADE	Total bilateral trade between China and Malaysia = Total exports from Malaysia to China + Total imports from China to Malaysia	Silberbergera and Königerb (2016); Zahonogo (2016); Grossman and Helpman (1991)

The data for this study is derived from different sources, for instance, the GDP deflator for Malaysia is obtained from the World Bank's World Development Indicators (WDI), the GDP for the construction sector and the FDI inflows from China to Malaysia are acquired from Bank Negara Malaysia (BNM), the total number of paved and unpaved roads are extracted from the Road Engineering Association of Malaysia (REAM), the labour force in the construction sector is captured from the Department of Statistics, Malaysia (DOSM), and the total bilateral trade between China and Malaysia is obtained from the International Monetary Fund's Direction of Trade Statistics (DOTS) database. All of the variables in this study are transformed into natural logarithm form before treating the data and the equation is estimated as the following:

$$lnDC_t = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln I_t + \beta_3 \ln L_t + \beta_4 \ln TRADE_t + \varepsilon_t \quad (3)$$

where ε_t is the error term.

3.3. Methodology

The autoregressive distributed lag (ARDL) bounds testing approach to cointegration of Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) is employed in this study as it possesses several advantages over other cointegration procedures, such as the Engle and Granger (1987), Johansen (1988), and Johansen and Juselius (1990) procedures: (1) it is applicable regardless of whether the underlying variables in the systems are purely integrated of order zero, *I*(0), purely *I*(1) or a mixture of both (Narayan, 2004); (2) it can obtain efficient estimations even with small sample sizes and without the presence of endogeneity between the regressors in the system (Farhani & Ozturk, 2015); (3) it enables all of the variables in the system to have their optimal lags (Ozturk & Acaravci, 2011); (4) it applies only a single reduced form equation to estimate the long-run relationship among the variables in the system (Ozturk & Acaravci, 2013); and (5) a dummy variable can be included in this approach to capture the effect of certain policies or events (Pesaran et al., 2001).

To confirm the long run nexus between the variables in the system, the critical bounds tables, constructed by Pesaran et al. (2001) and Narayan (2005), are used. However, these critical bounds tables, are invalid when any of the variables in the system have an order of integration greater than one (Ozturk & Acaravci, 2011). Thus, it is imperative to pre-test the unit root, for each of the variables in the system, before proceeding to the estimation stage.

This study employs the generalised least squares Augmented Dickey-Fuller (ADF) test (ADF-GLS) of Elliot, Rothenberg, and Stock (1996) and the weighted symmetric ADF test (ADF-WS) of Pantula, Gonzalez-Farias, and Fuller (1994) and Park and Fuller (1995) as these two unit root tests can deal with smaller sample sizes than the sizes suggested by conventional unit root tests (Farhani & Ozturk, 2015) and they demonstrate a greater power than conventional unit root tests (McNown & Puttitanun, 2002).

ADF-type endogenous breakpoint unit root tests have been used extensively, however, they are not preferred, since the critical values of the tests are derived based on the assumption of there being no break in the unit root null hypothesis (Strazicich, Lee, & Day, 2004). This assumption will exhibit size distortions in the presence of a unit root with a break (Nunes, Newbold, & Kuan, 1997; Vogelsang & Perron, 1998; Lee & Strazicich, 2001) and results in two undesirable outcomes: (1) the null hypothesis of unit root is rejected too often; and (2) the breakpoint is estimated incorrectly (Lee & Strazicich, 2004). As such, the Lagrange Multiplier (LM) unit root test with a structural break, as proposed by Lee

and Strazicich (2004), is also applied in this study to investigate the stationarity of the series in the system to avoid the spurious rejection of unit root null hypothesis with structural break and to estimate the breakpoint accurately.

Before investigating the existence of a long-run nexus among the regressors by bounds testing, the following unrestricted error correction model of the ARDL approach should first be estimated:

$$\Delta lnDC_t = \beta_1 + \sum_{i=1}^{k} \alpha_i \Delta lnDC_{t-i} + \sum_{i=0}^{k} \lambda_i \Delta lnFDI_{t-i} + \sum_{i=0}^{k} \chi_i \Delta lnI_{t-i} + \sum_{i=0}^{k} \delta_i ln\Delta L_{t-i} + \sum_{i=0}^{k} \varphi_i ln\Delta TRADE_{t-i} + \phi_1 lnDC_{t-1} + \phi_2 lnFDI_{t-1} + \phi_3 lnI_{t-1} + \phi_4 lnL_{t-1} + \phi_5 lnTRADE_{t-1} + \theta D98 + \varepsilon_t \quad (4)$$

where Δ denotes the first difference operator.

The bounds testing procedure is to test the null hypothesis of no cointegration among variables ($\varphi_1=\varphi_2=\varphi_3=\varphi_4=\varphi_5=0$) from Equation (4), based on joint F-statistics. Two sets of critical values, as reported in Narayan (2005), will be provided once the series satisfies the underlying assumption of the ARDL approach. The null hypothesis is rejected if the calculated F-statistic exceeds the upper bound, thus implying cointegration among the variables. In contrast, the null hypothesis is not rejected if the calculated F-statistic lies below the lower bound, inplying no cointegration among the variables. If the calculated F-statistics fall between the upper and lower bounds, no conclusion can be made.

If the null hypothesis of no cointegration among the variables is rejected, the long-run model can be further estimated in Equation (5) as follows:

$$lnDC_t = \beta_2 + \sum_{i=1}^{k} \alpha_{2i} lnDC_{t-i} + \sum_{i=0}^{k} \lambda_{2i} lnFDI_{t-i} + \sum_{i=0}^{k} \chi_{2i} lnI_{t-i} + \sum_{i=0}^{k} \delta_{2i} lnL_{t-i} + \sum_{i=0}^{k} \varphi_{2i} lnTRADE_{t-i} + \sum_{i=0}^{k} \theta_{2i} D98_{t-i} + \varepsilon_{2t} \quad (5)$$

Error correction term (ECT) illustrates the speed of the regressors to converge back to the long-run equilibrium. The ECT equation is defined as follows.

$$ECT_t = lnDC_t - \beta_2 - \sum_{i=1}^{k} \alpha_{2i} lnDC_{t-i} - \sum_{i=0}^{k} \lambda_{2i} lnFDI_{t-i} - \sum_{i=0}^{k} \chi_{2i} lnI_{t-i} - \sum_{i=0}^{k} \delta_{2i} lnL_{t-i} - \sum_{i=0}^{k} \varphi_{2i} lnTRADE_{t-i} - \sum_{i=0}^{k} \theta_{2i} D98_{t-i} \quad (6)$$

To enhance both the robustness and reliability of the regression output, diagnostic tests are carried out to assess the validity and reliability of the estimates in this study.

4. Empirical Results and Discussion

Table 3 Unit root test results

Variables	Without a structural break				With a structural break			
	ADF-GLS		ADF-WS		LS unit root test			
	Level	First differences	Level	First differences	Level	Break-point	First differences	Break-point
***ln*DC**	-0.301	-2.795**	1.068	0.481**	-3.650	2001	-4.561**	1998
***ln*FDI**	-0.725	-4.141***	0.976	-0.058***	-4.156	1999	-5.590***	1998
***ln*I**	0.199	-4.101***	1.028	0.156***	-3.370	2007	-5.501***	2006
***ln*TRADE**	-0.119	-3.807***	1.053	0.226***	-2.693	2003	-6.819***	2003
***ln*L**	-0.403	-3.339***	1.065	0.327***	-4.388**	1999	-5.335***	2008

Note: *** and ** denote that the test statistics are significant at the 1% and 5% levels of significance, respectively. Dickey-Fuller regressions include an intercept in both the levels and first differences. The LS unit root test is examined under Model (C) which allows for a shift in intercept and a change in trend slope under the alternative hypothesis.

The results of the unit root tests are shown in Table 3. From the table above, both the ADF-GLS and ADF-WS tests indicate that all of the series are stationary at *I*(1) and revealed that the ARDL approach is a suitable method for this study. However, to further ensure that the ARDL approach is appropriate

to generate robust and reliable results, this study employed the LS unit root test using the LM method with a structural break. The breakpoint for each series is auto-generated by the system. The result derived from the LS unit root test signifies that all of the series are stationary at *I*(1), except for labour force in the construction sector, which is at *I*(0). The various unit root tests results, as exhibited in Table 3, verified that the ARDL approach is the appropriate method to treat the data as none of the series is *I*(2) in the system. Due to the favourable unit root test results, this study proceeded to conduct the bounds test.

Table 4 Bounds test results for cointegration based on the ARDL approach

				Bound test critical values (Unrestricted intercept and no trend)	
Model	**F statistic**	**Lag**	**Level of significance**	***I*(0)**	***I*(1)**
F($lnDC_t$/$lnFDI_t$, lnI_t, $lnTRADE_t$, lnL_t)	11.226	1,0,0,0,0	1%	4.768	6.670
			5%	3.354	4.774
			10%	2.752	3.994
n = 27					

Note: Critical values are based on Narayan Table Case III (Narayan, 2005)

Table 4 shows the bounds test results for cointegration. The lag for each variable is generated automatically by the system. From Table 4, it is noticeable that the F-statistic (11.226) is larger than the critical upper bound value (6.67) at the 1% level of significance. Thus, the test result indicates that there is a long-run cointegration nexus among the dependent variable, namely; development of the construction sector and its independent variables, namely; FDI inflows from China to Malaysia, infrastructure, the labour force in the construction sector and bilateral trade between China and Malaysia. As a result, this study continued to estimate the impact of each independent variable on the development of the construction sector in Malaysia in the long run.

Table 5 Estimated long-run coefficients of the ARDL approach

Dependent variable, $lnDC_t$: Regressors	**Coefficients**	**t-ratio [p-value]**
The long-run results:		
$lnFDI_t$	0.159	2.290 [0.033]**
lnI_t	0.904	2.696 [0.014]**
$lnTRADE_t$	-0.643	-4.609[0.000]***
lnL_t	1.305	2.010 [0.058]*
D98	-1.335	-2.536[0.020]**
constant	-2.574	-0.772[0.449]
ECT	-0.230	-3.602[0.002]***
Adjusted R^2	0.988	
Durbin-Watson statistic	1.986	
F-statistic	269.423[0.000]	

Notes: ***, ** and * denote that the test statistics are significant at the 1%, 5% and 10% levels of significance, respectively.

Table 5 above shows the long-run coefficient for each independent and the dummy variables using the ARDL method. Arising from the impact of the 1997 Asian Financial Crisis, a structural break occurred in 1998. Thus, a dummy variable for 1998 (*D98*) was added to the empirical model. The

outcome of the regression confirms that 1997 Asian Financial Crisis which adversely affected Asian economies, particularly, East Asia and Southeast Asia, had a negative and significant impact on the development of the construction sector in Malaysia.

Besides, the result derived from the ARDL method signifies the positive impact of FDI on the development of the construction sector in Malaysia, as it is significant at the 5% level of significance. This finding indicates that investment projects carried out under the umbrella of the BRI would promote the development of the construction sector directly and sustain Malaysia's economic growth indirectly, in the long run. Furthermore, this outcome is consistent with the findings of Sacilotto and Loosemore (2018) where the authors found that FDI inflows from China to Australia were mainly Australia-centric and they drew the conclusion that FDI inflows from China to Australia was crucial to the development of the construction sector in Australia. To avoid the risks associated with FDI inflows, Sacilotto and Loosemore (2018) suggested that countries should not withdraw from or oppose to FDI inflows from China, but should develop close collaborative links, to improve direct communications, between both Chinese and local firms. Similarly, the government of Philippines declared that FDI from China not only improve the country's infrastructure but also benefits the economic growth by imposing fringe benefits to various sectors sector as trade, agriculture, tourism, etc. (Chao, 2021).

Apart from the above, the empirical result also supports the findings of Mensah, Osei, Dauda, and Salman (2019). The authors revealed that although there were risks associated with FDI, it has had a positive and significant impact on most countries' economies and, therefore, must be promoted. Mensah et al. (2019) also found that FDI inflows possesses a positive relationship with economic growth in many countries, such as the United States, Spain, Finland, Canada and Korea.

Likewise, the empirical result infers that infrastructure imposes a positive and significant impact on the development of the construction sector in Malaysia at the 5% level of significance. This result confirms that infrastructure is one of the main prerequisites for the development of the construction sector. Good infrastructure enables a smooth process in carrying raw materials, materials, semi-finished goods and finished products. Hence, good infrastructure in a country will promote the development of the construction sector and economic growth. This argument is compatible with the findings of Ivanova and Masarova (2013). Similarly, Hussain et al. (2019) also put forward the argument that infrastructure, particularly, transport infrastructure, would eventually impose a positive and significant impact on Brazil, Russia, India and China (BRIC) economic growth. Nonetheless, Iryna Tsymbaliuk and Alghadhywi (2020) revealed that infrastructure is the prerequisite for growth and via construction development. Hence, it can be intuited that BRI-infrastructure projects will promote the development of the construction sector in Malaysia and stimulate the country's economic growth.

It is noticeable that out of the three independent variables which impose positive and significant impacts on the development of the construction sector, the effect of the labour force in the construction sector is the greatest, with the size of the coefficient at more than 1%, which falls under the category of elastic. Hence, it can be concluded that the labour force in the construction sector is of paramount importance to the development of the sector. The results also signify that labour still remain the main factor of construction development. This result is consistent with the Cobb-Douglas production function. Based on the result above, one can postulate that with the advancement of technology in China, the BRI-led construction projects will enhance the skill-upgrading of Malaysia's labour force in the construction sector and result in the expansion and development of this sector. This postulation supports the findings of Souare and Zhou (2016) who revealed that most industries in Canada have experienced skill upgrading following foreign investment inflows. Likewise, Luo et al. (2020) also revealed that it is of paramount important to enhance and continuously upgrade the skills of the labour to sustain the expansion and development of construction section.

The only independent variable that imposes a negative and significant impact on the development of the construction sector is bilateral trade between China and Malaysia. According to the Ministry of International Trade and Industry Malaysia (MITI) (2019), manufactured products continuously dominate Malaysia's trade, amounting to RM1,598.85 billion in 2018. Meanwhile, China is the largest trading partner of Malaysia accounting for 16.7% of the total trade of Malaysia. The MITI (2019) also

revealed that China is Malaysia's largest export market and the third-largest importer of electric and electronic products. Therefore, this finding posits that the escalation of bilateral trade between Malaysia and China devotes the majority of resources to the manufacturing sector which might attribute a negative impact on the development of the construction sector.

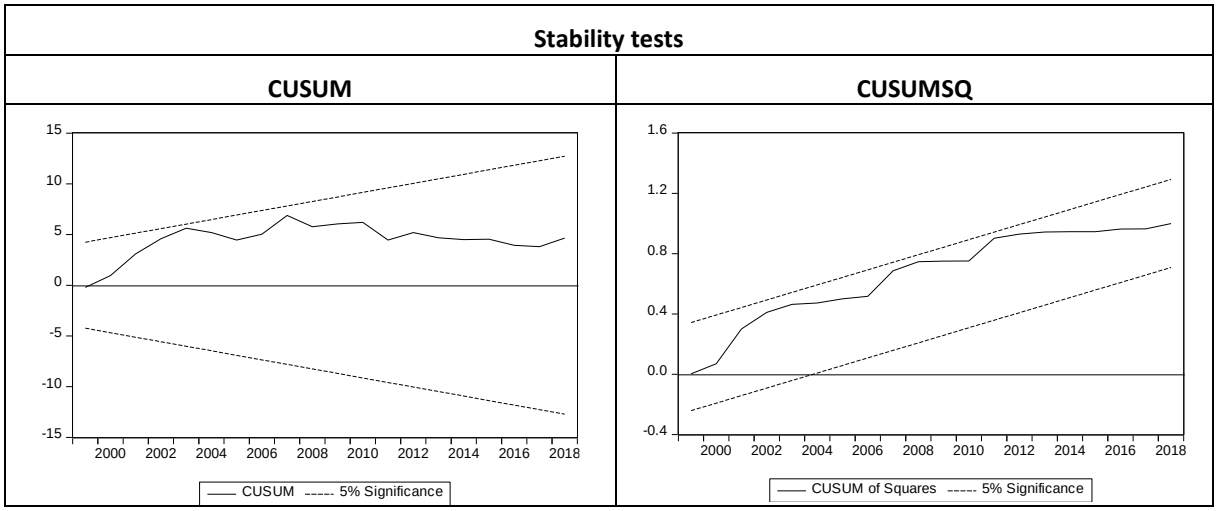
Nevertheless, the coefficient of the error-correction term is negative and significant at the 1% significance level. The result infers that about 23% of any disequilibrium between the variables of the model above will be corrected within one year.

Table 6 Results of the ARDL diagnostic tests

Test statistics	LM version	*F* version
Normality test	CHSQ (2) = 1.682 [0.431]	Not applicable
Serial correlation test	CHSQ (1) = 0.008 [0.927]	*F* (1, 19) = 0.006 [0.940]
Heteroscedasticity test	CHSQ (1) = 1.310 [0.252]	*F* (1, 25) = 1.275 [0.270]
ARCH test	CHSQ (1) = 0.130 [0.719]	*F* (1, 24) = 0.120 [0.732]
Ramsey RESET test	CHSQ (1) = 0.881 [0.348]	*F* (1, 19) = 0.641 [0.433]

Notes: CHSQ indicates the Chi-square value, F value represents the F-statistics and the figures in parenthesis indicate the probability values.

Figure 1 Results of the ARDL diagnostic tests



Notes: CHSQ indicates the Chi-square value, F value represents the F-statistics and the figures in parenthesis indicate the probability values. CUSUM and CUSUM square are tools used to examine the stability test. The model is stable if the line is lies between the lower bound and upper bound of both CUSUM and CUSUM Square.

To ensure that the model is fit for the estimation and the derived results are reliable, a series of diagnostic tests are carried out. The output from the diagnostic tests is exhibited in Table 6 and Figure 1. The diagnostic results confirm that the empirical model is free of all diagnostic problems such as autocorrelation, autoregressive conditional heteroscedasticity and non-linear relationships. Therefore, the model is stable and the regression output is robust and reliable.

5. Conclusions and Policy Recommendation

The five core elements of the Belt and Road Initiative aim to promote connectivity between China and the participating BRI countries from Asia, Africa and Europe.

Already, huge investments in infrastructure in many participating BRI countries is underway to achieve facilities connectivity. Some megaprojects, such as The Port of Piraeus and the Khorgas-Almaty Road have achieved great success. However, according to Rudoph (2019), dissenting voices, concerning the creation of debt traps, the erosion of national sovereignty and unsustainable financial burdens are heard. Malaysia, as one of the participating countries in the BRI, has collaborated with a

Chinese-owned company, namely; CCCC to develop a mega transport project, namely; the ECRL. This project was suspended shortly after its commencement, then revived one year later, at a significantly reduced cost.

Owing to the contradictory views from the participating countries, using ARDL method, this study aims to identify the long-run relationship between the development of construction sector in Malaysia and FDI inflow from China to Malaysia during 1991-2018. The outcome of this study could provide insights whether BRI-linked construction projects will benefit Malaysia's construction sector, in particular, or Malaysian economy, in general. Hence, the outcome of this research is crucial for the policy makers to formulate the policy that eventually enhance the economic development of Malaysia. The empirical results revealed that FDI inflow from China has had a positive and significant impact on the development of construction sector in Malaysia in the long-run. In addition, the result also indicates that labour force in construction sector plays the key role in the development of construction sector. As such, the findings suggest that Malaysian government should continue to implement open door policy for the influx of FDI from China and collaborate with China in planning and executing construction projects in order to stimulate the development of construction sector and to sustain the long-run economic growth. It is highly likely that the FDI inflow from China will enable the local labours to gain the benefits of technology transfer by acquire knowledge from China's skill labours and subsequently enjoy the upliftment of skill-set.

As contrast from most of the past studies, the outcome of this study adds value to the current BRI literature by focusing on the indepth analysis of construction sector. Based on the research outcome, to achieve the objective of stimulating development in the construction sector, the Malaysian government should be more selective in promoting China's FDI. Malaysia should welcome FDI involving high-technology for BRI-linked projects in order to gain the benefits of technology transfer. In addition, in order to avoid entering into debt traps and the problem of the loss of national sovereignty, transparency concerning the agreements between the two countries is of the utmost importance. Therefore, the Malaysian government should form a competent team to execute periodic reviews on projects under the umbrella of the BRI to monitor the progress of each project and to ensure the adherence to agreements. If the above policy is implemented effectively, both China and Malaysia will reap the benefits of joint prosperity brought by the BRI.

6. Limitation of the study and future research

The main limitation of this study is the limited data available as BRI was only initiated in 2013. As a result, the impact of BRI on the construction sector in Malaysia is based on the intuition from the mixture of historical data and data beyond 2013. Besides, the unavailability of the disaggregate FDI data from China to Malaysia will affect the precision of the results. As such, when the extent of time in which the study is being conducted is prolonged, more data can be collected. As such, to produce more accurate findings, future research would be recommended to increase the number of observations and to source for disaggregate FDI data by sector.

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