UMS
UNIVERSITI MALAYSIA SABAH

IMPACT OF BELT AND ROAD INITIATIVE ON ECONOMIC GROWTH

Ai-Yee, Ooi [a], Nur Shahirah Azman[b*], Andrew Tek Wei Saw[c], Kit-Yik, Teoh[d]

[a,b,c,d] *Labuan Faculty of International Finance, Universiti Malaysia Sabah, Labuan, Malaysia*
Corresponding author's email: shahirah@ums.edu.my

ABSTRACT
Belt and Road Initiative (*BRI*) has been proposed by president of China in 2013, as the purpose of boosting developments and trade activities in China, Asia, Europe, Middle East and Africa. The study focuses on examining the impacts of *BRI* strategy towards the economic growth of 60 participated countries. Panel data analysis is used to determine the relationship of foreign direct investment, government expenditure, international trade, exchange rate and inflation rate with gross domestic production. We divide the sample into pre-and post-*BRI* covering from 2008-2013 and 2014-2020 respectively to better dissect the impact of *BRI* on economic growth. Our findings show that the impact of foreign direct investment and exchange rate on economy growth are significant during the period of pre-*BRI* while after *BRI* foreign direct investment, exchange rate, government expenditure and inflation are found significantly associated with economic growth. The findings also demonstrate the expected sign of the relationship with theory; merely government expenditure shows unexpected negative sign. The study covers almost full sample of participated countries lead to the highly reliable panel regression results. The finding perhaps can be the guideline to those countries who intend to be part of *BRI* in the future.

1. INTRODUCTION
In late 2013, Xi Jinping, president of the Republic of China announced the country's strategy for a new global financial order in boosting developments and trade activities for China. This project is surrounding by so call the "Silk Road Economic Belt" and the "Twenty-First-Century Maritime Silk Road", together known as the Belt and Road Initiative (*BRI*) or One Belt One Road. *BRI* significantly showed its potential to be the world's largest platform for regional collaboration, as this striving project focuses on effectively improves and produces new trading routes for trading of goods and services,

as well as business opportunities with China, which included a combined of more 100 countries across Europe, Asia, the Middle East and Africa (World Bank, 2018).

The main idea of this strategy is to improve connectivity and networking throughout Europe, Asia, the Middle East and Africa through a policy of financing and building infrastructure across Eurasia, the South China Sea, the Indian Ocean and the Mediterranean (Affairs, 2015; Ingavale, 2013). Both connectivity and networking are about more than just economic, financial and legal integration, they also represent interconnection among cultures, and bonds that bring communities together. Yanyi (2015) states that *BRI* as 'the most significant and far-sighted project' China had ever put forward, focused on promoting policy coordination, facilitating connectivity and network, unimpeded trade, financial integration and creating people-to-people bond.

The Silk Road project were aimed at connecting countries that holds 55% of the world Gross Domestic Product (*GDP*), 70% of global population, as well as 75% of energy reserves (Li, 2014; Inchamnan, 2018). *BRI* certainly holds great promises; however, this project will be shadowed with potential pitfalls for both China and the neighbour countries as well.

Lending funds to neighbouring countries in financing infrastructure expansions that China builds for them is a smart initiative to make new networks and producing new business for Chinese firms, conversely this way does include risks in terms of economic and political risks for China, the recipient countries and its local communities. For instance, due to *BRI*, China had loaned out hundreds of billions of dollars to fund infrastructure projects in foreign countries even when China was experiencing an economic slowdown at home. This may lead to huge losses, hundreds of billions of dollars and more if *BRI* fails to stimulate the Chinese economy and leaves neighbouring countries hopelessly in hock to Beijing.

The Chinese Government has announced more than $900 billion in project funding of *BRI*, some were in the process of constructing, with most of the funds were supplied from China's policy banks and commercial lenders, instead of funded by government expenditures. However, the lack of commercial requirements behind *BRI* projects may lead to a highly uncertainty whether future project returns will be sufficient to fully insured the repayments to Chinese creditors (Weinland, 2017). This entire project will be more towards a political gamble than a calculated commercial venture as the issue lies in most of the funding was provided by commercial banks instead of funded by the Chinese government. These commercial banks keep most of the cash savings of Chinese consumers, while their stocks are widely held by retail investors.

Before the launching of *BRI*, China had been facing speedy increase in debts and non-performing loan. Debts in the non-financial sector grew about 75% since year 2011, compared to 8.6% in debt growth that led up to the 2008 financial crisis. Thus, additional loans from the *BRI* project will only increase China's NPL issue and could cause a banking system crisis. From a borrower's perspective, failure to repay the loans could cause crisis for governments and regional economies of the country as well. Hence, whether *BRI* may succeed will have huge consequences within the revolving nations and causing impacts in the well-being of the economics of several regions. Therefore, the authors are interested to know how will these countries gain benefits from participating in this massive project from the aspect of their growth of economic, by testing the foreign direct investment, government expenditure, exchange rate, international trade and inflation rate (Muyambiri & Chabaefe, 2018; Maginga *et al.*, 2018).

The question is that does or did *BRI* give a positive influence on the economic growth of those countries that participated regardless of those debt involved, or it brings a more prosperity development to those poverty countries to a higher level. Drawing on the motivation, this paper intends to explore the impact of pre- and post-*BRI* on the economic growth of the 60 participated countries.

2. LITERATURE REVIEW

Belt and Road Initiative is a global infrastructure development strategy adopted by the Chinese government and it was proposed in October 2013 and included the Silk Road Economic Belt and 21st Century Maritime Silk Road, China promotes economic and trade cooperation with Europe, Asia, and Africa (Xue *et al.*, 2022). The importance and contribution of *BRI* in stimulating world economy growth has captured increasing attention for further research work.

Tian *et al.* (2016) states that China intentionally chooses low-income countries because they have potential to form more usual collaboration relations, and as a new starting point of both Chinese exports and investment. These underdeveloped countries are located in between the East Asian and West European economies, thus the prospective of turning into a new growth pillar of the global economy and form new markets for China's *FDI* and export. Lin and Zhang (2015) claim that China growth is at least partially pulled down by a fragile global economy, however if the major world economic restore more intensely, the growth might also get enhance. Brun *et al.* (2002) concentrate on the spillover effects of *GDP* from the countries coastal to non-coastal area and concluded that the spillover effects were not enough to lower down the income imbalances throughout the country.

BRI aims to improve connectivity, reduce trade costs, and promote market integration through large infrastructure projects whereby the component of infrastructure dominates China's *FDI* in Belt and Road countries. According to the Ministry of Commerce, 51.6% of overseas project contracting agreements in 2016 came from Belt and Road economies, which was 36% more than the previous year (Zou *et al.*, 2022). The Padma Rail Link in Bangladesh, the Peshawar-Karachi Motorway, the Hakla-Dera Ismail Khan Motorway, and a rail network to the Netherlands are among the projects. According to Zou *et al.* (2022), China invests in *BRI* infrastructure to adapt to the "New Normal". Hence, their study suggests *BRI* infrastructure projects could help China's economy through provides a better alternative to poor logistics and can create regional accessibility; it enables the smooth flow of production factor endowments, reducing production costs; and it indirectly strengthens the debt provider's home currency. Study by Wang *et al.* (2020) using cross country panel data from 2007 to 2016 finds that at the national level; the transport infrastructure in the *BRI* countries plays an essential role in facilitating economic growth.

Moreover, their study finds significantly positive spatial spillover effects of economic growth in the categories of geographical distance, economic distance, cultural distance, and institutional distance spatial weight matrices, i.e., shorter geographical distances and economic, cultural, and institutional similarities among the *BRI* countries lead to mutual economic growth. This contradicts with study by Demurger (2001) that estimates the correlation between infrastructure development and *GDP* in China that reveals unlikeliness in geographical place, transportation network and telecommunication infrastructure played a significant role in growth achievement throughout the provinces in China.

Growth is neither mechanical nor smooth. Economic growth depends on using production factors efficiently. Therefore, since the late 1950s, researchers have been studying what factors affect economic growth (Lucas, 1988; Romer, 1986; Solow, 1956; Swan, 1956). As the vast literature shows, many factors affect a country's economic growth. Among the factors, foreign direct investment and exchange rate have been widely debated as most influencing elements on economic growth. A study by Cruz-Rodríguez (2022) provides empirical support for the hypothesis that exchange rate regimes affect economic growth in advanced, emerging, and developing countries. In the post-Bretton Woods period, the effects of different exchange rate arrangements on economic growth are examined using least squares dummy variable regressions on 125 countries (1974-1999). In international macroeconomics, exchange rate regime is a recurring issue. Empirical evidence shows that developing countries with fixed regimes have higher growth. Recently, currency crises in Asia, Russia, Brazil, and Argentina have increased interest in this area, and exchange rate regimes are more important in developing countries. A study by (Rao *et al.*, 2019) examines the effects of exchange rate regimes on *BRI*CS growth. The research spans 1970 to 2012. According to this study, pegged exchange rate regimes are not associated with better growth. *BRI*CS countries with pegged regimes have poor growth performance. The effect of a pegged regime's price stability on growth and *GDP* growth is positive. Countries with pegged regimes have lower real interest rates because they're an anti-inflationary tool. Thus, low real interest rates lead to more investment, which increases economic growth. Adopting a pegged regime can boost trade and economic growth in *BRI*CS nations. Therefore, it is essential to study if the economic corridor such as *BRI* could be significant to boost the economic growth to China.

Nonetheless some researchers found positive relationship between exchange rate and economic growth, among them are example Akinbobola and Oyetayo (2010), Tyers *et al.* (2008), and Thapa (2002). Miles (2006) claim that there have been a several mechanisms through which exchange rates are expected to affect the growth of economic. For example, Levy-Yeyati and Sturzenegger (2005) display those rates of floating lead to augmented growth for developing market countries. Ghosh *et al.* (2003), nevertheless, provide evidence that the exchange rate regime is not a matter for growth, but then the real exchange rate is totally essential for the growth of economic with proof of high growth stages being connected with underrated currencies. According to Stephen (2017), exchange rate is a key variable for strong economic formation in every nation. Miles (2006) highlights that a common currency depresses interest rates and currency risk thus driving economic growth and investment. Miles found that the exchange rate has a long run negative influence on economic growth which contrast with his expectation while Fapetu and Oloyede (2014) find a significant short-run nexus between economic growth and both foreign direct investment and foreign exchange.

In addition, *FDI* also has been identify as one of crucial factor contribute to the economic growth. *FDI* is a way to increase the host country's physical and human capital which then potentially increases the real *GDP*. Furthermore, *FDI* helps in the generating technological spillovers, transferring knowledge development of new enterprises, and also provides opportunities for the host countries to integrate into the global economic trade (Raza *et al.*, 2021). Separate literature examines *FDI*'s effects on productivity and economic growth. Sinha & Sengupta (2022) examine the dynamic interrelationships between foreign direct investment (*FDI*), ICT expansion, and economic growth in Asia-Pacific developing countries from 2001 to 2017. They used data from the World Bank

and World Telecommunication Indicators databases to do so. Their findings show that *FDI* and ICT have positive effects on economic growth, and ICT expansion influences *FDI* inflows in those countries. According to their study, ICT should be improved to attract more *FDI* and boost economic growth. Raza *et al.*, (2021) found a positive and significant association between *FDI* and economic growth in OECD countries from 1996–2003 by using the fixed effect model and the Generalized method of moments (GMM) estimator. This finding also consistent with study by Choi & Baek (2017) found that *FDI* has a positive impact on aggregate factor productivity, and the government should design policies to attract *FDI* in the finance, telecommunications, and computer software sectors in India.

Besides that, scholars such as Azman-Saini *et al.* (2010), Alfaro *et al.* (2010) and Hermes and Lensink (2003), argue that *FDI* has a positive impact on economic growth notably in the developed market of financial. According to Belloumi (2014), an exogenous upsurge in foreign direct investment would increase the income per capita and capital amount for the time being as shrinking returns would enforce a limit to the economic growth in the long-run. Furthermore, Azman-Saini *et al.* (2010) inspect the data from 91 countries over the period ranging from 1975–2005. Their results demonstrated a positive effect of *FDI* on the growth of economic, in a condition when the financial markets development surpasses a starting point level. Almfraji, Almsafir, and Yao (2014) use the VAR model to analyze the relationship between *FDI* and economic growth and they noticed that economic growth and *FDI* inflows interrelate with each other in relative long term. The significant relationship between *FDI* and *GDP* are supported by Faisal *et al.* (2016), Bekhet and Al-Smadi (2015), Dritsaki and Stiakakis (2014).

Low inflation and high economic growth are two major macroeconomic goals. Due to economic uncertainty, the reciprocal relationship between inflation and growth is a hot topic among policymakers. The government can't control inflation due to economic uncertainty for the example pandemic and unpredictable economic disaster that effect factor of production and this give negative impact to supply and demand of goods. Inflation causes prices to rise persistently. Multiple price indices are rising. In a growing and changing economy, prices rise and fall as supply changes to meet consumer and national needs. Many studies show predictable high inflation can harm an economy's long-term real growth or real activity. Study by Olusola *et al.*, 2022) investigate the causality relationship between inflation and economic growth between the years 1996 and 2019 in 27 EU countries. In their analysis, two variables were used as an indicator of inflation which are consumer prices Index (CPI) and *GDP* deflator. The results show that there is a bidirectional causality relationship from inflation to growth and from growth to inflation for both inflation indicators. Some researchers study IT's effect on economic growth.

Nene *et al.* (2022) assesses the effect of inflation targeting (IT) policy on inflation uncertainty and economic growth in African and European countries using GARCH and PVAR (PVAR). IT has a negative impact on economic growth in African countries, but a positive impact in European countries. In addition, their study finds that, Africa's IT strategy has a negligible effect on economic growth compared to Europe. Overall, European countries' inflation targeting regimes are more credible in reducing inflation uncertainty and sustaining economic growth than African countries.

Studies by Majumder (2016), Bhusal and Silkapar (2012), Mubarik and Riazuddin (2005), Mallik and Chowdhury (2001), demonstrate a positive relationship between

inflation and economic growth when economic growth is high, with a condition where inflation rate must be stable or it does not exceed more than 6%, this results are consistent with Mahmoud (2015). However, Ahmad *et al.* (2013) and Iqbal and Nawaz (2010) find a negative relationship between those variables. In fact, the high rate of inflation is decent for business class or high-income population however is bad for low-income population. In the study of Ali (2014) infers that the long run relationship is exist in the variables and positive relationship are also found between economic growth and inflation, and the result was similar with Mubarik and Riazuddin (2005). However, Madurapperuma (2016) claims that the relationship between economic growth and inflation have negative long run relationship.

International trade is the main and leading form of international economic relations, and it's expanding. According to international think tanks, international trade will account for 56% of global *GDP* in 2020. In 2020, world trade will be 39 trillion (Ibrahim AL-SULAIM, 2022). International trade plays an important role in the development of global economic entities, both as a factor of economic growth and of increasing interdependence. A study by Qi *et al.* (2022) uses the tri-variables Toda-Yamamoto model to examine West Africa's energy consumption, economic growth, and trade. Findings show that trade opening and economic growth in West Africa are mutually reinforcing. Next, foreign trade boosts economic growth more in less developed countries. When grouping countries by *GDP* per capita, there is a bilateral causal relationship between energy consumption and trade openness in the higher economic development group. This study also finds that trade openness boosts economic growth more in less developed West African nations. Another study by Kushwah *et al.* (2022) examines the relationship between financial development, innovation, trade, and economic growth in 20 developing and developed nations. Using Dynamic, Modified, and Simple OLS. The study found a link between economic growth, trade, and innovation for developed nations. For developing nations, economic growth is linked to trade, financial development, and innovation. The opposite is true for innovation. In developed nations, economic growth (EG) is boosted by trade (TO) and financial development (FD), while in developing nations, trade (TO), innovation, and FD boost EG. When using the vector error correction model, short-run causality between growth, trade, and innovation in developed nations and only between growth and trade in developing nations further confirms the results.

Razmi and Refaei (2013) state that open economies tend to succeed in high growth rates of economic than closed economies. International trade has a positive effect on economic growth and it became more important as the expansion of world markets took root within the global economy. Herzer (2013) notices that there is positive impact toward the openness of trade for developed countries and negative impact for developing countries. Zeren and Ari (2013) shows that there are positive bidirectional causal links exit between economic growth and openness in G7 countries. On the contrary, by using dynamic data, Ulaşan (2015) argues that trade openness will only enhance the economic growth with the intervention of other external factors. He also judges that measurement of trade openness is not significantly robust related with economic growth. Consistent with this argument, Trejos and Barboza (2015) depict that that trade openness might not the main element driven the economic growth in Asian, nevertheless the higher level of openness induces the higher output growth. The advantage of trade openness is not spontaneous. Accompany trade openness, policies as a measure aimed at nurturing the stability of macroeconomic and to create favourable investment climate (Newfarmer and

Sztajerowska, 2012). The inconclusive result of the trade growth could be due to the various research methods practice different gauges for trade openness. In sum, a vast of previous studies centered on cross country growth regressions propose a substantial growth in trade that leading to the growth in economic (Akimzhano *et al.*, 2018; Le Goff and Singh, 2014; Edwards, 1998).

Government expenditure also known as government spending which is one of the tools in a government's fiscal policy as it can affect the movement of *GDP* through its implications for the effectiveness of distribution of resources. There is a lot of research by many authors on the impact of government spending on a country's economic growth. Many studies confirm that government spending has a positive impact on economic growth (Lee *et al.*, 2019; Nyasha & Odhiambo, 2019). While some research such as Chen and Xu (2022) confirm that government expenditure contributes as source of stabilizing tool to the economic growth of varied nations under the industrialized and emerging projects. In addition, some study looking at the role of government expenditure towards green economy sustainability (Jin *et al.*, 2022). On the other hand, others have found a negative impact of government expenditure towards economic growth (Lupu *et al.*, 2018; Nwani and Omankhanlen, 2019; Nurudeen and Usman, 2010). While Olopade and Olopade (2010) conclude government spending have no significant impact on economic growth.

Drawing from the previous studies, thus far, there is no study has covered the impact of *BRI* project on the economic growth in the large number of participated nations. The primary motivation of this study is to analyze the complementary nature between the possible determinants and nations' economic growth extension of *BRI*.

3. DATA AND METHODOLOGY

The study aims to examine the impacts of *BRI* towards the economic growth of participated countries. Our sample includes annually data of gross domestic product (*GDP*), foreign direct investment (*FDI*), value of international trade (*TRADE*), government expenditure (*GE*), inflation (*INF*) and exchange rate (*EX*) of 60 countries, covers from the period of 2008 to 2020. These data are retrieved from World Bank and OECD database. We divide the sample into two sub-periods to better dissect the impact of *BRI* on economic growth. First sub-period is known as pre-*BRI* covers from year 2008 to 2013 where before the countries join the project; whilst second, post-*BRI* covers from 2014 to 2020 where the countries have agreed to join the project. All the series are transformed into logarithm form except the inflation rate, and the data are winsorised at 1st and 99th percentile before proceeding to regression development.

The winsorization safeguard our regression from the potential bias of outliers' effects. The Eviews 11 is employed to obtain the results for the model in equation (1). In order to answer the objective of the study whether *BRI* gives a positive influence on the economic growth of the participated countries, we formulate five hypotheses as follows:

H1: A positive relationship exists between foreign direct investment and gross domestic product.

H2: Government expenditure and gross domestic product is negatively associated.

H3: International trade and gross domestic product has a positive relationship.

H4: Exchange rate is negatively associated with gross domestic product.

H5: Inflation and gross domestic product is negatively related.

Three panel models namely pooled Ordinary Least Square regression, fixed effect and random effect models are considered. The most appropriate model will be tested by using Poolablity F-test (Pooled OLS verses FEM), Breusch-Pagan Lagrange Multiplier test (Pooled OLS verses REM) and Hausman test (REM verses FEM). The evaluation of a panel regression can be specified as follows:

$$\ln GDP_{it} = \beta_0 + \beta_1 \ln FDI_{it} + \beta_2 \ln GE_{it} + \beta_3 \ln TRADE_{it} + \beta_4 INF_{it} + \beta_5 \ln EX_{it} + \mu_{it} \tag{1}$$

$\beta_0 ... \beta_5$ represent the intercepts and the coefficients associated with the respective explanatory variables, $\ln GDP$ denotes gross domestic product, $\ln FDI$ represents foreign direct investment, $\ln GE$ is government expenditure, $\ln TRADE$ is international trade, INF denotes inflation rate and $\ln EX$ represents exchange rate.

The existence of serial correlation can be diagnosed by using Wooldridge serial correlation test, with the null hypothesis of the model is free from serial correlation. Whilst Pesaran Cross-Sectional Dependency (Pesaran, 2021) test is used to detect the cross-section dependence problem. Rejection of null hypothesis shows the existence of cross-section dependence problem in the model.

4. ANALYSIS

Table 1 shows the summary statistics of the dependent and all independent variables for 60 countries in our study. The statistics derive from the original values of the variables. We calculate the Pearson correlations of the variables and the correlation matrixes are presented in Table 2. Consistent with H1, *FDI* is positively correlated with *GDP*, while *GE* and *EX* are negatively correlation with *GDP* which are in line with H3 and H4. Nevertheless, the sign of correlation for *TRADE* and *INF* are contrasted with the expected outcomes.

Turning to the model selection and diagnostic tests, the findings of Poolability, the Breusch-Pagan LM and Hausman tests in Table 3 show that fixed effect model (FEM) is most appropriate models for both pre- and post-*BRI* models. Based on the smallest value of Schwarz criterion, the two-way fixed effect model is selected for pre-*BRI* and one-way fixed effect is selected for post-*BRI* respectively. The model was diagnosed both autocorrelation and cross-section dependency problems. In order to mitigate the biases on the estimation due to these problems, we adjust for the clustered standard errors in the baseline estimations.

Table 4 shows the baseline estimation results for both pre-*BRI* and post-*BRI*. Foreign direct investment and exchange rate is strongly significant related to gross domestic product during pre-*BRI*. Foreign direct investment is found positively correlated to *GDP*, on the contrary EX indicate negative relationship with *GDP*. The other three variables are found no significant impact on *GDP*.

The findings of post-*BRI* show that all the variables are statistically significant correlated with gross domestic product except international trade. Foreign direct investment shows positive impact on economy growth while government expenditure, inflation and exchange rate show inverse relationship with *GDP*.

Before Belt and Road Initiative, government expenditure and inflation rate are found not significant to gross domestic product. However, after joining Belt and Road Initiative, both variables have become significant toward gross domestic product. This may be due to after the announcement of the joining the Belt and Road Initiative, these countries' have widely applied exchange rate.

Table 1: Summary statistics.

	N	Mean	S.D.	Min	Max	P5	P25	Median	P75	P95
GDP	780	25.0363	1.6725	21.4182	29.8897	22.5730	23.6582	24.8418	26.2432	27.7780
FDI	734	21.4166	1.8367	16.3813	26.1844	18.2899	20.3335	21.3432	22.7201	24.4939
GE	780	23.0712	1.7060	19.6728	28.0498	20.5729	21.7873	22.9572	24.2337	25.9901
TRADE	763	4.4190	0.5274	2.7808	5.9055	3.5435	4.0537	4.4707	4.7850	5.1203
EX	712	3.3713	2.9180	-1.2496	10.0454	-0.6035	1.1630	3.2308	4.8661	9.1470
INF	762	4.8811	5.4432	-2.0794	29.5066	-0.6648	1.4571	3.3621	6.7066	14.8379

Notes: The table summarizes the statistics for all the variables of 60 countries in the baseline model (1). *S.D.* denotes standard deviation and *N* indicates the number of observations. *P5, P25, P75 and P95* are percentiles at 5th, 25th, 75th and 95th respectively.

Table 2: Correlation matrix.

	GDP	*FDI*	*GE*	*TRADE*	*EX*	*INF*
GDP	1.0000					
FDI	0.8223	1.0000				
GE	-0.9781	0.5054	1.0000			
TRADE	-0.2878	-0.0508	-0.2175	1.0000		
EX	-0.0083	-0.0059	-0.0978	-0.3889	1.0000	
INF	0.0324	-0.0006	-0.0095	-0.2421	0.2322	1.0000

Notes: The table depicts the Pearson correlation coefficients between the variables in the baseline model (1).

Table 3: Model selection and diagnostic tests.

	Model Selection		Diagnostic Test	
	pre-*BRI*	**post-*BRI***	**pre-*BRI***	**post-*BRI***
Poolability F-test	1126.6408 (0.0000)	443.0310 (0.0000)	-9.06E+15 (0.0000)	-7.05E+11 (0.0000)
BPLM-stat	142.6132 (0.0000)	118.9882 (0.0000)	-1.212 (0.2255)	5.9995 0.0000)
Chi-Square stat	12.4419 (0.0292)	209.8454 (0.0292)		

Notes: The table presents the model selection and diagnostic test results. Three tests: Poolability F-test, Breusch-Pagan LM-statistic and Hausman test are used preferred model selection while Wooldrige serial correlation and Pesaran cross-sectional dependency are used as model diagnostic test. The value in the parantheses is standard error. *** , ** and * refer to the statistical significance at 1%, 5% and 10% levels.

Table 4: Gross domestic products and its determinants.

	pre-*BRI*	post-*BRI*
C	7.9652***	16.4606***
	(1.6673)	(1.2886)
ln*FDI*	0.8296***	0.7479***
	(0.0553)	(0.5218)
ln*GE*	-0.4478	-0.0844***
	(0.2649)	(0.0279)
ln*TRADE*	0.0985	-0.0092
	(0.1143)	(0.0544)
INF	0.0031	-0.0191**
	(0.0251)	(0.0089)
ln*EX*	-0.2205***	-0.1033***
	(0.0636)	(0.0386)

Notes: The table provides the summary results for the baseline estimation in (1). Fixed Effect model is used to regress gross domestic product (ln*GDP*) on the determinants, foreign direct investment (ln*FDI*), international trade (ln*TRADE*), government expenditure (ln*GE*), inflation (*INF*) and exchange rate (ln*EX*). C is constant of the regression. The value in the parantheses is clustered standard error. ***, ** and * refer to the statistical significance at 1%, 5% and 10% levels.

5. CONCLUSION

This study aims to explore the impact of pre- and post- Belt and Road Initiative (*BRI*) toward the economic growth on the countries that participate in the *BRI* campaign by using panel data analysis.

Foreign direct investment and exchange rate show significant impact on economy growth during the period of Pre-*BRI*. The results indicate that foreign direct investment is positively significant at 1% level, though exchange rate is negatively significant at 1% level. The findings indicate that the more inflow in foreign direct investment, the more influence toward economic growth.

The result of exchange rate shows a negative relationship toward gross domestic product as expected in theory. A rise in output would raise import due to the income effect, leading currency to depreciate as people buy foreign currency to purchase import goods. The negative sign may also due to the higher output cause interest rate to be raised, this circumstances then attract inflow of foreign currency who seek for higher return in financial markets, eventually trigger the home currency to appreciate.

In the Pre-*BRI* Model and Post-*BRI* model both show exchange rate have a negatively significance relationship with gross domestic product. This may be due to the reason that after those countries agrees to join *BRI*, their currency has been more stable. The main objective of *BRI* project was to improve the connectivity and networking throughout Europe, Asia, the Middle East and Africa through a policy of financing and building infrastructure across Eurasia, the South China Sea, and the Indian Ocean. Connecting and linking the exchange rate with the major or strong currency country like China, meaning those countries that have participated in the project of *BRI* will remain their currency stable in order to upsurge their economic growth.

Our results also reveal that after joining *BRI*, both inflation rate and government expenditure were found significant and negatively correlated toward economic growth. This can be reasoned that low inflation would contribute to a higher rate of growth (Olusola *et al.*, 2022). This is because low inflation rate helps to promote stability,

confidence, and encourages for investment. The investment will further promote long term economic growth. In addition, low inflation increases purchasing power which raise consumption and therefore increases the gross domestic product. The negative sign could also be due to the high and volatile inflation rates that suffer by an economy, and then rates of economic growth tend to be lower.

The effect of government expenditure is straight forward towards gross domestic product. *BRI* is one of the most massive development strategies between China and neighboring countries that holds 55% of the world gross domestic product, 70% of global population and 75% of energy reserves (Li, 2014). Hence, most of the government spending on the development is expected to increase the economy growth. However, our finding shows inverse relationship between government spending and economy growth which is consistent with the latest literatures (Nwani & Omankhanlen, 2019; Lupu *et al.*, 2018). The results could be due to the project involves almost half of the world economies and it takes a longer period to see the return on the government spending. Furthermore, the global economy growth was stagnant due to the pandemic Covid-19, lending fund to neighboring countries in financing infrastructure developments and lack of commercial requirements behind the *BRI* projects in foreign countries cause the unexpected sign was found between government spending and gross domestic product.

The Belt and Road Initiative is an ambitious effort to improve economic, financial, legal and cultural integration throughout the participating countries. Based on our results, foreign direct investment could be the key pillar and most direct variable determining the success of *BRI* on the economic domain. Thus, China as the host of the *BRI* may need to closely interact with the participating countries and increase investment in the countries' comparative advantage sectors to boost integrated economic growth. Future research is recommended to include a more comprehensive study by adding a variable such as debt distress, or testing the countries on a regional basis that have not been tested in this research. A sufficiently longer time frame and resources are also crucial in order to undertake the study on a larger scale.

REFERENCES

Affairs, M. O. (2015). *Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road.* Beijing.

Ahmad, A, Ahmad, N., & Ali, S. (2013). Exchange rate and economic growth in Pakistan (1975-2011). *Journal of Basic and Applied Scientific Research, 3*(8): 740-746.

Akimzhano, T., Amandykova, S., Tleukhan, R., Daurembekov, Y., & Aykumbekov, N. (2018). Problems of applying and realization of preventive measures in the form of detention concerning persons, suspected and accused in the commission of the act of terrorism and crimes of extremist nature. *Opción*, *34*(85-2), 800-823.

Akinbobola, T. O., & Oyetayo, O. J. (2010). Econometric analysis of real exchange rate and domestic output growth in Nigeria. *International Journal of Academic Research*, *2*(5).

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2010). Does foreign direct investment promote growth? Exploring the role of financial markets on linkages. *Journal of Development Economics*, *91*(2), 242-256.

Ali, S. (2014). Inflation, Income Inequality and Economic Growth in Pakistan: A Cointegration Analysis. *International Journal of Economic Practices and Theories, 4*(1).

Almfraji, M. A., Almsafir, M. K., & Yao, L. (2014). Economic growth and foreign direct investment inflows: The case of Qatar. *Procedia-Social and Behavioral Sciences*, *109*, 1040-1045.

Aschauer, A. (2000). Do states optimize? Public capital and economic growth. *The Annuals of Regional Science*, *34*(3), 343-363.

Azman-Saini, W. N. W., Baharumshah, A. Z., & Law, S. H. (2010). Foreign direct investment, economic freedom and economic growth: International evidence. *Economic Modelling*, *27*(5), 1079-1089.

Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of political economy*, *98*(5), S103-S125.

Bekhet, H. A., & Al-Smadi, R. W. (2015). Determinants of Jordanian foreign direct Investment inflows: Bounds testing approach. *Economic Modelling*, *46*, 27-35.

Belloumi, M. (2014). The relationship between trade, *FDI* and economic growth in Tunisia: An application of the autoregressive distributed lag model. *Economic Systems*, *38*(2), 269-287.

Bhusal, T. P., & Silpakar, S. (2012). Growth and inflation: Estimation of threshold point for Nepal. *Economic Journal of Development, 13*, 131-138.

Brun, J. F., Combes, J. L., & Renard, M. F. (2002). Are there spillover effects between coastal and noncoastal regions in China?. *China Economic Review*, *13*(2), 161-169.

Chen, Q., & Xu, X. (2022). Stabilizing economic growth: Growth target and government expenditure since World War II. *China Economic Quarterly International*, *2*(2), 98–110.

Choi, Y. J., & Baek, J. (2017). Does *FDI* really matter to economic growth in India? *Economies*, *5*(2).

Cruz-Rodríguez, A. (2022). *Exchange arrangements and economic growth. What relationship is there? Exchange Arrangements and Economic Growth. What relationship is there?*

Demurger, S. (2001). Infrastructure development and economic growth: an explanation for regional disparities in China?. *Journal of Comparative economics*, *29*(1), 95-117.

Dritsaki, C., & Stiakakis, E. (2014). Foreign direct investments, exports, and economic growth in Croatia: A time series analysis. *Procedia Economics and Finance*, *14*, 181-190.

Edwards, S. (1998). Openness, productivity and growth: what do we really know?. *The economic journal*, *108*(447), 383-398.

Eichengreen, B. (2008). Exchange rate regimes and capital mobility: how much of the Swoboda thesis survives? *National Bureau of Economic Research*. No. w14100.

Faisal, F., Muhamad, P. M., & Tursoy, T. (2016). Impact of Economic Growth, Foreign Direct Investment and Financial Development on Stock Prices in China: Empirical Evidence from Time Series Analysis. *International Journal of Economics and Financial, 6*(4), 1998-2006.

Fapetu, O., & Oloyede, J. A. (2014). Foreign exchange management and the Nigerian economic growth (1960-2012). *European Journal of Business and Innovation Research*, *2*(2), 19-31.

Ghosh, A., & Gulde, A. y Wolf, H. (2003). "Exchange rate regime: choices and consequences". MIT Press.

Hasnul, A. G. (2015). The effects of government expenditure on economic growth: the case of Malaysia.

Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *The Journal of Development Studies*, *40*(1), 142-163.

Herzer, D. (2013). Cross-country heterogeneity and the trade-income relationship. *World Development*, *44*, 194-211.

Holmes, J. M., & Hutton, P. A. (1990). On the casual relationship between government expenditures and national income. *The Review of Economics and Statistics*, 87-95.

Ibrahim AL-SULAIM, M. (2022). Theories and concepts in the study of trade and economic relations between countries. *Journal of Science and Innovative Technologies*, *22*, 48–63.

Inchamnan, W. (2018). Therapeutic strategy in gamification and game-based learning for elderly people in Thailand. *Humanities & Social Sciences Reviews*, *6*(1), 44-52.

Ingavale, D. (2013). An impact of advertisements on purchase decision of youth with reference to consumer goods. *Advances in management*, *3*(1),18-22.

Iqbal, N., & Nawaz, S. (2009). Investment, inflation and economic growth nexus. *The Pakistan Development Review*, 863-874.

Jin, Y., Tang, Y. M., Chau, K. Y., & Abbas, M. (2022). How government expenditure Mitigates emissions: A step towards sustainable green economy in belt and road initiatives project. *Journal of Environmental Management*, *303*.

Kushwah, S. v, Siddiqui, A. A. B., & Singh. (2022). Dynamics of financial development, innovation, trade, and economic growth: evidence from developed and developing nations. In *International Journal of Accounting & Business Finance*. *8*(1).

Le Goff, M., & Singh, R. J. (2014). Does trade reduce poverty? A view from Africa. *Journal of African Trade*, *1*(1), 5-14.

Lee, J. C., Won, Y. J., & Jei, S. Y. (2019). Study of the relationship between government expenditures and economic growth for China and Korea. *Sustainability (Switzerland)*, *11*(22).

Levy-Yeyati, E., & Sturzenegger, F. (2005). Classifying exchange rate regimes: Deeds vs. words. *European Economic Review*, *49*(6), 1603-1635.

Li, J. (2014). Report: Silk Road Economic Belt May Be Divided into Three Phases. *Initial Completion Predicted in*, *2049*.

Lin, J. Y., & Zhang, F. (2015). Sustaining growth of the People's Republic of China. *Asian Development Review, 32*(1), 31–48.

Lupu, D., Petrisor, M. B., Bercu, A., & Tofan, M. (2018). The impact of public expenditures on economic growth: A case study of Central and Eastern European countries. *Emerging markets finance and trade*, *54*(3), 552-570.

Madurapperuma, M. W. (2016). Impact of inflation on economic growth in Sri Lanka. *Journal of World Economic Research*, *5*(1), 1-7.

Maginga, T. J., Nordey, T., & Ally, M. (2018). Extension System for Improving the Management of Vegetable Cropping Systems. *Journal of Information Systems Engineering & Management, 3*(4), 29.

Mahmoud, L. O. M. (2015). Consumer price index and economic growth: A case study of Mauritania1990-2013. *Asian Journal of Empirical Research*, *5*(2), 16-23.

Majumder, S. C. (2016). Inflation and its impacts on economic growth of Bangladesh. *American Journal of Marketing Research*, *2*(1), 17-26.

Mallik, G., & Chowdhury, A. (2001). Inflation and economic growth: evidence from four South Asian countries. *Asia-Pacific Development Journal*, *8*(1), 123-135.

Miles, W. (2006). To float or not to float? Currency regimes and growth. *Journal of Economic Development. 31*(2), 91-105.

Mubarik, Y. A., & Riazuddin, R. (2005). *Inflation and growth: An estimate of the threshold level of inflation in Pakistan*. State Bank of Pakistan.

Muyambiri, B., & Chabaefe, N. N. (2018). The finance–growth nexus in Botswana: A multivariate causal linkage. *Dutch Journal of Finance and Management*, *2*(2), 03.

Nazir, S., Saeed, S., & Muhammad, A. (2017). Threshold modeling for inflation and *GDP* growth. *MPRA* Paper.

Nene, S. T., Ilesanmi, K. D., & Sekome, M. (2022). The Effect of Inflation Targeting (IT) Policy on the Inflation Uncertainty and Economic Growth in Selected African and European Countries. *Economies*, *10*(2).

Newfarmer, R., & Sztajerowska, M. (2012). Trade and employment in a fast-changing world. *Policy Priorities for International Trade and Jobs*, 7-73.

Nurudeen, A., & Usman, A. (2010). Government expenditure and economic growth in Nigeria, 1970-2008: A disaggregated analysis. *Business and Economics Journal*, *4*(1), 1-11.

Nwani, A. T., & Omankhanlen, A. E. (2019, December). Insurance receivables and economic growth: the case of Nigeria. In *Journal of physics: conference series* (Vol. 1378, No. 4, p. 042093). IOP Publishing.

Nyasha, S., & Odhiambo, N. M. (2019). The Impact of Public Expenditure on Economic Growth: A Review of International Literature. *Folia Oeconomica Stetinensia*, *19*(2), 81–101.

Olopade, B. C., & Olapade, D. O. (2010). The impact growth and development in developing Countries: Nigeria as a case study. *Journal of Accounting*, *2*(1), 12-25.

Olusola, B. E., Chimezie, M. E., Shuuya, S. M., & Addeh, G. Y. A. (2022). The Impact of Inflation Rate on Private Consumption Expenditure and Economic Growth—Evidence from Ghana. *Open Journal of Business and Management*, *10*(04), 1601–1646.

Pesaran, M. H. (2021). General diagnostic tests for cross-sectional dependence in panels. *Empirical Economics*, *60*(1), 13-50.

Qi, M., Xu, J., Amuji, N. B., Wang, S., Xu, F., & Zhou, H. (2022). The Nexus among Energy Consumption, Economic Growth and Trade Openness: Evidence from West Africa. *Sustainability (Switzerland)*, *14*(6), 3630.

Rao, B., Haq, A., & Abdul, G. (2019). Exchange rate regimes and its impact on growth: An empirical analysis of *BRI*CS countries. *Theoretical and Applied Economics*, *XXVI*, *2*, 157–172.

Raza, S. A., Shah, N., & Arif, I. (2021). Relationship Between *FDI* and Economic Growth in the Presence of Good Governance System: Evidence from OECD Countries. *Global Business Review*, *22*(6), 1471–1489.

Razmi, M. J., & Refaei, R. (2013). The effect of trade openness and economic freedom on economic growth: The case of Middle East and East Asian countries. *International Journal of Economics and Financial Issues, 3*(2), 376.

Shen, L. (2016). Comment/Insights & Opinion. Retrieved from South China Morning Post (2016, December 13th): http://www.scmp.com/comment/insight-opinion/article/2054143/xi-jinpings-one-belt-one-road-strategy-showing-way-new-world

Sinha, M., & Sengupta, P. P. (2022). *FDI* Inflow, ICT Expansion and Economic Growth: An Empirical Study on Asia-Pacific Developing Countries. *Global Business Review*, *23*(3), 804–821.

LBIBf 20(2), pp. 120-134.

Stephen, A. G. (2017). Econometric analysis of exchange rate and export performance in a developing economy. *Asian Economic and Financial Review*, *7*(4), 334.

Thapa, N. B. (2002). An econometric analysis of the impact of real effective exchange rate on economic activities in Nepal. *Economic Review: Occasional Paper*, *14*, 17-36.

Tian, W., Yu, M., & Zhang, F. (2016). The exceptional performance of Chinese outward direct investment firms. China Economic Journal, 9(2), 209–219.

Trejos, S., & Barboza, G. (2015). Dynamic estimation of the relationship between trade openness and output growth in Asia. *Journal of Asian Economics*, *36*, 110-125.

Tyers, R., Golley, J., Yongxiang, B., & Bain, I. (2008). China's economic growth and its real exchange rate. *China Economic Journal*, *1*(2), 123-145.

Ulaşan, B. (2015). Trade openness and economic growth: panel evidence. *Applied Economics Letters*, *22*(2), 163-167.

Vedder, R., & Gallaway, L. (1998). *Government Size and Economic Growth*. Washington, D.C.: Ohio University.

Wang, C., Lim, M. K., Zhang, X., Zhao, L., & Lee, P. T. W. (2020). Railway and road infrastructure in the Belt and Road Initiative countries: Estimating the impact of transport infrastructure on economic growth. *Transportation Research Part A: Policy and Practice*, *134*, 288-307.

Weinland, D. (2017). China warned of risk to banks from One Belt, One Road initiative. *Financial Times, 26*.

World Bank. (n.d.). *Belt and Road Initiative*. Retrieved September 26, 2022, from https://www.worldbank.org/en/topic/regional-integration/*BRI*ef/belt-and-road-initiative

Xue, R., Liu, H. Z., Baron, C., Miao, X. Y., & Jafri, M. A. H. (2022). Insight of the Chinese enterprises' investment performance along 'one belt one road'. *Journal of the Asia Pacific Economy*, 1-42.

Zeren, F., & Ari, A. (2013). Trade openness and economic growth: a panel causality Test. *International journal of business and social science*, *4*(9).

Zou, L., Shen, J. H., Zhang, J., & Lee, C. C. (2022). What is the rationale behind China's infrastructure investment under the Belt and Road Initiative. *Journal of Economic Surveys*, *36*(3), 605–633.