

Article

Exploration of the Impact of China's Outward Foreign Direct Investment (FDI) on Economic Growth in Asia and North Africa along the Belt and Road (B&R) Initiative

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Abstract: This empirical study has examined the impact of Chinese investments, namely infrastructure, energy, services, other investment sectors, and trade openness on the economies of the 25 Asian and North African countries along with the Belt and Road (B&R) Initiative for a period of 2007 to 2016 using the Johansen Fisher Panel Cointegration Test, Panel Dynamic Ordinary Least Squares (PDOLS) model, and the Toda and Yamamoto technique for testing causality. The findings revealed cointegration among the variables and that the impact of Chinese investments on economic growth in the host countries is positive, but it has a weaker effect, to a certain extent, in all sectors of the host countries while trade openness positively impacts the countries. Furthermore, there is evidence of a unidirectional causality between some FDI (foreign direct investment) economies while the investment in services and other sectors does not cause economic growth in the host countries. Based on the results, the paper proposes that the host countries increase the FDI in the sector of infrastructure, energy, and technology to enhance their economies.

Keywords: outflow FDI; Belt and Road Initiative (BRI), DOLS; Toda and Yamamoto; economic growth; Asia and South Africa countries



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1. Introduction

Foreign direct investment (FDI) is a cross-border investment by an occupant element in one economy to get an enduring interest in an enterprise's inhabitation in another economy [1]. FDI is recognized as an essential instrument for the development of worldwide capital streams. It is, additionally, one of the most applicable parts of the ongoing rush of globalization [2]. At present, attracting FDI is the top agenda for the emerging and developing economies. A striking element of the new globalization measure is the role played by multinational enterprises (MNEs) in creating work, development, profitability gains, and innovation moves, just as opening the door to superior reconciliation in global value chains [3]. Several researches have discovered that sustainable economic development improves the impact of FDI's contingent on the host-nation environment [4]. FDI supports development using innovation dissemination if the host economy flaunts adequate absorptive limit [5]. FDI is a significant determinant of development and can have a positive impact when the domestic homegrown financial system is progressive, and FDI should be more gainful to developed economies [6].

The practice of FDI is quite old. Neither all the nations worldwide have been open to it, nor have they invited the conceivable outcomes of cooperation outside the world. China is one of those countries where foreign companies were only allowed to invest in it after the successful Chinese government opening policy in 1979. China had a considerable surplus in the capital and started outward foreign investment since 2000 [7]. China is trying to make better returns on its accumulated foreign reserves by its ambitious Belt

and Road Initiative (BRI) strategy, proclaimed in 2013. This development is considered to redesign policy to interface China worldwide near Central Asia, South East Asia, South Asia, East Africa, and East-Central Europe [8]. With the Belt and Road Initiative, China envisions goading territorial collaboration by utilizing China's economic and financial force capacity for approximately almost 1 trillion USD for normal investments and trade. It not only interlinks China's economy with South East and Central Asia but also links with the Middle East, Africa, and Europe. Starting now, China is the world's most astonishing economy, subject to amount of national yield, and the World Bank's purchasing power fairness considers in like manner the, when in doubt, most noteworthy energy creator, exporter, and customer. By 2020, China will change into the second of the world's most noticeable abroad theorist as well. Its offshore resources may altogether increment from USD 6.4 trillion to almost USD 20 trillion [9]. As per MOFCOM (2008), Chinese non-financial FDI in Belt and Road Initiative nations amounted to \$15.6 billion; it is generally 8.9% more from the previous year. Additionally, expanded FDI outpourings may be the eventual outcome of the Chinese government attempting to separate its foreign trade hold [10,11].

China is an arising and developing net outward FDI streams nation. China's 16,000 multinational endeavors (MNEs) had set up roughly 22,000 foreign collaborators in 179 nations and districts [12]. China's abroad record is ending up being reasonably historic all around the globe. At some spots in the degree of 2004 and 2013, China's foreign investment broadened 13.7 events from \$45 billion to \$613 billion. For example, two Chinese state-guaranteed banks, China Development Bank and Cost Import Bank of China, begun dispatching their activities in 2010 and attributed more money dependably to other non-mechanical nations than the World Bank. In 2014, China started the BRICS Development Bank, Asia Infrastructure Investment Bank (AIIB), and the Silk Road Fund, addressing making a Chinese impact in the development account [12,13]. The Figure 1 reports Chinese investment in different sectors of the economy as follows:

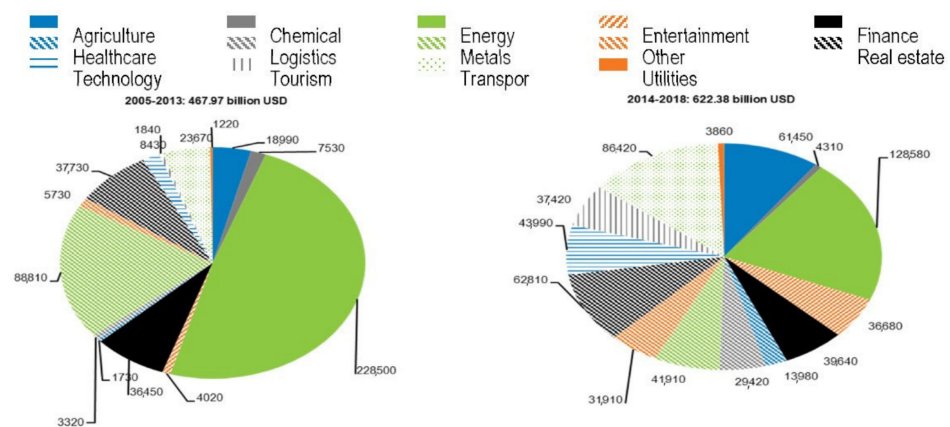


Figure 1. Reports Chinese investment stated in USD million for 2005–2013 versus 2014–2018 by area in the worldwide economy and total national sum. Note: 2018 information is to end of June. Source: China Worldwide Investment Tracker Information base, which covers all investments of USD 100 million or higher. American Enterprise Establishment (AEI). Service of Business, Republic of China (MOFCOM) information sums are around 10% higher for a similar period because of little investments' nook. Stat Link 2 <http://dx.doi.org/10.1787/888933786439>.

Chinese outward foreign direct investment has transformed after China's changing economic necessities of late. Foreign organization investments have been separated into the standard of mechanical regions. Before 2014, half of the 468 billion USD was in the energy area, and 88.8 billion USD was in metals (around 68% of the aggregate). Land and cash were the third and fourth most fundamental investment regions in the last nine years. From 2015 to 2018, the proportion of investment is more basic than the first year's

assessment of investment over the most recent nine years, and its piece has moved away from the energy, metals, and records to impressively more upgraded course of action of modern areas, for instance, agribusiness (seeds, agro-synthetic substances, and handling); advancement (essentially mechanical technology, clinical, distributed computing, imaging, and media interchanges); transport (fundamentally flight, transportation, and rail); the travel industry; land and the “other” characterization, for instance, customer products, and materials [13,14].

In general, this study examines sectoral analysis of the impact of Chinese outward foreign direct investment on the economic development of 25 Asian and North African countries alongside the Belt and Road (B&R) Initiative. This research study will also understand which sectors have a causal relationship to economic growth and determine this relationship’s direction after examining the causality links between the six variables (see Table 1). These causality connections are useful for leaders in host nations to decide the most possible investment areas for economic development. This present study’s outcomes are of extraordinary importance on the grounds that numerous scientists question the utility of China’s investment objectives added to the Belt and Road Initiative (BRI). It additionally expresses that there is no certain impact of Chinese investment on economic development, especially in agricultural countries. The Belt and Road Initiative (BRI) is consistently investigated as a ‘debt snare’ for the agricultural countries. It is completely declared that the BRI is prepared towards China’s overpowered domineering system [13].

Table 1. List of variables used in the analysis (see Appendix A: Table A1 for variable definition).

Variables	Proxy	Variable Code	Data Source
Economic Growth Investment in	Real Gross Domestic Product Per Capita	GDPPC	WDI
Infrastructure	Real China’s Outward Investment in Real Estate and Transportation	INRET	AEI (HF.)
Investment in Energy	Real China’s Outward Investment in Energy	INE	AEI (HF.)
Investment in services	Real China’s Outward Investment in (Health, Education, Tourism, Logistics, Entertainment, Utilities)	INS	AEI (HF.)
Investment in Others	Real China’s Outward Investment in (Agriculture, Metals, Technology, Chemicals)	INO	AEI (HF.)
Trade openness	Export + Import/GDP	OP	UNCTAD

Note: Import plus export data for these countries and GDP in dollars are obtained to study trade openness (Export + Import/GDP) as an independent variable. Dataset will be available on a reasonable request from the Corresponding Author. (Source: Authors’ Calculation).

The Application of IDP Theory for Chinese Economy

Investment Development Path (IDP) theory is a widely accepted model in the analysis of OFDI (outward foreign direct investment) which was introduced by Dunning in 1981 [14–19]. IDP theory claims that when there is consistent increase in economic development measured by GDP Per Capita (GDPPC), then there is also significant change in the inward and outward investment of a country. This is reflected in the country’s Net Outward Investment Position (NOIP), which is hypothesized to evolve from being highly negative in the early stages of development to becoming positive and eventually fluctuating around zero once the country is fully developed and industrialized. The IDP model gives special attention to the government role in FDI [19]. The IDP differs for countries mainly according to the pattern and efficacy of government interventions, and the theory should take account of this [19].

The IDP concept is applicable to the analysis of Chinese OFDI. Prior studies claim that IFDI (inward foreign direct investment) is an instrument of OFDI and government efforts must be accredited in the increase of both types of FDI, inward and outward, while investigating outward foreign direct investment (OFDI) of a country [14,15,20]. The IDP model asserts that economic development of the country influences both types of FDI, inward and outward, and its growth rate over time. Consequently, this growth rate is

influenced subsequently by government policy and its management. Thus, Government is a key stakeholder within the IDP model. China is the second largest economy of the world after USA and the second highest FDI recipient in the world. Using foreign investment to improve its worldwide efficacy is a key target of China's reform and 'open-door' policy [21–24]. China implemented its 'open-door' policy and economic reforms in 1978. China has attracted FDI globally and China has become one of the world's largest FDI destinations and attracted FDI worldwide since it has started its 'open-door' policy and institutional reforms. In the last two decades, there has been a dramatic increase in FDI outflows in China following the 1999 implementation of national policy encouraging Domestic Investment (DI) to 'go out' [21–24]. Chinese government has played an important role in influencing FDI flows, inbound and outbound, in several countries, and the influence of Chinese government is strongly embedded in the IDP theoretical models. Chinese government's role in the micro and macro level management of the economy at the firm or industry level, as well as provincial and national level, has also been an important influence on FDI flows (both the inflows and outflows). Particularly, Chinese government regulations on foreign investment projects, sectoral restrictions, phasing down of foreign ownership over time, and limitations on the duration of foreign investment licenses and government enterprise ownership have had a major impact on FDI flows.

Existing research studies such as [25,26] investigated the relationship between Outward domestic investment (ODI) and economic growth for China at macro-economic level. On the contrary, few studies, such as [27] analyzed relationship between OFDI and economic growth for China at firm-level data. Thus, prior research literature examined the relationship between outward foreign direct investment and economic growth for China by using firm or provincial or industrial-level or macro-economic-level data. However, little research has been devoted to investigate the impact of Chinese ODI on economic growth at sectoral level for Belt and Road Initiative countries. There is recent study by [28] which investigates the institutional effects of China's OFDI on the Belt and Road (B & R) countries and this study also tries to distinguish institutional effects among countries with different natural resource endowments. There is another study by [29] which aims to explore the nexus between these variables for developing countries along the "One Belt and One Road" but these studies ignored the analysis based on different economic sectors. To the best of our knowledge, this is the first empirical analysis to investigate China's OFDI by sectors of Belt and Road Initiative (BRI) countries covered by this study. China's OFDI is covering different sectors of Belt and Road Initiative (BRI) countries. However, we will analyze three main sectors such as infrastructure sector, the energy sector and services sector; and as a result of limited investment in other sectors, we were unable to analyze all sectors individually, so it has grouped into a fourth sector, which we will refer to as the other investment sector. However, the objectives of this paper were designed as follows:

1. To examine whether China's outflow of direct investment in the services sector and other investment sectors are impacting the economic growth of Belt and Road Initiative (BRI) countries;
2. To investigate if China's outflow of direct investment in the infrastructure and energy sectors is impacting the economic growth of Belt and Road Initiative (BRI) countries;
3. To explore whether trade openness is impacting the economic growth of Belt and Road Initiative (BRI) countries; and
4. To test for the direction of causality between the different combinations of the factors under the investigation.

The rest of the paper is facilitated as follows: Section 2 consists of literature review. Section 3 is the methodology part of the paper. Section 4 is the experimental discoveries and empirical results of the paper. Section 5 consists of the conclusion of the paper.

2. Literature Review

There is a solid causal association among FDI and GDP for 31 non-industrial countries for time span ranges from 1970 to 2000. FDI has a positive development influence

when the nation has fundamentally prepared a workforce that awards it to mishandle FDI floods [29,30]. FDI has positive and tremendous ramifications for the genuine per capita GDP for a panel of 140 nations [30]. FDI has a positive and gigantic effect on economic development for nations with large salaries [4]. There is proof of positive and huge effects of FDI (% GDP) on economic development for the US [31]. The connection between financial development and economic development, as far as a GDP for South Asian countries, is explored by [32] from 1980 to 2013 annually and concluded that FDI and domestic investment contributed to South Asian nations [32]. There is no confirmation of an association between FDI and economic development while examining the West African Financial Zone and showing the uneven relationship, according to which FDI is maneuvered into nations with the higher GDP per capita [33]. Since quite a while ago, run causal association among FDI and economic development for India was inspected by [34] and contemplated that India's public developmental policy should zero in on the profitable use of FDI and domestic investment. It, in like manner, underscored the viability of development benefits towards the economic development of a nation [34]. What is more, the authors of [35] looked to build up an econometric connection between large-scale-level framework investment and total productivity [35]. The hypothetical model characterized by [36] fortified the instinct of supporting Aschauer's empirical work in which infrastructures such as roads, as well as railways, lowered transport costs and enabled increasing returns [36].

Aschauer's findings are also supported by [37,38]. Combined econometric models of endogenous growth with examinations of diffusion of development, endeavored to show the impact of FDI on the economic development of several economies [39,40]. In these models, advancement accepts a principal work in economic development. The components adding to the flexibility of capital and improvement have been, unquestionably, the reason behind low-income countries creating at a higher rate [39,40] while the multinational corporations render foreign direct investment by giving resources, for instance, mechanical aptitudes, pioneering capacities, and the panel experience which are suitably learned through different getting ready projects. The FDI incorporates economies at the hour of creation in the globalized world economy through various variables, for instance, development, capital, and permission to foreign business sectors and managerial abilities [41]. State-owned enterprises constitute a significant amount of outward foreign direct investment, whereas government plays an influential role in directing these investments [7,42]. Chinese multinational enterprises possess comparative advantages in terms of easy access to capital below market rates and have experience of operating in a place with similar institutions and government control [7,43]. China's institutional environment's particularity provides these investors with a firm-specific advantage that is better at handling risks associated with operating in countries characterized by weak governance and political and economic uncertainty.

Neighboring countries with ethnic and cultural close ties are among preferable destinations [43,44]. All things considered, China's OFDI is decidedly perceived to empower normal assets, yet not altogether associated with licenses as a middle individual of a fundamental asset [7]. Normal assets are essentially emphatically associated with China's OFDI. China's OFDI needs to place assets into the host nation's fuel assets. In like manner, OFDI from China has usually been viewed as characteristic resource pursuing [45–47].

During the most recent decade, energy activities and stakes joined and addressed two-fifths of China's 630 billion USD of abroad investments altogether. China has started late and expanded its investments in foreign RES encounters, showing up at USD 32 billion out of 2016. Beginning now and into the foreseeable future, it keeps an eye on a 60% development which showed up, diversely comparable to that of 2015. It has become the world's most recognizable theorist in RES, both at its domestic and foreign energy markets, to reduce emanations. Rather than the USA, China has expanded its indigenous gas creation and expanded its imports through pipelines and liquefied natural gas (LNG) from foreign providers. In November 2017, it was, furthermore, the world's most unquestionable theorist in nuclear power projects (OECD/IEA). As a fragment of its past 'raveling to

another country' methodology, and Belt and Road Initiative (BRI) to restore the outdated Silk Road, Chinese oil organizations have dependably related abroad and expanded their abroad worth creation to around 3 mb/d in 2016. Moreover, they have, in like manner, expanded their investments in oil and gas infrastructures, and their supply included high-risk nations, for example, Sudan. Its raw petroleum imports grew up to 7.6 mb/d in 2016. More than 1 mb/d are proficient pipelines from Kazakhstan, Myanmar, and Russia in 2017 [48]. China may have become the world's most noteworthy oil-getting nation in 2017 and thusly, beating the USA, which relies definitely upon its rapidly expanding indigenous shale and tight oil creation. Notwithstanding rising oil imports from Russia, China will remain subject to oil imports from the Middle East for half of its oil imports and, other than that, on Sea Lines of Communication (SLOCs), and the obstructed Strait of Malacca [49].

Our result findings show that exchange rate volatility affects both international trade and FDI significantly but negatively in BRI -related countries. Our result estimations are in line with the economic theory which claim that exchange rate volatility can badly affect international trade and FDI inflows in the developing and emerging/BRI-related countries [50].

Our result estimations show that China's OFDI is approximately 40% higher in OBOR countries relative to those of non-OBOR countries. Though, after controlling for the heterogeneity across OBOR and non-OBOR countries, the significance of increasing effect occurring due to OBOR initiative vanishes after controlling heterogeneity effects across OBOR and non-OBOR countries when we apply matching approach. Furthermore, our result estimations show that OBOR initiative expands the market-seeking motivation and decreases the resource-seeking motivation of China's OFDI. Our result findings support the boosting effect of the OBOR initiative of the long tradition of cultural and economic as well as institutional convergence with the OBOR countries, rather than a temporary policy shock [51].

The main contribution of the paper discusses the key plans of the China– Eurasian Economic Union (EAEU) partnership which is presented by [48] and also suggests substitute cooperation strategies for China. The authors develop the most attractive plan for the EAEU and propose the best strategy for its implementation. The efficiency of conjugation is hard to assess directly, but on the basis of the given data, the authors expect that at this stage of economic development of the EAEU countries and the institutional development of the BRI, the conjugation process will be an effective and beneficial decision for both sides [48].

3. Methodology

3.1. Data and Its Sources

Variables used in this paper include Economic Growth as Real Gross Domestic Product Per Capita (GDPPC) as an outcome variable. In contrast, the explanatory variables include investment in infrastructure as Real China's Outward Investment in Real Estate Transportation (INRET), Investment in Energy as Real China's Outward Investment in Energy (INE), Investment in Services as Real China's Outward Investment in (Health, Education, Tourism, Logistics, Entertainment, Utilities) (INS), Investment in Others as Real China's Outward Investment in (Agriculture, Metals, Technology, Chemicals) (INO), and Trade openness as (Export + Import)/GDP (OP) where GDPPC was sourced from World Bank Development Indicators (WDI). INRET, INE, INS, and INO were sourced from American Enterprise Establishment (AEI). Operation was sourced from United Nations Meeting on Exchange and Development (UNCTAD). Regardless, Chinese's OFDI was restricted before 2005, and FDI officially transformed into a touch of China's public economic development plan after 2005. The Chinese government began to suitably support Chinese OFDI after 2005 to explore abroad business areas, increment Chinese undertakings' competitiveness, and stay away from foreign duty obstructions [52]. Hence, based on data availability, the range of data used in this paper is from 2007 to 2016. Nonetheless, the list of variables used theoretical justification and reported sources in Table 1.

3.2. Estimation Techniques

The choice of an appropriate model for the exploratory examination in panel data significantly influences the outcome. A right model produces practical and steady outcomes, while an off-base model prompts a confused end. For instance, up until now, a large portion of the cross-country centers around economics forming wrongly recognized that errors are wholeheartedly dispersed across data. While, as a general rule, factors in cross-country are considered contingent upon each other, particularly as time goes on. Thusly, to drop some unacceptable doubt of independent batches in cross-country panel data and get unsurprising results, this paper will utilize the Panel Dynamic Ordinary Least Squares (PDOLS). PDOLS is totally parametric and offers a computationally accommodating choice as opposed to the Panel Feasible Adjusted Ordinary Least Squares (PFOLS) estimator proposed by [53] and [54]. Properties of Dynamic Ordinary Least Squares (DOLS) have been analyzed by [55] when there are fixed impacts in the cointegrating model. We take this to be the beginning stage for our examination. PDOLS, generally, performs well under the short-run dynamic plans that we consider and can accomplish a striking improvement in appraisal precision over that of single-condition DOLS with even an unassuming number of cross-sectional units. This paper will apply PDOLS to evaluate since a long time back ran interest for panel data of 25 nations in Asia and North Africa.

3.2.1. Panel Unit Root Tests

Panel unit root tests have become mainstream among specialists in economics in managing the stochastic properties across the panel data structures. Notwithstanding, different panel unit root tests have been established by different researchers. Such tests incorporate [56–59]. Moreover, Refs. [60,61] recommend whether economic data are non-stationary or stationary, and it is helpful to perform tests of the invalid hypothesis of non-stationary just as the elective hypothesis of a stationary. Consequently, the most normally utilized by scientists are the panel unit root tests form of [56,57] i.e., the Fisher-ADF and Fisher-PP panel unit root tests, and this exploration utilized them as well. When all is said and done [56,57] panel unit root tests depend on the accompanying relapse:

$$\Delta Y_t = \alpha + \lambda t + \beta Y_{t-1} + \delta \Delta Y_{t-1} + \dots + \beta_{t-k} \Delta Y_{t-k} + \varepsilon_t \quad (1)$$

3.2.2. Panel Co-Integration Test

Keeping the standard basic practice in panel cointegration examinations, we think about a multivariate, since quite a while ago, we ran relationship of the accompanying form:

$$GDPPC_{it} = \beta_0 + \beta_1 INRET_{it} + \beta_2 INE_{it} + \beta_3 INS_{it} + \beta_4 INO_{it} + \beta_5 OP_{it} + \mu_{it} \quad (2)$$

where β_0 is constant parameter, $GDPPG_{it}$ is the real GDP Per Capita of i th country in year t , $INRET_{it}$ is Chinese OFDI in infrastructure sector of i th country in year t , INE_{it} is Chinese OFDI in the energy sector of i th country in year t , INS_{it} is Chinese OFDI in the services sector of i th country in year t , INO_{it} is Chinese OFDI in other investments sector, OP_{it} is the trade openness variable of i th country in year t . $\beta_1, \beta_2, \beta_3, \beta_4$, and β_5 are parameters for independent variables underestimation and μ_{it} stochastic error term.

The cointegration test statistics used are based on the test of [62,63] which avoids the usage of unit-root tests on the residuals and slackens up the assumption of an incredible cointegrating vector. Johansen test and estimation strategy—maximum likelihood—makes it conceivable to estimate all cointegrating vectors when there are multiple variables. Along these lines, the following model permits the test for more multiple cointegrating vectors. Permit LR to demonstrate the cross-area unequivocal likelihood-ratio (trace) statistics of the hypothesis at most r cointegrating vectors in the system. The normalized LR -bar statistics are represented beneath:

$$\Psi_{LR} = \frac{\sqrt{N} [LR - \mu]}{\sqrt{v}} \quad (3)$$

where for each cross-sectional unit, the average of the trace statistics is denoted by LR and the mean and the change of the asymptotic trace statistics are spoken by μ and ν , respectively.

3.2.3. Panel Dynamic Ordinary Least Squares (PDOLS) Model

To evaluate the relationship between FDI by sectors of infrastructure energy, services, others, and trade openness as independent variables, and economic growth as a dependent variable, the paper has employed the Panel Dynamic OLS (DOLS) approach, where the parameter β be estimated utilizing the between-measurement, bunch mean the PDOLS estimator, recommended by [64]. However, PDOLS regression is presented as follows:

$$OFDI_{it} = a_i + \beta_i DI_{it} + \sum_{j=-p_i}^{p_i} \Phi_{ij} \Delta DI_{it-j} + \varepsilon_{it} \quad (4)$$

where β is the conventional time series, Φ_{ij} is the lead and lag contrasts coefficient which accounts for conceivable sequential correlation and endogeneity of the regressors in this manner yielding impartial evaluations. The gathering mean panel Dynamic Ordinary Least Square estimator for the coefficient β is:

$$\hat{\beta} = N^{-1} \sum_{i=1}^N \hat{\beta}_i \quad (5)$$

The associated t -statistics are calculated as:

$$t_{\hat{\beta}} = N^{-1/2} \sum_{i=1}^N t_{\hat{\beta}_i} \quad (6)$$

3.2.4. Testing for Causality

If a cointegration relationship exists among the variables, then Granger causality exists in any event's one direction. The subsequent stage of the paper is trying for the Granger-causal test among the variables. In any case, however, the Johansen Fisher Panel Cointegration Test inspects the presence or nonappearance of, since quite a while ago, run connections among variables; it does not demonstrate the direction of causality. Henceforth, the paper utilized the Toda–Yamamoto (T–Y) test for causality, which includes the basic method for testing Granger causality in level Vector Auto-Regressives (VARs). The T–Y test has superiority over other techniques for testing Granger causality as it tends to be utilized, independent of whether the variables are incorporated into a different order or cointegrated [65]. T–Y is the most steady methodology when contrasted with VAR and Vector Error Correction Model (VECM).

When we have a small size sample, the Y–T approach is less distorted than other causality approaches, and it is preferable [65]. Moreover, this test is essential because the direction of causality between OFDI and GDPPC is not sure. While some economic scholars accept that economic growth (GDPPC) causes OFDI, others believe that FDI causes economic growth. Following [66–68], the T–Y Granger causality test is represented by the following causality VAR system in Equations (7) and (8):

$$Y_{it} = \alpha_{it} + \sum_{i=1}^{k+d} \beta_{it} Y_{t-i} + \sum_{j=1}^{k+d} \gamma_{jt} X_{t-j} + \varepsilon_{yt} \quad (7)$$

$$X_{it} = \alpha_{it} + \sum_{i=1}^{k+d} \theta_{it} X_{t-i} + \sum_{j=1}^{k+d} \delta_{jt} Y_{t-j} + \varepsilon_{xt} \quad (8)$$

where θ_{it} and δ_{jt} are the parameters; α_{it} is the constant; β_{it} , γ_{jt} are the coefficients; d is the most extreme order of integration in the system; k is the genuine lag length, and ε_{yt} and ε_{xt} are the stochastic error terms.

4. Empirical Findings

This section presents the empirical discoveries of the paper. These comprise descriptive statistics result, correlation matrix result, unit root tests result, cointegration test result, panel DOLS estimate, and Toda–Yamamoto (T–Y) estimate. Table 2 reports the result of the descriptive statistics of the variables. Descriptive statistics comprises of techniques used to sum up and depict the factual qualities of the dataset. It shows the midpoint estimates, standard deviation, skewness, and kurtosis of the chosen variables.

Table 2. Descriptive statistics of variables.

	GDPPC	INRET	INS	INO	INE	OP
Mean	12,521.79	2,960,000	85,502,008	1,740,000	5,540,000	99.14
Median	4776.788	0.000000	0.000000	0.000000	0.000000	82.4
Maximum	69,679.09	6,510,000	23,800,000	5,540,000	8,580,000	395.67
Minimum	74.67575	0.000000	0.000000	0.000000	0.000000	24.69
Std. Dev.	17,202.09	6,770,000	2,820,000	501,000	113,000	69.75
Observations	249	249	249	249	249	249

Source: Prepared by author.

Table 3 presents the correlation matrix between GDPPC, INRET, INS, INO, INE, and OP. All the correlations are low and this suggests that there is no high correlation among the variables, which indicated that GDPPC has a positive correlation with all independent variables. Furthermore, the result also confirms no multicollinearity among the independent variables since the co-efficient for all the independent variables is less than 0.90. Table 4 shows the delayed consequence of panel unit root tests—Fisher-ADF and Fisher-PP unit root tests, both at a level and first contrast. As shown in Table 4, all the tests reject the invalid hypothesis of unit root at level, which proposes none of the variables is non-stationary at level. Nonetheless, in the wake of taking the standard capability, all the unit root tests result to insist that the variables are stationary at order one, i.e., $I(1)$. Therefore, all the variables have an essentially indistinguishable mentioning of integration, and accordingly, the Johansen Fisher Panel Cointegration Test should be used in testing whether there is a, since a long time back, run relationship among the variables of interest.

However, the analysis will estimate the number of lag to be used through the use of lag order selection criteria, namely LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion. Table 5 presents the lag order determination models of the investigation. From the table, it very well may be seen that the ideal number of lag to be utilized in the investigation is three lags as proposed by all the rules.

Table 3. Variables correlation matrix.

	GDPPC	INRET	INS	INO	INE	OP
GDPPC	1					
INRET	0.093217216	1				
INS	0.170914902	0.134265259	1			
INO	0.037802295	0.050972362	0.182173257	1		
INE	0.073981387	0.076335744	−0.0761768	0.03125011	1	
OP	0.047473173	0.018380473	0.227854483	0.000643958	−0.033597308	1

Source: Prepared by author.

Table 4. Results of unit root tests.

Variable	Fisher-ADF				Fisher-PP			
	At Level		At First Difference		At Level		At First Difference	
	Cons	Cons with Trend	Cons	Cons with Trend	Cons	Cons with Trend	Cons	Cons with Trend
GDPPC	0.8887 (38.204)	0.0000 (126.811)	0.0000 *** (153.712)	0.0000 *** (157.794)	0.8222 (40.7285)	0.1158 (62.1758)	0.0000 *** (100.496)	0.0000 *** (100.706)
INRET	0.0369 (59.7585)	0.4432 (42.6453)	0.0000 *** (100.523)	0.0000 *** (2.4706)	0.0000 (196.572)	0.0000 (195.361)	0.0000 *** (329.057)	0.0000 *** (286.586)
INE	0.3863 (50.1994)	0.4432 (42.6453)	0.0001 *** (3.6613)	0.0005 *** (86.8971)	0.0000 (142.894)	0.0000 (184.881)	0.0000 *** (312.384)	0.0000 *** (282.980)
INS	0.0158 (41.2111)	0.5996 (44.9250)	0.0000 *** (65.0684)	0.0001 *** (58.7131)	0.0023 (48.2548)	0.0003 (54.7314)	0.0000 *** (120.106)	0.0000 *** (124.493)
INO	0.0667 (54.1700)	0.0590 (35.6764)	0.0048 ** (66.9129)	0.1132 *** (51.0456)	0.0000 (108.719)	0.0000 (93.8641)	0.0000 *** (191.605)	0.0000 *** (223.672)
OP	0.0260 (71.1991)	0.0054 (79.0899)	0.0000 *** (119.787)	0.0000 *** (108.824)	0.1783 (59.0552)	0.0097 (76.3290)	0.0000 *** (176.564)	0.0000 *** (183.341)

Note: The numbers in the () are t statistic. *** denotes: 10%; 5% and 1% levels of significance respectively. (Source: Prepared by authors).

Table 5. Estimated VAR lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	155.8923	NA	0.000000607	-11.10313	-10.81517	-11.0175
1	318.1380	240.3640	0.000000567	-20.45467	-18.43892	-19.85528
2	372.7259	56.60971	0.00000224	-21.83155	-18.08802	-20.7184
3	488.9384	68.86667 *	0.000000272	-27.77322 *	-22.30191 *	-26.14631 *

* indicates lag order selected by the criterion (Source: Authors' calculations).

Table 6 shows the cointegration test consequence of the Johansen Fisher Panel Cointegration Test, which tests the invalid hypothesis that there is no cointegration among the variables against alternative hypothesis of cointegration. From Table 6, the outcome dismisses the invalid hypothesis of no cointegration and affirms that there is a, since quite a while ago, run relationship among the variables under the investigation.

Table 6. Johansen Fisher Panel Cointegration Test.

Hypothesized	Fisher Stat. *	Fisher Stat. *	Fisher Stat. *	Fisher Stat. *
No. of CE (s)	(From Trace Test)	Prob.	(From the Max-Eigen Test)	Prob.
None *	0.333667	195.2940	107.3466	0.0000
At most 1 *	0.274971	124.6559	79.34145	0.0000
At most 2 *	0.232723	68.70741	55.24578	0.0021
At most 3	0.090465	22.61360	35.01090	0.5343
At most 4	0.032303	6.114668	18.39771	0.8598
At most 5	0.002303	0.401130	3.841466	0.5265

Trace test shows 3 cointegrating equation (s) at the 1% level of significance. * denotes: 10%; 5% and 1% levels of significance respectively. P-values are MacKinnon-Haug-Michelis (1999). (Source: Authors' calculations).

Having tried for cointegration and discovered the presence of such, the following stage of the investigation is to gauge the since quite a while ago run connection among GDPPC and outward FDI by applying the Panel Completely Adjusted Ordinary Least Squares (PFMOLS) and Panel Dynamic Ordinary Least Squares (PDOLS) procedures. Be that as it may, since the PDOLS can control the issue of endogeneity in the gauge, the after effects of the PDOLS is to be utilized in estimating the effect of China's Outward FDI on Economic Development in Asia and North Africa along Belt and Road (B&R) over the long haul and the consequence of such is reported in Table 7. From the table, the

PDOLS assessment shows a measurably huge constructive outcome of China's Outward FDI on Economic Development in Asia and North Africa along Belt and Road (B&R) over the long haul at 1% level for all the variables. Notwithstanding, the positive connection among GDPPC and outward FDI for all sectors notice that the coefficients of all sectors of Chinese OFDI are powerless. Overall, INE-to-GDPPC ratio by 1 rate point builds GDPPC by 0.165%, INS-to-GDPPC ratio by 1 rate point expands GDPPC by 0.207%, INS-to-GDPPC ratio by 1 rate point builds GDPPC by 0.207%, INO-to-GDPPC ratio by 1 rate point builds GDPPC by 0.615%, and Operation-to-GDPPC ratio by 1 rate point builds GDPPC by 0.123%. Consequently, it can see the frail estimation of the coefficient because of the low power of Chinese investments in different examination test nations.

Table 7. Panel Feasible Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS).

Variables	FMOLS			DOLS		
	Coef.	T	$p > t $	Coef.	z	$p > z $
INRET	0.164	0.94	0.347	0.129 ***	1530.05	0.0000
INE	0.101	1.64	0.102	0.165 ***	1520.4	0.0000
INS	0.615	0.03	0.976	0.207 ***	834.62	0.0000
INO	0.125	1.28	0.201	0.615 ***	1499.23	0.0000
OP	2.788765	0.25	0.8.02	0.123 ***	1514.78	0.0000
Cons	10,196.03	5.86	0.0000	0.113 ***	1391.63	0.0000
R-squared		0.0410			0.1605518	
F(5, 243)		1.43				
Prob > F		0.2124				
No of obs.		249			242	

Note: *** denotes 10%; 5% and 1% levels of significance respectively (Source: Authors' calculations).

To look at the direction of causality between the variables, the paper embraced the T-Y approach which contains three phases [68]. The principal stage utilized the unit root testing methodology to decide the greatest order of integration (dmax) in which results show that the most extreme order of integration is one, for example, $dmax = I(1)$ as affirmed in Table 4. The subsequent stage decides the ideal lag length (k) in which the paper has utilized VAR in levels among the variables. Table 5 shows that the choice measure demonstrates that the ideal lag length to be utilized is three lags. Accordingly, the paper has chosen three lags for the VAR model, for example, $k = 3$. Be that as it may, there is a scope of formal indicative tests, including autocorrelation, heteroscedasticity, and normality tests, where the model finishes all these demonstrative assessments. Moreover, the investigation has checked for the steadiness of the assessed model before applying the causality test. Table 8 reports the strength test to guarantee the model's dependability through the trademark polynomial test's roots. From Table 8, all the module values are short of one; therefore, there is no root outside the unit circle. Consequently, the model is dynamically steady.

Table 8. Roots of characteristic polynomial test.

Root	Modulus
0.921823 – 0.128101i	0.930681
0.921823 + 0.128101i	0.930681
0.817741	0.817741
0.571338	0.571338
0.094881 – 0.339223i	0.352242
0.094881 + 0.339223i	0.352242

Note: No root lies outside the unit circle. VAR satisfies the stability condition. Source: Authors' calculations.

The third phase of the T–Y form of the causality test utilizes the adjusted Wald test to check the VAR ($k + d_{max}$) model's causality direction. Here, the ideal lag length is equivalent to $(3 + 1 = 4)$ lags, for example $(k + d_{max})$. Following the above information, the system of conditions (7) and (8) are mutually assessed as SURE (Apparently Random Relapse Conditions) model. SURE relapse makes the calculation of changed Wald test measurement too straightforward [69–71]. After, the examination has assessed VAR model with ideal lag length as equivalent to 4. The changed Wald test has been performed, and results are reported of the three as causality draws near. Since this examination expects to explore the direction of causality between the variables, condition (7) and condition (8) should be together assessed to decide the direction of causality between the variables for the proposed viable work. The Null Hypothesis (H_0) infers that independent variable cannot cause the dependent variable, while the Alternative Hypothesis (H_1) suggests that the independent variable causes the dependent variable.

The result in Table 9 shows rejection of the null hypothesis for D(INS) and D(INO), respectively, since the p -value is significant for D(INS) and D(INO). Conversely, it cannot reject the null hypothesis for D(INE), D(INRE), and D(OP) since the p -value is insignificant for D(INE), D(INRE), and D(OP). Additionally, we reject the null hypothesis for all variables taken together jointly since the p -value is significant. Hence, it concludes that all of the independent variables jointly cause GDPPC. In addition, the FDI in energy, infrastructure sectors, and trade openness cause GDPPC, while these independent variables D(INS) and D(INO) do not cause GDPPC in the host countries. Therefore, it can say that there is a unidirectional causality running from independent variable to the dependent variable. For example, Chinese foreign investment in the energy sector influences economic development, while the expansion in development does not influence foreign investments in the energy sector or other sectors in the host nations.

Table 9. Granger causality/block exogeneity Wald.

Dependent Variable: D(GDPPC)				Dependent Variable: D(INE.)				Dependent Variable: D(INS.)			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
D(INE)	2.697855	2	0.2595	D(GDPPC)	1.629761	2	0.4427	D(GDPPC)	0.092237	2	0.9549
D(INS)	0.476690	2	0.7879	D(INS)	10.45156	2	0.0054 ***	D(INE)	1.268442	2	0.5303
D(INO)	1.464179	2	0.4809	D(INO)	19.09041	2	0.0001 ***	D(INO)	2.519827	2	0.2837
D(INRET)	0.123061	2	0.9403	D(INRET)	2.731225	2	0.2552	D(INRET)	3.736464	2	0.1544
D(OP)	1.047690	2	0.5922	D(OP)	0.081894	2	0.9599	D(OP)	0.017137	2	0.9915
All	6.684454	10	0.7549	All	36.68561	10	0.0001 ***	All	8.119419	10	0.6172
Dependent variable: D(INO)				Dependent variable: D(INRET)				Dependent variable: D(OP)			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
D(GDPPC)	1.721848	2	0.4228	D(GDPPC)	4.150290	2	0.1255	D(GDPPC)	0.948302	2	0.6224
D(INE)	4.132639	2	0.1267	D(INE)	3.182368	2	0.2037	D(INE)	0.215316	2	0.8979
D(INS)	13.96956	2	0.0009 ***	D(INS)	2.092280	2	0.3513	D(INS)	0.853015	2	0.6528
D(INRET)	1.354715	2	0.5080	D(INO)	0.327861	2	0.8488	D(INO)	0.378679	2	0.8275
D(OP)	4.157306	2	0.1251	D(OP)	2.473090	2	0.2904	D(INRET)	0.273921	2	0.8720
All	22.98236	10	0.0108 ***	All	13.12764	10	0.2166	All	2.819756	10	0.9854

Note: *** denotes 10%; 5% and 1% levels of significance respectively (Source: Authors' calculations).

5. Conclusions and Recommendation

This examination analyzed the effect of Chinese investments in the infrastructure, energy, administrations, and investment in other sectors on economic development for a panel of the 25 Asian and North African nations along the Belt and Road (B&R) Initiative for a time of 2007 to 2016 utilizing the Johansen Fisher Panel Cointegration Test, Panel Dynamic Ordinary Least Squares (PDOLS) model, and the Toda and Yamamoto method for testing causality. The discoveries uncovered cointegration among the variables and that the effect of Chinese investments on economic development in the host nations is positive, however, it has a more fragile impact, partly in all sectors of the host nations, while exchange receptiveness positively affects the nations. Consequently, this examination is

not one-sided to the principal hypothesis, which expresses that FDI contributes impartially or decidedly to economic development, or the subsequent hypothesis which says that FDI contributes adversely to economic development. Moreover, our outcome discoveries show a unidirectional causality connection among OFDI and economic development as in causality as running from OFDI to economic development, which empowers us to infer that FDI causes development and not otherwise. Furthermore, our outcomes show that there is, for some time, run causality existing between economic development and FDI in the energy and infrastructure sectors. Exchange transparency additionally causes economic development, while the investment in administrations and other sectors does not cause development in the host nations. However, it has been found that the Chinese investments have increased noticeably in the host countries after the announcement of the Chinese initiative of Belt and Road in 2013. Therefore, based on the results, the paper proposes that the host countries increase FDI in the sector of infrastructure (transportation and real estate), energy, and technology to enhance their economic growth.

The B&R Initiative will promote and stimulate the new wave of globalization [72]. China launched the B&R projects in 2013, and its ODI into B&R countries has escalated progressively, from \$13.7 billion in 2014 to \$15.3 billion in 2016 [73]. China's ODI is not only a foundation pillar in the B&R Initiative, but also China's ODI is an important pillar that allows B&R countries to enter global industrial value chain and promote regional economic cooperation as well as facilitate sustainable development in these countries [39,40]. The B&R countries are the key focus of global investors and stakeholders due to vast geographical coverage and size of the economy because of rising Chinese ODI in this group of countries. Thus, the B&R countries have opened important new context in the world economy which is a key point of attraction for international investors to launch subsidiaries and sub-offices of multinational companies (MNCs) in the growing and conducive corporate sector environment of these Belt and Road Initiative countries.

There are few limitations in our study and we can bridge up these shortcomings that can drive future research. Firstly, our research study has a limitation of the time span involved in the analysis. Based on data availability, the range of data used in this paper is from 2007 to 2016 and thus, the time period in our analysis is limited. Future analysis is needed to reexamine and further validate our result findings by accessing the latest dataset until the later year of 2020. Conditionally, on the availability of the latest dataset on B&R countries, we should extend this line of research using a longer time frame to further examine the effects of Chinese ODI on the economic growth of B&R countries. Secondly, the causal relationship between Chinese ODI and economic growth operates both ways. We should further testify the causality relationship on both sides between Chinese OFDI and economics along Belt and Road Initiative economies. The present model of Chinese OFDI effects on economic growth of B&R countries can further be expanded for future research and supported by the gravity model for future research or further addition of core variables such as formal or informal institutional quality, financial development or exchange rate volatility.

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Appendix A

Table A1. Variable definitions and data sources.

Variables	Significance of the Variables in the Model	Source
Real Gross Domestic Product Per Capita (GDPPC)	GDP per capita (GDPPC) represents the synthetic economic development level of a country. It is widely used proxy for Economic Growth in nearly all empirical studies of FDI [74,75] (Barrell and Nahhas, 2018; Head and Mayer 2014)	WDI
Investment in Infrastructure (INRET)	The B&R initiative covers a number of regions of economic integration and worldwide governance [32]; it is particularly an infrastructure-led economic integration and planned for integrating China's trading partners by developing their infrastructure such as roads, railways, ports and airports [76]	AEI (HF.)
Investment in Energy (INE)	China's reliance on natural resources has changed a lot. Natural resources are slowly and gradually losing their significance in China's ODI. Latest research studies suggest that oil and metals are two key contributing factors of China's ODI during 2003–2009 [77]	AEI (HF.)
Investment in Services (INS)	The percentage of ODI in financial services, leasing, and business services is rapidly increasing over time [78]. Advanced technology, finance, agribusiness and health care sectors have become more preferred and focused areas of investment [79].	AEI (HF.)
Investment in Others (INO)	Natural resources contribute to the institutional development in a complex way. Some scholars argue that natural resources are among the key drivers of China's ODI [80,81]	AEI (HF.)
Trade openness (OP)	Trade openness is directly linked to FDI inflows. Open countries are more subject to external shocks, therefore they need a better institution for stabilizing their economy. Increase in FDI inflows also stabilize the financial institution which resultantly increase trade flows and economic development [82].	UNCTAD

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